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**Important Note**

You need to use the RE specification macros provided by the “RE\_SpecificationMacroTemplate.dotm” (refer to “Utilities” on [page “Specification Templates” in the RE Wiki](http://wiki.ford.com/display/RequirementsEngineering/Specification+templates)) to allow seamless VSEM import of the specification content. **Use only these RE specification macros to create requirements** in this specification. Refer to “[How to use the Specification Templates](http://wiki.ford.com/display/RequirementsEngineering/How+to+use+the+Specification+Templates?src=contextnavpagetreemode)” on how to enable and use the macros and the requirements templates in this specification.

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# Introduction

## Document Purpose

The Feature Implementation Specification (FIS) specifies the deployment of the logical functions of a feature to an electrical architecture. The FIS specifies all interactions between the ECUs of the electrical architecture required for the feature including the technical signals and the interfaces. It also gives interface and integration requirements, which are specific to the feature for the electrical architecture.

To get more information about the concept of feature, function and component level abstraction refer to the [Ford RE Wiki](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Engineering+for+SW+Enabled+Features).

## Document Scope

***#Hint:*** *The FIS can be used to document multiple deployment variants (refer to chapters “Deployment Variants” and “E/E Architecture Variants”). It is however recommended (except for small features) to have a separate FIS for each variant, because managing multiple variants in the same document easily gets complex and cumbersome.*

***#Functional Safety:*** *For Functional Safety specify only one deployment variant per FIS.*

This FIS describes the deployment of the feature Fog Lighta to the following electrical architecture(s):

| **Electrical Architecture Name** | **Owner** | **Reference** |
| --- | --- | --- |
| FIS\_CORE\_H2\_V2.4\_28062019   * Exterior Lighting H2 Architecture |  |  |
| FIS\_CORE\_L1-L2\_V1   * L1-L2 Exterior Lighting Architecture |  |  |
| FIS Exterior Lighting (Core, Variant H1T)   * H1T Exterior Lighting Architecture |  |  |
|  |  |  |

Table 1‑1: Electrical Architecture(s) referenced in this document

## Document Audience

The FIS is written by the feature owner Eric Vieira (EVIEIRA1). All Stakeholders, i.e., all people who have a valid interest in the feature implementation should read and, if possible, review the FIS. It needs to be guaranteed, that all stakeholders have access to the currently valid version of the FIS.

### Stakeholder List

For the latest list of the function stakeholders and their roles & responsibilities refer to [F001010/C VSEM Folder](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=jItFpjdbx3NrTDAAAAAAAAAAAAA&servername=Production_Server).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **CDSID** | **Contact Info** | **Role** | **Stakeholder Group** |
| Eric Aleksander Vieira | EVIEIRA1 | [evieira1@ford.com](mailto:evieira1@ford.com) | Core Feature Owner | Systems Engineering |
| Nicolás Gagliardi | NGAGLIA2 | [ngaglia2@ford.com](mailto:ngaglia2@ford.com) | Model Architect | Model Based System Engineering |
| Lucas Santos | LSANT318 | [lsant318@ford.com](mailto:lsant318@ford.com) | Core Feature Owner | Systems Engineering |
| Jeff Mesko | JMESKO | [jmesko@ford.com](mailto:jmesko@ford.com) | Core Lighting Feature/Function Engineer | Core Lighting |
| Herta Lusho | HLLUSHO | [hllusho@ford.com](mailto:hllusho@ford.com) | Core Lighting | Core Lighting |
| Anthony Strzelczyk | ASTRZELC | [astrzelc@ford.com](mailto:astrzelc@ford.com) | Core Lighting | Core Lighting |
| Gochhait, Bhuban Kumar (B.) | BGOCHHAI | [bgochhai@ford.com](mailto:bgochhai@ford.com) | BCM Owner | Body SW Controls |

## Document Organization

### Document Context

Refer to the [Specification Structure page](http://wiki.ford.com/display/RequirementsEngineering/Specification+templates) in the [Ford RE Wiki](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Engineering+for+SW+Enabled+Features) to understand how the FIS relates to other Ford Requirements Documents and Specifications.

### Document Structure

The structure of this document is explained below:

**Section 1** – Introduction – Giving an explanation how to use this document including responsibilities and the scope of the document. Additionally it contains the revision history and a list of unsettled but known issues that have to be consolidated in future versions. It explains the terminology and gives a clarification of the definitions, concepts and abbreviations used in the document.

**Section 2** – Feature Implementation Description – Giving an overview of the platform and listing assumptions, constraints or dependencies

**Section 3** – Feature Implementation Architecture – Describing 3 Architecture Views:

* Functional Architecture – Showing the logical architecture of functions
* Physical Architecture – Showing the physical architecture (first of all the E/E Architecture), which the Logical Functions get allocated to.
* Software Architecture – Showing the software architecture relevant for the feature (for features with in-house development only)
* Function Deployment – Presenting the allocation of logical functions and signals to the electrical and other components

**Section 4** – Deployment Specific Modeling –Modeling techniques providing additional detail on e.g. interface behavior

**Section 5** – Deployment Specific Requirements – Deployment specific requirements for ECUs, Network Communication, and Process

**Section 6** – List of Open Concerns

**Section 7** – Revision History

**Section 8** – Appendix - Presenting additional data mainly in a tabular form, e.g., a data dictionary

## Document Conventions

### Requirements Templates

Refer to “[How to use the Specification Templates](http://wiki.ford.com/display/RequirementsEngineering/How+to+use+the+Specification+Templates?src=contextnavpagetreemode)” on how to use the specification templates and the VBA macros to create/edit the requirements in the specifications.

The VBA macro enable the import of the specification to VSEM (refer to ["How to import specifications into VSEM as separate requirements"](http://wiki.ford.com/pages/viewpage.action?pageId=104991616&src=contextnavpagetreemode)).

#### Identification of requirements

The unique requirement ID given in the headline of any requirement follows the requirement throughout the development process. The requirement ID format follows a well-defined syntax.

All identifiers in an FIS shall be composed of 4 parts:

* A leading prefix, which indicates the type of requirement (R=Requirement, UC=Use Case, SC=Scenario, …)
* A prefix, which indicates the abstraction level (F=Feature, FNC=Function, CMP = component).
* Followed by a name, indicating the scope, which the requirement belongs to (e.g. feature or function name )
* Ending with the actual requirement number

*Example:*

*R\_CMP\_LockArbitrator\_00004* This is the fourth requirement on component level for the function Lock Arbitrator.

#### Requirements Attributes

Additionally attributes can be added to each requirement. This helps to classify requirements. A [list of available attributes](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes?src=contextnavpagetreemode) is given in the RE Wiki.

## References

### Ford Documents

The list of all Ford internal documents, which are directly related.

| **Reference** | **Title** | **Doc. ID** | **Revision** | **Document Location** |
| --- | --- | --- | --- | --- |
|  | Fog Lamps FD | F001010 | B |  |
|  | Fog Lamps FS |  |  |  |
|  |  |  |  |  |
|  | Subsystem Specific Diagnostic Specification (Part 2) | DS-NU5T-14B476-AAA001 | Version 4 | <https://azureford.sharepoint.com/sites/EEBCM/_layouts/15/osssearchresults.aspx?u=https%3A%2F%2Fazureford%2Esharepoint%2Ecom%2Fsites%2FEEBCM&k=ds%2Dnu5t> |
|  | Functional Specification Body Control Module | FS-NU5T-14B476-AAB002 |  |  |
| FEDE | Electromagnetic Compatibility Specification | FMC1278 |  |  |
| FEDE | Lifetime specification - global engineering standard (GES) | REQ 18-001 |  |  |
| FEDE | E/E system environmental (NON-EMC) | RQT-002600-009611 |  |  |
| FEDE | High speed & medium speed controller area network protocols | RQT-000600-009571 |  |  |
| FEDE | LDM Efficiency Binning Strategy | EX170100A0015 |  |  |
| FEDE | Ford Electronics Manufacturing Requirements |  |  |  |
| FEDE | Design Verification & Product Validation Process | FAP03-149 |  |  |

Table 1‑2: Ford internal Documents

### External Documents and Publications

The list of external documents could include books, reports and online sources.

***#Hint:*** *You may refer to* [*IEEE Citation Reference*](http://www.ieee.org/documents/ieeecitationref.pdf) *on how to format a reference.*

| **Reference** | **Document / Publication** |
| --- | --- |
| [bbb] |  |
|  |  |

Table 1‑3: External documents and publications

## Glossary

### Definitions

| **Definition** | | **Description** |
| --- | --- | --- |
| Master Lighting Control Switch **or** Master Headlamp Switch **or** Headlamp Switch | | This is the multi-position rotary switch on the panel inside the vehicle. Usually located on the left side of the steering column. |
| Hi/Lo Beam Headlamp Stalk Switch | | This is the turn signal stalk which incorporates the Hi/Lo Headlamp switch. Push forward to activate high beams, Pull back to turn the high beams off. Low beam does not have to be active to turn on the high beams. |
| Snow Plow electrical attachment | | typically the snowplow or trailer come with their own dedicated ECUs  if not, it has to be configured by the dealership. The BCM has to be configured or a CAN message has to be sent to enable the feature (dealer installation) |
| Trailer electrical attachment | typically the snowplow or trailer come with their own dedicated ECUs  if not, it has to be configured by the dealership. The BCM has to be configured or a CAN message has to be sent to enable the feature (dealer installation) | |

Table 1‑4: Definitions used in this document

### Abbreviations

| **Abbr.** | **Stands for** | **Description** |
| --- | --- | --- |
| E/E | Electrical and Electronics |  |
| FSR | Function Safety Requirements | ISO 26262 Related Requirements |
| FS | Functional Specification | The document describing, collecting and developing the requirements of a function or a group of functions. |
| FD | Feature Document | F001010 Front Lamp document specifies **what** the feature shall do and how it shall behave from customer perspective. |
| FSM | Functional State Machine | Used to reference a state machine flow chart |
| BCM | Body Contorl Module |  |
| LDM | LED Driver Module |  |
| ECU | Electronic Control Module |  |
| HCM | Headlamp Control Module. |  |
| LIN | Local Interconnect Network | (Local Interconnect Network) is a serial communication system |
| CAN | Controller Area Network |  |
| IPC | Instrument Panel Cluster | IPC |
| MLS/LSM | Master Light Switch/Light Switch Module | MLS/LSM |
| APIM | Auxiliary Protocol Interface Module | Accessory Protocol Interface Module (SYNC) SYNC processor |
| SED | State Encoded Decimal | State Encoded Decimal - 0 = Off 1 = On |

Table 1‑5: Abbreviations used in this document.

# Feature Implementation Overview

## Description

**#Hint:** Give a short overview on what E/E systems / platforms the feature is implemented and what special considerations have to be taken into account for E/E systems / platforms.

## Input Requirements/Documents

**#Hint:** *The table below helps the feature owner to collect relevant input* (requirements, documents, mails, models, …) *while writing the spec. When finalizing the spec, the feature owner should check, if all inputs have been properly considered by derived/outgoing requirements* in chapter “Feature Implementation Requirements” *or the architectural elements.*

*Note:* It is not required to list each input requirement individually in this table, referencing the input document is enough (if relevant document section is indicated).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reference**  (Reference as listed in ch. “References”) | **Section/Requirement** | **Description** | **Derived Requirement**  (optional – reference to requirement in ch. “Feature Implementation Requirements”) | |
| **Feature/Function Requirements** | | | | |
| Front Fog Lamps FD | Section 5 Feature Requirements | Requirements of Front and Rear Fog Light |  | |
| Front Fog Lamps FS | Section 2.5 Function Requirements | Requirements of Front and Rear Fog Light |  | |
| **Ford Engineering Standards** | | | | |
| FEDE | Lifetime specification - global engineering standard (GES) | REQ 18-001 |  | |
| **Legal Regulations** | | | | |
| USA | **FMVSS 101** | CONTROLS AND DISPLAYS | |  |
| USA/Canada | **SAE J583** | FRONT FOG LAMP | |  |
| USA/Canada | **SAE J578** | CHROMATICITY REQUIREMENTS FOR GROUND VEHICLE LAMPS AND LIGHTING EQUIPMENT | |  |
| Canada | **CMVSS 101** | CONTROLS AND DISPLAYS | |  |
| ECE | **R19** | POWER-DRIVEN VEHICLE FRONT FOG LAMPS | |  |
| ECE | **R37** | UNIFORM PROVISIONS CONCERNING THE APPROVAL OF: FILAMENT LIGHT SOURCES FOR USE IN APPROVED LAMP UNITS OF POWER-DRIVEN VEHICLES AND OF THEIR TRAILERS | |  |
| ECE | **R38** | REAR FOG LAMPS FOR POWER-DRIVEN VEHICLES AND THEIR TRAILERS | |  |
| ECE | **R48** | VEHICLES WITH REGARD TO THE INSTALLATION OF LIGHTING AND LIGHT-SIGNALLING DEVICES | |  |
| ECE | **R112** | MOTOR VEHICLE HEADLAMPS EMITTING AN ASYMMETRICAL PASSING-BEAM OR A DRIVING-BEAM OR BOTH AND EQUIPPED WITH FILAMENT LAMPS AND/OR LIGHT-EMITTING DIODE (LED) MODULES | |  |
| ECE | **R121** | VEHICLES WITH REGARD TO THE LOCATION AND IDENTIFICATION OF HAND CONTROLS, TELL-TALES AND INDICATORS | |  |
| ECE | **R148** | UNIFORM PROVISIONS CONCERNING THE APPROVAL OF LIGHT-SIGNALLING DEVICES (LAMPS) FOR POWER DRIVEN VEHICLES AND THEIR TRAILERS | |  |
| CCC | **GB 11554-2008** | PHOTOMETRIC CHARACTERISTICS OF REAR FOG LAMP FOR POWER-DRIVEN VEHICLES AND THEIR TRAILERS | |  |
| CCC | **GB 15766.1-2008** | LAMPS FOR ROAD VEHICLES – DIMENSIONAL, ELECTRICAL AND LUMINOUS REQUIREMENTS | |  |
| CCC | **GB 4660-2007** | PHOTOMETRIC CHARACTERISTICS OF POWER-DRIVEN VEHICLE FRONT FOG LAMPS | |  |
| CCC | **GB 4785-2007** | PRESCRIPTION FOR INSTALLATION OF THE EXTERNAL LIGHTING AND LIGHT SIGNALLING DEVICES FOR MOTOR VEHICLES AND THEIR TRAILERS | |  |
| Brazil | **RESOLUTION NO. 227** | ESTABLISHING THE REQUIREMENTS RELATING TO VEHICLE LIGHTING AND SIGNALLING DEVICES | |  |
| Brazil | **CONTRAN RESOLUTION 667** | ESTABLISHING THE CHARACTERISTICS AND TECHNICAL SPECIFICATIONS OF THE SIGNALLING AND LIGHTING SYSTEMS AND THEIR DEVICES APPLICABLE TO CARS, VANS, UTILITY VEHICLES, TRUCKS, LORRIES, TRACTOR UNITS, BUSES, MINIBUSES, TRAILERS AND SEMITRAILERS, NEWLY-MANUFACTURED, NATIONAL OR IMPORTED, AND PROVIDING FOR OTHER MEASURES | |  |
| Brazil | **CONTRAN RESOLUTION 758** | ESTABLISHES REQUIREMENTS FOR LOCATIONS AND ILLUMINATION OF CONTROLS, INDICATORS AND TELL-TALES FOR MOTOR AND ELECTRIC VEHICLES. | |  |
| Argentina | **DECREE NO.779 ANNEX 1** | LIGHTING AND SIGNALLING SYSTEMS FOR MOTOR VEHICLES | |  |
| **Industry Standards** | | | | |
| Global | **ISO 26262** | The system should be developed according to Ford's implementation of Functional Safety. | |  |
|  |  |  |  | |
| **Other Sources** | | | | |
|  | <Example: some stakeholder document> |  |  | |
|  |  |  |  | |

Table 2‑1: Input Requirements/Documents

## Lessons Learned

**Special note**: The Fog Feature may be configured with delays and debounce between turning on and turning off. Also, POSITION/PARKING->Front Parking Lamps are ON when Position is ON along with tail, License plate, and side markers. If the Headlamps are ON, the POSITION/PARKING lamps are ON by default.

…………………………………….

NOTE: The electrical translation of the physical switch positions are as follows:

**OFF** = all lamps are OFF

**POSITION/PARK** = ONLY Parking

**HEADLAMP** = Parking & Low Beams

**AUTOLAMP** = Automatic control of Parking & Low Beams

If the high beams are on at the time the master headlamp switch turns off, the high beams also turn OFF.

…………………………………..

DRL and FOG:

DRL and Fog cannot be on at the same time. True for all markets. See DRL\_Conditions\_Cfg below:

**DRL\_Conditions\_Cfg**

Description: Conditions for DRL Activation

U.S.A. and Canada(OPTION\_A)

1. ignition is in the run position

2. transmission is not in park (if automatic transmission)

3. parking brake is not engaged (if manual transmission)

4. headlights are not on at full intensity (position lights may be on or off)

Number 4 is only accounting for pre-auto lamp designs we've had DRL for many years before we added Auto lamps and that was how it worked when manual low beam was the only way to turn on/off the low beams now that auto is applied 100%, we put DRL into the Auto daytime mode so it's not wrong so much as it is old and outdated.

## Assumptions

**#Classification**: Optional

**#Hint:** A list of assumptions concerning the effects/dependencies of the feature’s deployment as well as (e.g. known limitations). During the course of the feature development most of those assumptions are typically either converted into actual requirements or discarded at some point – such that this chapter ideally remains mostly empty.

# Feature Implementation Architecture

## Functional Architecture

**#Hint**: This section depicts the Functional Architecture, i.e., the decomposition into Logical Functions. This architectural step is needed to find the right functional partitioning for the function level.

### Description

**#Hint**: Provide some informal description of the characteristics of the chosen Functional Architecture. Also give some graphical representation of the Functional Architecture. Either SysML activity diagrams or [Data Flow Diagrams](http://wiki.ford.com/display/RequirementsEngineering/Data+Flow+Diagram?src=contextnavpagetreemode) could be used to depict such a Functional Architecture.

**#Link:** [*SysML - Activity Diagrams*](https://pd3.spt.ford.com/sites/SystemsEngineering/SEC/sysml-teamsite/SysML%20Wiki/Activity%20Diagram%20Basics.aspx) or [*RE Wiki - Data Flow Diagrams*](http://wiki.ford.com/display/RequirementsEngineering/Data+Flow+Diagram?src=contextnavpagetreemodehttp://wiki.ford.com/display/RequirementsEngineering/Data+Flow+Diagram?src=contextnavpagetreemode)



Figure 3‑1: Functional Architecture

### Function List

The following functions from the [Global Feature & Function List](https://www.vsemweb.ford.com:443/tc/launchapp?-attach=true&-s=226TCSession&-o=ZmZNi0JHx3NrTDAAAAAAAAAAAAA) are referenced in this Feature Implementation Specification:

|  |  |  |
| --- | --- | --- |
| **Function ID** | **Function Name** | **Function Description** |
| F1 | Provide Driver Input | Driver selects Fog Feature via MLS |
| F2 | Provide Conditional Factors | Factors influencing whether or not the Driver desired feature is allowed to become active |
| F3 | Arbatrate Fog Light Requests | Conditional factors are determining the action desired. |
| F4 | Actuate Front Fog Lamps | Front Fog Lamps are activated |
| F5 | Actuate Rear Fog Lamps | Rear Fog Lamps are activated |
| F6 | IPC telltale display | Display Fog Lamp Status to Driver |
| F7 | Ambient Light Conditions | Directly affects autolamp |

Table 3‑1: List of Functions

### Signal List

*#Hint: Refer to the Data Dictionary - Logical Signals.*

[Hot Link to Appendix:](#_Data_Dictionary)

## Physical Architecture

### E/E Architecture

#### E/E Architecture Variants

**#Classification:** Mandatory – State “No Variants defined”, if not used.

**#Hint:** If different variants of the E/E architecture are specified in this section, list those variants in the table below.

Variants can be expressed based on Variant Options. Typical Variant Options (think of them as Logical Parameters) driven by architecture are e.g. “Network Topology” (e.g. FNV2 or AV) or “Powertrain Type” (e.g. “Electrical Vehicle” vs. “conventional powertrain”. “Conventional Powertrain” might be further split into “ECM+TCM” vs. “PCM”). The optional column “Variant condition” allows to express the dependency of a Variant based on Variant Options/Logical Parameters.

If requirements or certain architectural elements (signals, interfaces, components) are not applicable for all variants, those requirements/elements should state explicitly, which E/E architecture variant they apply to.

**#Link:** [RE Wiki – Variant Management](http://wiki.ford.com/display/RequirementsEngineering/Variant+Management).

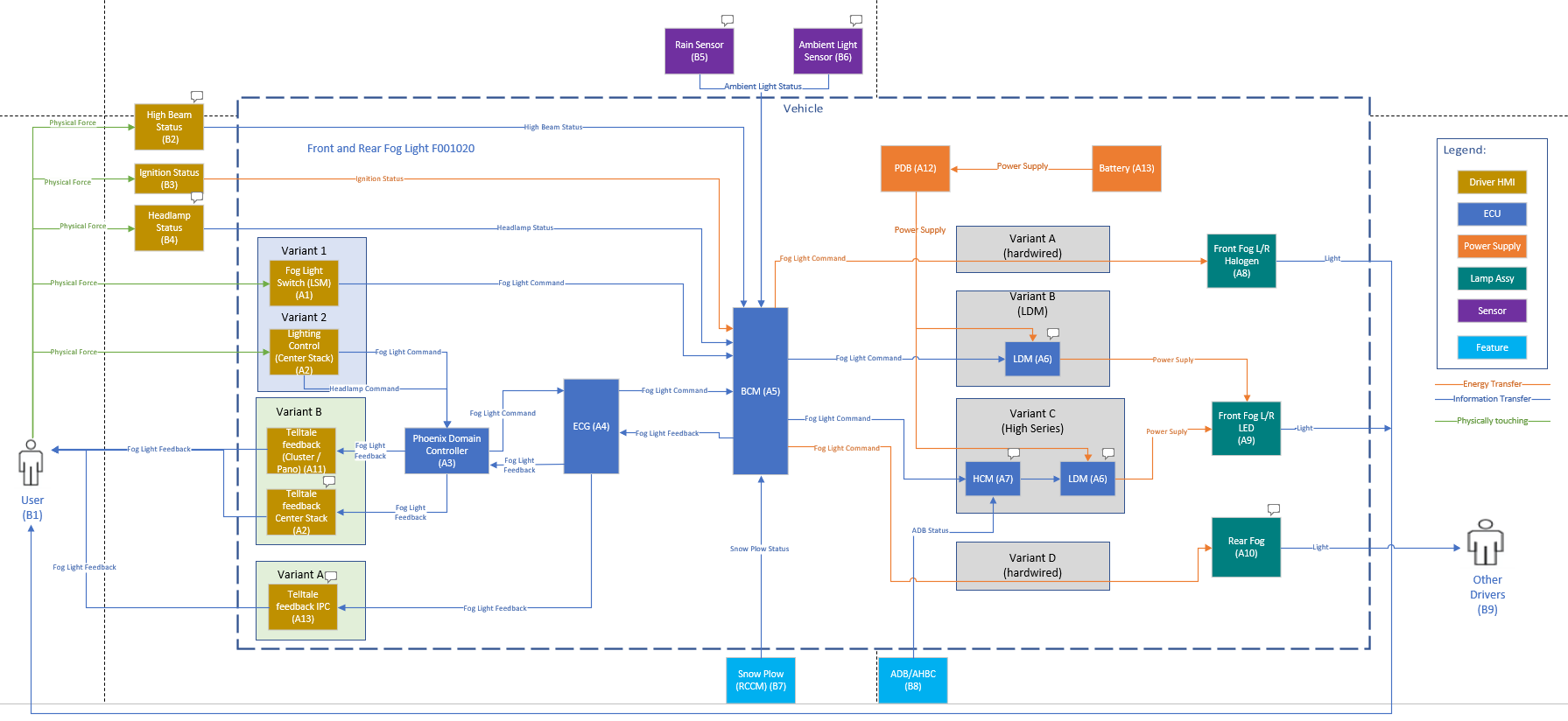


Figure 3‑2 System Block Architecture



Figure 3‑3 Input/Output Variants

|  |  |  |
| --- | --- | --- |
| E/E Architecture Variant Name | Variant Description | Variant Condition (optional) |
| Variant A | * BCM drives the front fog lamps directily |  |
| Variant B | * The BCM drives LDM via LIN which drives the fog lamps |  |
| Variant C1   Variant C2 | * The BCM drives HCM via CAN which drives the LDM via CAN to have the LDM drive the fog lamps * The BCM drives HCM via CAN which drives the LDM via LIN to have the LDM drive the fog lamps |  |
| Variant D | * BCM drives the rear fog lamp directily |  |
| Variant 1 | * HMI SW input component – LIN bus |  |
| Variant 2 | * HMI SYNC input component (Front and Rear Fog Lights activated via soft button) – CAN bus |  |

##### E/E Architecture “Front Fog Architecture Variant A”



Figure 3‑4 Variant A - E/E Architecture

##### E/E Architecture “Front Fog Architecture Variant B”



**Figure 3‑5 Front Fog Variant B - E/E Architecture**



Figure ‑ E/E Architecture for Variant B (LIN Network Topology)

##### E/E Architecture “Front Fog Architecture Variant C1 and Variant C2”



Figure 3‑7 Front Fog Variant C1 - E/E Architecture



Figure 3‑8 E/E Architecture for Variant C1 (CAN Network Topology)



Figure 3‑9 Front Fog Variant C2 - E/E Architecture



Figure 3‑10 E/E Architecture for Variant C2 (CAN Network Topology)

##### E/E Architecture “Rear Fog Architecture Variant D”



Figure 3‑11 E/E Architecture for Variant D – Rear Fog Lamps

##### E/E Architecture “MLS Architecture Variant 1”



Figure 3‑10 E/E Architecture for Variant 1 Relative MLS Input - LIN



Figure 3‑12 E/E Architecture for Variant 1 Relative MLS (LIN Network Topology)

##### E/E Architecture “Architecture for CAN Soft Button Variant 2”

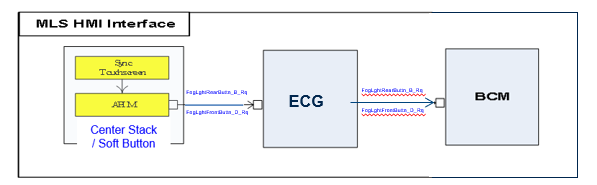


Figure 3‑132 Variant 2 – Soft Button Input E/E Architecture

#### E/E Components

#Hint: Use component name/acronym as given in the [VSEM Global Core ECU & EE Devices Dictionary](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=BleFgEP3x3NrTDAAAAAAAAAAAAA&servername=Production_Server) If not listed in that database, you may use the use PSF naming convention of the [EDAS signal database in VSEM](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=gPXpSoIbx3NrTDAAAAAAAAAAAAA&servername=Production_Server).  
You may directly link to the corresponding VSDM

EM entry. Refer to the examples below”.

#Links: [*PSF Translate*](https://pd3.spt.ford.com/sites/EESEC3P/PSF_Translate/SitePages/Home.aspx)r (a little utility to search for an EDAS component name in PSF notation)

|  |  |
| --- | --- |
| Component Name | **Description** |
| BCM | Body Control Module |
| LDM (Right fog and Left fog) | LED Driver Module |
| HCM | Headlamp Control Module. |
| IPC | Instrument Panel Cluster |
| MLS/LSM | Master Light Switch/Light Switch Module |
| APIM | Auxiliary Protocol Interface Module: Accessory Protocol Interface Module (SYNC) SYNC processor, separate from the head unit (Audio control Module) |
| SCCM | Steering Column Control Module for Stalk HI\_LO Beam |
| Ambient Sensor | The Ambient and Rain sensor affects the AutoLamp feature. If either is triggered, AutoLamp will turned off (headlamps turn off) and, in turn, turn off the fog lamps. |
| Rain Sensor | The Ambient and Rain sensor affects the AutoLamp feature. If either is triggered, AutoLamp will turned off (headlamps turn off) and, in turn, turn off the fog lamps. |
| ECG (Enhanced Central Gateway) | Gateway Module which is responsible for transitioning of messages from one Network to other. |

Table 3‑2: Electrical Components

#### E/E Connections

#Hint: Lists the E/E connections relevant for the feature and - for network connections - which *Messages* from the *Data Dictionary* are allocated to them. The ‘Connection Type’ is derived from the [*GDT/EDAS Signal Classification*](https://pd3.spt.ford.com/sites/fede/vsem-spls/Shared%20Documents/13-gdt/training/ppt/Signal_Classifications_v6.ppt?web=1). The ‘Protocol’ selection list might not be complete, yet. Add your protocol definition, if needed.

#Links: - [*GDT/EDAS Signal Classification*](https://pd3.spt.ford.com/sites/fede/vsem-spls/Shared%20Documents/13-gdt/training/ppt/Signal_Classifications_v6.ppt?web=1) (as reference for ‘Connection Type’ below)

* [*PSF Translate*](https://pd3.spt.ford.com/sites/EESEC3P/PSF_Translate/SitePages/Home.aspx)r (a little utility to search for an EDAS signal name in PSF notation)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Connection Name | **Connection Type** | **Protocol**  Only if ‘Connection Type’ is “Network”/”RF-Digital” | **Description** | **Allocated Messages**  Only if ‘Connection Type’ is “Network”/”RF-Digital” | **Connected Nodes** |
| (Hardwire from BCM to Front Fog Ckt.) RF FOG LAMP and LF FOG LAMP (Variant A) | PMW | n/a | Direct  Harwired Signal | … | … |
| BCM to LDM (Variant B) | Network | n/a | LIN | BCM\_L5\_FC1(0) - 30  **SIGNAL NAMES:**  Front\_Foglamp\_Rqst  Ignition\_Status  High\_Beam\_Status  FTP\_Status  Autolamp\_Rqst  RF\_EEL\_Rqst\_Enbl  LF\_EEL\_Rqst\_Enbl  LF\_EEL (100)  RF\_EEL (102) | BCM to LDM (Variant B) |
| BCM to HCM  (Variant C1) | Network | CAN FD |  | BodyInfo\_3, 0x3B3  BCM\_Lamp\_Stat, 0x3C3  Compressor\_Req\_FD1, 0x326  **SIGNAL NAMES:**  FrontLghtFrontOn\_B\_Stat  HeadLghtHiOn\_B\_Stat  Ignition\_Status  SnowPlowMode\_B\_Enbl  headlghtSwitch\_D\_Stat  HeadLamploadv\_B\_Stat | BCM to HCM  (Variant C1) |
| HCM to LDM  (Variant C1) | Network | CAN (Mid Speed) | Lighting CAN (private CAN) | CAN Standard 0x50  CAN Standard 0x55  CAN Standard 0X6FF  CAN Standard 0X6FE  **SIGNAL NAMES:**  Front\_Fog\_Actv\_Rq  Igntion\_Status  LowBeam\_Stat  TesterPhysicalResLDMA  TesterPhysicalResLDMB | HCM to LDM  (Variant C1) |
| BCM to Rear Fog Ckt (Variant D) | PMW | n/a | Direct  Harwired Signal |  | BCM to Rear Fog Ckt (Variant D) |
| Headlamp Request  (Absolute headlamp Switch) | Network | LIN | Used to request activation/deactivation of headlamps | Abs\_Pos\_Stat\_LINHSM | Master Lighting Control Switch to BCM |
| Headlamp Request  (Relative headlamp Switch) | Network | LIN | Used to request activation/deactivation of headlamps | Encoder\_Cnt\_Up  Enxoder\_Cnt\_Down | Master Lighting Control Switch to BCM |
| Ambient Light Sensor Input | CAN | FD-CAN | Used to determine Ambient Light Level Status | Steering\_Data\_FD1 | SCCM to BCM |
| Telltale Status | CAN | HS3 CAN | Displays the activated status of the headlamp to the driver using a telltale | BCM\_Lamp\_Stat\_HS3 | ECG to IPC |
| HMI\_Stalk to BCM | Network | CAN FD |  | CAN Standard 0X83  **SIGNAL NAMES:**  HeadLghtHiFlash\_D\_Actl | Stalk to BCM |
| Visual\_Feedback | Network | CAN FD | FD1 CAN - IPC Fog Telltale | BCM\_Lamp\_Stat | BCM to ECG |
| Fog Front and Rear Switch to BCM | Analog | n/a | Direct  Harwired Signal |  |  |
| Front Fog Activation via HMI\_Soft Button\_Input | Network | CAN | Request signal to On/Off Front Fog Lights through the button press from HMI. Front Fog light on/off trigger | FogLghtFrontButtn\_B\_Rq | APIM\_CDC / APIM\_CIM to BCM via ECG |
| Rear Fog Activation via HMI\_Soft Button\_Input | Network | CAN | Request signal to On/Off Rear Fog Lights through the button press from HMI. Rear Fog light on/off trigger | FogLghtRearButtn\_B\_Rq | APIM\_CDC / APIM\_CIM to BCM via ECG |

Table 3‑3: E/E Connections

#### Signal List

***#Hint:*** *Refer to the* [*Data Dictionary*](#_Data_Dictionary) *-* [*Technical Signals*](#_Technical_Signals)*.*

[Hot Link to Appendix:](#_Data_Dictionary)

### Software Component Architecture

**#Classification:** Optional – For features with in-house SW development only (remove section otherwise)

***#Hint:*** *For Features with in-house SW development (specifically in an Agile Environment) it is required, that the development team documents and agrees on at least their SW interfaces to the outside world early in the process.*

#### Description

**#Hint**: Provide some informal description of the characteristics of the chosen Software Component Architecture. Also give some graphical representation of the Software Component Architecture. SysML Internal Block Diagrams or [AUTOSAR](http://wiki.ford.com/display/RequirementsEngineering/Data+Flow+Diagram?src=contextnavpagetreemode) Virtual Function Bus models could be used to depict such a Software Component Architecture.

**#Link:** [*SysML – Internal Block Diagrams*](https://pd3.spt.ford.com/sites/SystemsEngineering/SEC/sysml-teamsite/SysML%20Wiki/Internal%20Block%20Diagram%20Basics.aspx) and [*AUTOSAR*](https://www.autosar.org/)

This Software Component Architecture … <add some explanatory text here>

This section to be left blank or moved to AUTOSAR DOCUMENTATION.

## Function Deployment

***#Hint:*** *This section lists and details the deployment variants of the feature.*

### Deployment Variants

**#Classification:** Mandatory – State “No Variants defined”, if not used.

**#Hint:** If there is more than 1 variant of deployment, the different variant should be listed and described below. Deployment variants are very much driven by E/E architecture variants (refer to section *E/E Architecture Variants*). Nevertheless, Feature/Function variant options might also drive additional deployment variants.

**#For Functional Safety:** Specify each deployment variant in a separate FIS.

|  |  |  |
| --- | --- | --- |
| **Deployment Variant Name** | Variant Description | Variant Condition (optional) |
| Variant A (for Front fog) | This is a direct PWM signal from the BCM to the front fog lamp circuit |  |
| Variant B (for Front fog) | This CAN signal comes from the BCM to the LDM to drive the front fog lamp ckt (PWM output from the LDM). |  |
| Variant C (for Front fog) | This CAN signal comes from the BCM to the HCM then to the LDM via CAN message, to drive the front fog lamp ckt (PWM output from the LDM). |  |
| Variant D (for Rear fog) | This signal comes directly from the BCM, to drive the rear fog lamp ckt. |  |
| Variant 1 | HMI Hardwired MLS Switch input to BCM |  |
| Variant 2 | This CAN signal comes from APIM\_CDC / APIM\_CIM to BCM when pressing soft button from Center Stack. Touch screen interface. |  |

#### Deployment “Variant 1”

***#Classification:*** *Optional*

***#Hint:*** *Add a deployment diagram (e.g. a SysML Activity Diagram where the actions represent the Technology Functions and the swimlanes represent the components) and some explanatory text about the variant to this section. The naming of the Technology Functions should make clear, what Logical Function it had been derived from (e.g. VehicleSpeedCalculation(Wheelbased)\_ABS)*

N/A (since this is optional and really only needed on a more complex system)

### Function Allocation

***#Hint:*** *The “Function Allocation Table” shows the mapping of the Logical Functions and the corresponding Technology Functions of a feature to components of the physical architecture as also shown in the deployment diagrams. Typically, there is a 1:1 relationship between (Atomic) Logical and Technology Functions. For details refer to the* *RE Wiki pages* [*“Deriving Implemented Functions from Logical Functions”*](http://wiki.ford.com/display/RequirementsEngineering/Deriving+Implemented+Functions+from+Logical+Functions) *and “*[*Cascade Requirements*](http://wiki.ford.com/display/RequirementsEngineering/Cascade+Requirements%23CascadeRequirements-CascadingVsTraceability)*” When applying MBSE methods please refer to Guideline for Alignment of SW QoS with Ford Starting Model (SysML) for how Logical and Technology Functions in the Ford Starting Model align to Atomic Logical Functions and Technology Functions in RE.*

*For Functional Safety critical features the second table (“****Error! Reference source not found.****”) has to be additionally filled in*

* *to map Technical Safety Requirements (TSRs) to Technology Functions and hence Components and*
* *to assign an ASIL level to Components and TSRs*

***#Link:***[*RE Wiki - Deriving Implemented Functions from Logical Functions*](http://wiki.ford.com/display/RequirementsEngineering/Deriving+Implemented+Functions+from+Logical+Functions)

[*RE Wiki - Cascade Requirements*](http://wiki.ford.com/display/RequirementsEngineering/Cascade+Requirements#CascadeRequirements-CascadingVsTraceability)

[*Functional Safety Sharepoint*](https://pd3.spt.ford.com/sites/GlobalFunctionalSafety/Pages/default.aspx)

[*Guideline for Alignment of SW QoS with Ford Starting Model (SysML)*](http://wiki.ford.com/display/RequirementsEngineering/Alignment+with+the+Ford+Starting+Model)

| Component | Technology Function Name | Logical Function Name |
| --- | --- | --- |
|
| HMI MLS SWITCH | Rotary Absolute LIN base switch | Operate HMI |
| Rotary Relative LIN base switch |
| HMI CENTER STACK | APIM sync (Touch screen input) display | Operate HMI |
| BCM | ECU | Ignition status  Configuration  Headlamp State  HighBeam Ramp State  Snow Plow Mode State  OPeratonal Voltage State  Front Fog State  Trialer State  Rear Fog State  Ext\_Lighting Ign State |
| BMS | ECU | Operatonal Voltage State |
| HCM | ECU | Headlamp control |
| LDM | ECU | LED control |
| SCCM | ECU | High beam HMI input control |
| APIM\_CDC | ECU | Soft Button HMI input control |
| APIM\_CIM | ECU | Soft Button HMI input control |

Table 3‑4: Function Allocation Table (Basic)

# Feature Implementation Modeling

***#Hint:*** *This chapter shall give deployment specific refinements of the customer use cases, which are defined in the Feature Document. Based on activity diagrams and possibly sequence diagrams, this chapter shows, how the overall functionality is decomposed in activities / functions, which can be allocated to single physical components. In addition, this chapter shows how the individual components / activities collaborate.*

## Component Interaction Diagrams

***#Hint:*** *This chapter would typically list sequence charts or activity diagrams with swim lanes for all involved physical components to illustrate the interactions between components for relevant scenarios.*

*End-to-end timing constraints could be placed in the diagrams. End-to-end timing would be relevant if more than 2 nodes (sender / receiver) are involved when information flows from signal generation (e.g. button pressed by user) to signal consumption (e.g. light is switched on).*

### Scenario: “System Startup / Shutdown”

***#Hint:*** *This chapter shall define specific scenarios / sequences (e.g. power-up initialization, ignition after-run, NM sleep / wake up, MicroHybrid start / stop inhibition.*

### Scenario: “Normal Sequence Operation”



Figure 4‑1:“Normal Sequence Operation”

## Component Interface Behavior Diagrams

*#Hint: For complex (application level) interface protocols a protocol state machine would be more appropriate than a bunch of sequence diagrams to illustrate the interactions between components. So, this section would typically show a (protocol) state machine.*

# Feature Implementation Requirements

***#Hint:*** *The Feature Implementation Specification is first of all an architecture document. It shows the Functional and the E/E architecture as well as the deployment of the Functional one to the E/E one.*

## Functional Safety

**#Classification**: Functional Safety only – If not used, remove content and state “Not Applicable”

***#Hint:*** *If feature is not Functional Safety critical, remove subsections from this chapter and state “Feature is not Functional Safety critical”*

### ASIL Decomposition of Technical Safety Requirements

**#Classification**: Functional Safety only – If not used, remove content and state “Not Applicable”

***#Hint:*** *Sometimes an ASIL decomposition of Technical Safety Requirements (TSRs) is required. The (input) TSRs, which are to be decomposed, are derived from FSRs. Those input TSRs are to be specified in this chapter (right above the corresponding ASIL decomposition table). For each input TSR add one “ASIL Decomposition Table”. In the “ASIL Decomposition Table” the derived, decomposed TSRs are referenced by ID and Title. Those TSRs are however not specified in the FIS but in the ECU Functional Specfication.*

**#Macro:** [Add Ins -> Add Requirement macro](http://wiki.ford.com/pages/viewpage.action?pageId=174654231) (select “**Func./Tech. Safety Requirement**” as type)

***#Link:***[*Functional Safety Sharepoint*](https://pd3.spt.ford.com/sites/GlobalFunctionalSafety/Pages/default.aspx) *- Functional Safety Concept*

*ASIL rated QM – No FSR’s*

<Place the input TSR here above the decomposition table>

| **Input TSR** | <Provide the ID of the TSR which shall be decomposed. That TSR is given above> | |
| --- | --- | --- |
| **Decomposition Rationale** | <Give a reason why the decomposition was performed> | |
| **Method for Decomposition** | Choose a Method | |
| **TSR 1 after Decomposition** | **TSR ID** | <Provide the ID of the decomposed TSR> |
| **TSR Title** | <Provide the title of the decomposed TSR> |
| **ASIL** |  |
| **Rationale** | <Provide a reason and thought behind that particular requirement. Should include how the requirement is able to independently fulfill the needs of the parent requirement> |
| **Satisfied by** | <Provide an Technology Function, physical signal, or physical component satisfying the requirement. This element shall be independent of the element satisfied by the other half of the ASIL decomposition.> |
| **TSR 2 after Decomposition** | **TSR ID** | <Provide the ID of the decomposed TSR> |
| **TSR Title** | <Provide the title of the decomposed TSR> |
| **ASIL** |  |
| **Rationale** | <Provide a reason and thought behind that particular requirement. Should include how the requirement is able to independently fulfill the needs of the parent requirement> |
| **Satisfied by** | <Provide an Technology Function, physical signal, or physical component satisfying the requirement. This element shall be independent of the element satisfied by the other half of the ASIL decomposition.> |
| **TSR for Independence**  *Note: should consider commonly used input, output and processing*  *Note: additional row should be added if additional* *requirements for Independence are necessary* | **TSR ID** |  |
| **TSR Title** |  |
| **ASIL** |  |
| **Rationale** |  |

Table 5‑1: ASIL Decomposition Table

## Requirements on Components

### Component 1- BCM

#### Technology Fog Function

***#Classification:*** *Mandatory*

***#Hint:*** *Technology Functions are split into two parts:*

* *subsection Function Interfaces: defines the mapping of the Logical Signals/Parameters to Technical (i.e. physical) Signals/Parameters, which is ECU/allocation specific. It also specifies interface details on how signals are published or subscribed*
* *subsection Function Requirements: defines, which requirements are reused/carried over unchanged from the Logical Function and which requirements are need to be modified due to deployment specific circumstances.*

**#Link:** [*RE Wiki – Deriving an Implemented Function*](http://wiki.ford.com/display/RequirementsEngineering/Deriving+Implemented+Functions+from+Logical+Functions)*#*

[*RE Wiki - Cascade Requirements*](http://wiki.ford.com/display/RequirementsEngineering/Cascade+Requirements#CascadeRequirements-CascadingVsTraceability)

*RE-Wiki – How to manage requirements in VSEM – Implemented Functions*

##### Function Interfaces

***#Hint:***

*The subsections “Inputs”, “Outputs” and “Parameters” below map the Logical Signals / Parameters their Technical (i.e. physical) counterparts, which are sent and received by the Technology Function. This is done by mapping tables, which reference Data Dictionary entries. If Data Dictionary entries are not sufficient, the Interface Requirements section may be used to specify additional requirements. If possible also link those requirements to the tables in the subsections “Inputs”, “Outputs” and “Parameters”.*

*How to …:*

1. *If the technical signal / parameter does not yet exist in the GSDB or elsewhere in VSEM, create those in the “Technical Signals”/”Technical Parameters” section of the “Data Dictionary”. Use* [*Add Ins -> Add Requirement macro*](http://wiki.ford.com/display/RequirementsEngineering/How+to+use+the+Specification+Templates#AddNewRequirement) *(select “Technical Signal”/”Technical Parameter” as type).*

*Note: Bookmarks are automatically created for the ID, the name and the description of each signal / parameter in the “Data Dictionary”, if you use the macros.*

*Note: The corresponding Logical Signal/Parameter should already exist in the Data Dictionary, because it should have been created, when specifying the Logical Function (refer to the Logical Signals/Technical Signals).*

1. *Reference the signal / parameter name bookmark from the Data Dictionary in the tables below.*
2. *If the mapping is not 1:1 (e.g. a Logical Signal gets split into 2 Technical Signals) the Mapping Details need to be specified by a Mappings object in the Data Dictionary.*
3. *For “Publisher Interfaces” and “Subscriber Interfaces” column you may (optionally) link to AIS Interfaces in the Data Dictionary.*
4. *For “Messages” to be referenced in the “E/E Connections” column proceed similarly. Example: <ConnectionName>::<MessageName> refers to the Message which is sent on bus <Connection Name> and which is given in section Messages of the “Data Dictionary”. Alternatively, for CAN you could link directly to the message from the CMDB (e.g.* [*CGEA 1.3*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=n0SJN9h0x3NrTDAAAAAAAAAAAAA&servername=Production_Server) *or* [*FNV2*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=jXfpx2PHx3NrTDAAAAAAAAAAAAA&servername=Production_Server)*).*

**#Link:** [*RE Wiki – Adding a Technical Interface*](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Technical+Interface)

**#Link:** [*RE Wiki – Adding a Signal or Parameter Mapping*](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Signal+or+Parameter+Mapping)

###### BCM Inputs for all Variants

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| **Headlight\_Status** | Abs\_Pos\_Stat\_LINHSM:  OFF  Position  Headlamps  Autolamps. |  | LINHSM to BCM | LINHSM\_LIN\_Frm01 |
| LINHSMLINStatus | LINHSMLINStatus |  | LINHSM to BCM | LINHSM\_LIN\_Frm00 |
| Encoder\_Cnt\_Dn\_LINHSM | Encoder\_Cnt\_Dn\_LINHSM |  | LINHSM to BCM | LINHSM\_LIN\_Frm01 |
| Encoder\_Cnt\_Up\_LINHSM | Encoder\_Cnt\_Up\_LINHSM |  | LINHSM to BCM | LINHSM\_LIN\_Frm01 |
| Hight\_Beam\_Indicator\_Rqst | HeadLghtHiCtrl\_D\_RqAhb:  (Lo/HI Beam  Flash  Auto\_Lo/HI Beam) |  | From GWM  To BCM and  HCM\_FD1 | Steering\_Data\_FD1  0X83 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Snow\_Plow\_Status | SnowPlowMode\_B\_Enbl | mapped with SnowPlowMode\_Rqst in BCM | Climate Control ECU to GWM to BCM | Compressor\_Req\_FD1 |
| Rear \_Fog\_ Trailer \_Status | LcwaMsgTxt\_D\_Stat |  | GWM | IPMA\_Data2\_FD1  0X3D9 (0x1 Trailer connected) |
| Ambient Light Sensor | LghtAmb\_D\_Sns |  | From GWM  To BCM and  HCM\_FD1 | Steering\_Data\_FD1  0X83 |
| LghtAmbDrvMde\_D\_Reg |  |  | From GWM  To BCM | CAN FD Standard  0x215 |
| LghtAmbIntsty\_No\_Rq |  |  | From GWM  To BCM | CAN FD Standard  0x3DA |
| Flash to Pass, Man and Auto (Hi/Lo) | HeadLghtHICtrl\_D\_RqAhb |  | From GWM  To BCM | Steering\_Data\_FD1  0X83 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Trailer\_Tow\_Present\_Status | TrlrLampCnnct\_B\_Actl |  | From GWM  To BCM | CAN FD Standard  0x443 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Trailer\_Connected\_Input\_Ckt | LcwaMsgTxt\_D\_Stat |  | GWM to BCM | IPMA\_Data2\_FD1  0X3D9 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rear Fog  Switch | RR\_Fog\_Input\_Ckt |  | LINHSM to BCM |  |
| Front Fog  Switch | FR\_Fog\_Input\_Ckt |  | LINHSM to BCM |  |
| Front\_Fog\_Switch\_Request | FogLghtFrontButtn\_B\_Rq |  | From APIM\_CDC / APIM\_CIM to BCM |  |
| Rear\_Fog\_Switch\_Request | FogLghtRearButtn\_B\_Rq |  | From APIM\_CDC APIM\_CIM to BCM |  |

Table 5‑2: Input Signal mappings of Fog Function

###### BCM Outputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details**  *(Conditional)* | **Publisher Interface** | **Connection**  *(Optional)* |
| Exterior\_RF\_Rear\_Fog\_Lamp | Rear\_Fog\_Lamp\_Ckt |  | BCM | Hardwired output to Fog Ckt  FET\_Ctrl\_Index 23 |
| Exterior\_LF\_Rear\_Fog\_Lamp | Rear\_Fog\_Lamp\_Ckt |  | BCM | Hardwired output to Fog Ckt  FET\_Ctrl\_Index 23 |
| Exterior\_RF\_Front\_Fog\_Lamp | RF\_Fog\_Lamp\_Ckt |  | BCM | Hardwired output to Fog Ckt  FET\_Ctrl\_Index 22 |
| Exterior\_LF\_Front\_Fog\_Lamp | LF\_Fog\_Lamp\_Ckt |  | BCM | Hardwired output to Fog Ckt  FET\_Ctrl\_Index 21 |
| Front\_Fog\_Light\_Rqst | FogLghtFrontON\_B\_Stat |  | BCM (TX) to  IPMA\_ADAS\_FD1  HCM\_FD1/ APIM\_CDC / APIM\_CIM | BodyInfo\_3  0x3B3 |
| Rear\_Fog\_Light\_Rqst | FogLghtRearON\_B\_Stat |  | BCM (TX) to  IPMA\_ADAS\_FD1  HCM\_FD1/ APIM\_CDC / APIM\_CIM | BodyInfo\_3  0x3B3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ignition\_Status | Ignition\_Status |  | BCM (TX) to HCM | BodyInfo\_3  0x3B3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HeadlghtSwitch\_D\_Stat | HeadlghtSwitch\_D\_Stat |  | BCM (TX) to HCM | BCM\_Lamp\_Stat  0x3C3 |
|  |  |  |  |  |
| Ignition\_Status | Ignition\_Status |  | BCM to LINHSM | BCM\_LIN\_Frm01(7) |
| Parklamp\_Status | Parklamp\_Status |  | BCM to LINHSM | BCM\_LIN\_Frm01(7) |
| HeadLghtEnbl\_B\_Stat | HeadLghtEnbl\_B\_Stat |  | BCM to LINHSM | BCM\_LIN\_Frm01(7) |
| HS\_Ind\_Pos | HS\_Ind\_Pos |  | BCM to LINHSM | BCM\_LIN\_Frm01(7) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| FTP\_Status | FTP\_Status |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 15 |
| High\_Beam\_Status | High\_Beam\_Status |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 14 |
| Rear\_Fog\_HMI\_Status | Rear\_Foglamp\_Rqst |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 29 |
| Front\_Fog\_HMI\_Status | Front\_Foglamp\_Rqst |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 30 |
| HeadLamp\_HMI\_SW\_AutoLamp | Autolamp\_Rqst |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 23 |
| Ignition\_Status | Ignition\_Status |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 0 |

Table 5‑3: Output Signal mappings of Fog LogicalFunction

###### BCM Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  | Part 2 DIAGNOSTIC spec of the BCM to ECU spec. | Hard coded. M2 (changeable) downloaded at EOL (based on market). M3 fixed download at EOL. Check with BCM. | Method 2 a DID (changeable) |
| FrontFog\_Enable\_Cfg | FrontFog\_Enable\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  This parameter enables/disables the Front Fog Lighting feature. |
| FrontFog\_AutoCancel\_Cfg | FrontFog\_AutoCancel\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  This configuration parameter indicates auto cancel behavior for Front\_Fog\_Light\_SW\_Status when ignition status changes to OFF or ACC or Position/Parklamps are OFF. |
| FogLampCkt\_Switch\_Cfg | FogLampCkt\_Switch\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  DIAG: Indicates if Input Switch for Front Fog Lampare used or not.  Non-Volatile -- Factory Set Method 2 |
| FogLampSwitchType\_Cfg | FogLampSwitchType\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  Decides the front/rear fog lighting  switch input types which can be either HARDWIRED, LIN or CAN. |
| FogLampOffDelayFast\_Cfg | FogLampOffDelayFast\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  Dependent on FrontFog\_WithHighBeams\_Cfg being set to INHIBIT. |
| FogLampOffDelayMid\_Cfg | FogLampOffDelayMid\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2 |
| FrontFog\_WithHighBeams\_Cfg | FrontFog\_WithHighBeams\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  This configuration parameter indicates whether the front fog lamps are allowed/inhibited to be on when high  beams or flash-to-pass are on. |
| FogLampOffDelaySlow\_Cfg | FogLampOffDelaySlow\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2 |
| FogLampOnDelayFast\_Cfg | FogLampOnDelayFast\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2 |
| FogLampOnDelayMid\_Cfg | FogLampOnDelayMid\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2 |
| FogLampOnDelaySlow\_Cfg | FogLampOnDelaySlow\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2 |
| FogLamp\_Start\_Delay\_Cfg | FogLamp\_Start\_Delay\_Cfg |  | Method 3 | Non-Volatile -- Factory Set Method 3 |
| Fog\_Lamp\_Usage\_Cfg | Fog\_Lamp\_Usage\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  Determine the usage of foglamps |
| FrontFogCkt\_WithTurn\_Cfg | FrontFogCkt\_WithTurn\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2 |
| FrontFog\_WithHighBeams\_Cfg | FrontFog\_WithHighBeams\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2 |
| FrontTurn\_Position\_Lamps\_Cfg | FrontTurn\_Position\_Lamps\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  determines if LF\_Turn\_Lamp\_Ckt and RF\_Turn\_Lamp\_Ckt are configured |
| Fog\_InRushTimeDelay\_Cfg | Fog\_InRushTimeDelay\_Cfg |  | Method 3 | Non-Volatile -- Factory Set Method 3 |
| Fog\_Lamp\_Ckt\_Usage\_DutyCycleRamp\_Cfg | Fog\_Lamp\_Ckt\_Usage\_DutyCycleRamp\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  Determines if LF/RF\_Fog\_Lamp\_Ckt ramping, as a Cornering Light, is optimized for halogen bulbs, or for  LEDs to appear linear without jitter. |
| FrontFogCkt\_WithTurn\_Cfg | FrontFogCkt\_WithTurn\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  Determines if a Front Fog Lamp is shut off while an adjacent turn signal is flashing. |
| FrontFog\_WithHighBeams\_Cfg | FrontFog\_WithHighBeams\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2 |
| LF\_Fog\_Lamp\_Ckt\_Usage\_Cfg | LF\_Fog\_Lamp\_Ckt\_Usage\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  Determines LF\_Fog\_Lamp\_Ckt are used as fog lamp only, etc. |
| SnowPlowModeDisableDelay\_Cfg | SnowPlowModeDisableDelay\_Cfg |  | Method 3 | Non-Volatile -- Factory Set Method 3  Indicates the maximum time that the snow plow mode will wait,after the CAN signal indicates that the snow  plow mode is no longer requested. |
| RearFog\_Enable\_Cfg | RearFog\_Enable\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  This parameter indicates whether the rear fog lights are enabled or disabled |
| RearFogWithTrailer\_Cfg | RearFogWithTrailer\_Cfg |  | Method 2 | Non-Volatile -- Factory Set Method 2  Determines if vehicle Rear Fog Lamps are allowed to operate when a trailer is connected |
| RearFogLamp\_Start\_Delay\_Cfg | RearFogLamp\_Start\_Delay\_Cfg |  | Method 3 | Non-Volatile -- Factory Set Method 3  A delay time to allow updated status of Front\_Fog\_Light\_Rqst and Headlamps\_Command |

Table 5‑4: Parameter mappings of Fog Function

###### Interface Requirements

***#Hint:*** *This section provides a place where to specify interface specific requirements of the Technology Function, if Interface objects from* *Technical Interfaces* *and Mappings objects cannot be used (e.g. requirement is not covered by AIS attribute). Deployment specific requirements, which are not related to the interface directly, should be specified in section Function Requirements.*

*Naming Convention for interface requirements:*

*“PubIfReq\_TechnicalSignalName: InterfaceAttribute” (e.g. “PubIfReq\_Veh\_V\_ActlBrk: Timing”)*

*“SubIfReq\_TechnicalSignalName: InterfaceAttribute” (e.g. “SubIfReq\_Veh\_V\_ActlBrk: Missing/Invalid Signal”)*

*“MapReq\_LogicalSignalName\_TechnicalSignalName” (e.g. “MapReq\_LSG\_VehicleSpeed\_Veh\_V\_ActlBrk”)*

*For a selection of interface attributes refer to the list below*

*List of possible interface attribute groups/attributes of a signal subscriber:*

|  |  |
| --- | --- |
| *Timing* | *Signal refresh rate, Publishing Interval (ms), Publisher Latency Requirements, Signal Transmit Cycle Time, End-to-End Latency Requirements* |
| *Wakeup / Sleep* | *Publishing Network Sleep Inhibitor, Updates Signal while asleep, Network Wake Up, fresh data on Network wakeup, Max latency before signal is valid on Network wakeup* |
| *Reset* | *Fresh data on ECU Reset, Max latency before signal is valid on reset* |
| *Robustness/Integrity* | *Checksum, Counter, Quality Factor, MAC, Functional Safety Relevant,* |
| *Functional* | *ECU Power Mode, Functional Voltage Range (Min, Max), Performance Voltage Range (Min, Max), CAN Node Type, Standardization Category, Fault Type,* |

*List of possible interface attributes/attribute groups of a signal publisher:*

|  |  |
| --- | --- |
| *Timing* | *Subscribing Interval (ms), Subscriber Latency Requirements, End-to-End Latency Requirements* |
| *Missing/Invalid Signals Strategy* | *Missing Message Strategy, Use Last Signal Value when Missing Message, Timeout period when Last Signal Value cannot be used for missing message, Use Default Value when Missing Message, Missing Message Default Value, Missing Message DTC, Update Bit, Update Bit Signal Logic* |
| *Robustness/Integrity* | *Checksum, Counter, MAC, Quality Factor, Functional Safety Relevant, ASIL Rating* |
| *Wakeup / Sleep* | *Network Wake Up, Subscribing Network Sleep Inhibitor* |
| *Routing* | *Gateway Required, Gateway Message Type, Max Gateway Latency* |
| *Functional* | *ECU Power Mode, Functional Voltage Range (Min, Max), Performance Voltage Range (Min, Max), CAN Node Type* |

###R\_FNC\_Front Fog Light Status\_0001### Front Fog Light Status to Center Stack

BCM module shall transmit a Signal (FogLghtFrontON\_B\_Stat) to Center Stack Screen via Phoenix Domain Controller module to inform Front Fog Light Status (Front Fog Light Activated / Deactivated)

###R\_FNC\_Rear Fog Light Status\_0002### Rear Fog Light Status to Center Stack

BCM module shall transmit a Signal (FogLghtRearON\_B\_Stat) to Center Stack Screen via Phoenix Domain Controller module to inform Rear Fog Light Status (Rear Fog Light Activated / Deactivated).

###R\_FNC\_Front Fog Light Status\_0003### Front Fog Light Status to Cluster

BCM module shall transmit a Signal (FogLghtFrontON\_B\_Stat) to Cluster (IPC) via Phoenix Domain Controller to inform Front Fog Light Status (Front Fog Light Activated / Deactivated – telltale feedback).

###R\_FNC\_Rear Fog Light Status\_0004### Rear Fog Light Status to Cluster

BCM module shall transmit a Signal (FogLghtRearON\_B\_Stat) to Cluster (IPC) via Phoenix Domain Controller to inform Rear Fog Light Status (Rear Fog Light Activated / Deactivated – telltale feedback).

###R\_FNC\_Fog Lights\_0005### BCM publisher signal timing

The signals FogLghtFrontON\_B\_Stat and FogLghtRearON\_B\_Stat shall be published within the timing of 1000 milli seconds.

###R\_FNC\_Fog Lights\_0006### BCM publisher signal latency

The signals FogLghtFrontON\_B\_Stat and FogLghtRearON\_B\_Stat shall be published with a signal latency of 40 ms (awake) and 120 ms (asleep).

###R\_FNC\_Soft Button Activation / Deactivation\_0007### Momentary Soft Button behavior

While pressing the screen soft button, the signal statusshall be “Pressed”. Once the screen soft button is released, the signal status shall be “Not Pressed”. BCM will toggle the state of the fog lamps feature on a Not Pressed to Pressed transition. The default value of this signal is Not Pressed.

###R\_FNC\_Front Fog Lights\_0008### FogLghtFrontButtn\_B\_Rq Signal Unavailable for less than 5 seconds

When the FogLghtFrontButtn\_B\_Rq signal is delayed or missing, BCM shall hold on to the previous value of the Front Fog Lights signal request.

###R\_FNC\_Rear Fog Lights\_0009### FogLghtRearButtn\_B\_Rq Signal Unavailable for less than 5 seconds

When the FogLghtRearButtn\_B\_Rq signal is delayed or missing, BCM shall hold on to the previous value of the Rear Fog Lights signal request.

###R\_FNC\_Front Fog Lights\_0010### FogLghtFrontButtn\_B\_Rq Signal Unavailable for more than 5 seconds

When the FogLghtFrontButtn\_B\_Rq signal is delayed or missing, BCM shall hold on to the previous value of the Front Fog Lights signal request.

###R\_FNC\_Rear Fog Lights\_0011### FogLghtRearButtn\_B\_Rq Signal Unavailable for more than 5 seconds

When the FogLghtRearButtn\_B\_Rq signal is delayed or missing, BCM shall hold on to the previous value of the Rear Fog Lights signal request.

#### Fog Lights On/Off Function

The Fogs Lights shall be activated/deactivated only after Fog Delay Function or Fog Debounce Function conditions are met. [FogLampSwitchType\_Cfg](#_BCM_Parameters) provides the input request type. According to the market regulations, [FrontFog\_WithHighBeams\_Cfg](#_BCM_Parameters) provides the information whether Fog Lights are allowed or not with High Beams.

The BCM shall use the leading edge (from “Inactive” to “Active”) of Fog Light Switch Input to toggle the user’s request. When the Fog Light Switch is a CAN input BCM shall use the parameters Front\_Fog\_Lamp\_Rqst\_CANand Rear\_Fog\_Lamp\_Rqst\_Canto Activate or Deactivate the Fog Lights and the signals FogLghtFrontON\_B\_Stat and FogLghtRearON\_B\_Stat shall provide the status of the Fog Lights. When the Fog Light Switch is a LIN or Hardwired input the parameters and Rear\_Fog\_Lamp\_DbncV shall be used to Activate or Deactivate the Fog Lights.

For EU Market, the BCM shall enable the Front Fog Lights as per user’s requests when Ignition\_Status = RUN and

Headlight\_Status is not OFF and Parklamps\_Command = ON ( and SnowPlowMode\_Status = Disabled. For US Market, Front Fog Lights are inhibited with High Beams and to enable Front Fog Lights is also needed that Headlamps\_Command = OFF or LOW. If one of these conditions is not met, Front Fog Lights shall be turned disabled.

BCM shall turn ON the Rear Fog Lights per user’s request when Ignition\_Status = RUN and Front\_Fog\_Light\_Rqst = ON or Headlamps\_Command = HIGH or LOW. If one of these conditions is not met, Rear Fog Lights shall be turned OFF.

#### Front Fog Lights Cancel Function

Front Fog Lamps are automatically **de-selected** when:

* headlamp switch is off
* or ignition switch is off or acc (if **FrontFog\_AutoCancel\_Cfg** is CANCEL)
* or position/parklamps are off (if **FrontFog\_AutoCancel\_Cfg** is CANCEL)
* or Snow Plow Mode is enabled (if **FrontFog\_AutoCancel\_Cfg** is CANCEL)

Ignition Switch cycling will turn Front Fog Lamps on and off. However while **FrontFog\_AutoCancel\_Cfg** is NO\_CANCEL, Ignition Switch cycling does not cancel the user request for Front Fog Lamps.

When **FrontFog\_AutoCancel\_Cfg** is NO\_CANCEL, Headlamp Switch Cycling (i.e. changing the headlamp switch to OFF and back to anything else other than OFF) will not retain the user request for Front Fog Lamps. Changing Headlamp Switch to OFF results in canelling the user request for front fog lamps for any **FrontFog\_AutoCancel\_Cfg**.

When **FrontFog\_AutoCancel\_Cfg** is NO\_CANCEL, the Headlamp Switch is in the Auto position, and conditions are correct for Front Fog Lamps operation (i.e. the Ignition Switch is in Run, and it is night such that Autolamps has headlamps & parklamps on, and high beams are off, and Snow Plow Mode is disabled) and the user presses the Front Fog Lighting Switch, then Front Fog Lamps shall turn on. Then, the Front Fog Lamps shall turn on and off coincident with Autolamps control of the parklamps, while the user request remains selected.

For North American applications, **FrontFog\_AutoCancel\_Cfg** shall be set to NO\_CANCEL. When the ignition switch changes to OFF or ACC, or the position/parklamps turn off, or Snow Plow Mode is enabled, the user request for fog lamps (**Front\_Fog\_Light\_SW\_Status**) shall not change, but the front fog lamps shall turn off.

For European applications, **FrontFog\_AutoCancel\_Cfg** shall be set to CANCEL. When the ignition switch changes to OFF or ACC, or the position/parklamps turn off, or Snow Plow Mode is enabled, the user request for foglamps (**Front\_Fog\_Light\_SW\_Status**) shall be cancelled and the front fog lamps shall turn off.

#### Front Fog Lights Enable/Disable Function

This parameter enables/disables the Front Fog Lighting feature.  It may be set to ENABLED, even if the vehicle is not fitted with a Front Fog Lighting Switch and Front Fog Lamps. One reason to set it to DISABLED is for MY17 V36x, which connects FR\_Fog\_Input\_Ckt to a physical switch, even when the vehicle is not fitted with Front Fog Lamps. In that application, this will disable the front fog CAN signal to the cluster telltale, and the front fog status to the Rear Fog Lighting feature

The Method 2 Configuration **FrontFog\_Enable\_Cfg** can be set to either:

* **ENABLED** – the Front Fog Lighting feature is enabled.
* **DISABLED –** the Front Fog Lighting feature is disabled

#### Rear Fog Lights with Trailer Function

The Rear Fog Light on the trailer shall behave in the same way as on the vehicle such as all rear fog lamps on the trailer must remain illuminated as long as Rear Fog Light is selected.

In the case a trailer is connected to the vehicle, when RearFogWithTrailer\_Cfg = INHIBIT, the rear fog lamp on the trailer is illuminated, but the rear fog lamp on the vehicle is deactivated when Rear Fog Light is selected.

This is required forEuropean applications and allowed by ECE regulations. However, when RearFogWithTrailer\_Cfg = ALLOW, bothvehicle and trailer rear fog lamps will be illuminated.This is required for Brazilian applications.

The Rear Fog Light on the trailer shall behave in the same way as on the vehicle such as all rear fog lamps on the trailer mustremain illuminated as long as Rear Fog Light is selected.The user request for Rear Fog Lamps (Rear\_Fog\_Switch\_Status) uses non-volatile storage (shall not change due to a reset).

#### Fog Delay Function

The delay function is used to handle the use-case I of starting the engine while front or rear fog lamps are already on. They apply to European configurations in which we expect front fog to turn off during START, but to turn back on when ignition returns to RUN (without cancelling). The use-case is changing ignition to RUN, waiting at least 2 seconds, then turning on headlamps and front fog before changing ignition to START. With headlamps selected, Ignition\_Status = START suspends position lamps, which would otherwise cancel front fog. [FogLamp\_Start\_Delay\_Cfg](#LPR_N_FogLamp_Start_Delay_Cfg_00060) provides a delay, following the return of ignition to RUN, to allow Parklamps\_Command to return to ON, before the usual front fog cancellation conditions are evaluated. [RearFogLamp\_Start\_Delay\_Cfg](#LPR_D_RearFogLamp_Start_Delay_Cfg_00061) provides a delay, following the return of ignition to RUN, to allow updated status of Front\_Fog\_Light\_Rqst and Headlamps\_Command to be available to the Rear fog feature, before the usual Rear fog cancellation conditions are evaluated.

For use-case II (U.S.), a delay came be applied to the fog lamps for smoothing out illumination transitions between head lamps and front fog lamps. The applied fog delay is inversely applied to the transition of the High Beams from HIGH to OFF or HIGH to LOW, and from OFF or LOW to HIGH. The fog lamp delay speed is correlated to the High Beam Ramp Speed but the execution of the delay can be sync’d (as an option, both delays start at the same time) or executed in series (Head Lights finish first before Fog Lamps start their delay transition). The later is currently defined in the BCM spec. The following parameters are used for front fog delays:

**Numeric\_Zero** is a constant which provides a zero delay to turn on/off the fog lamps.

**FogLampOffDelayFast\_Cfg** : When FrontFog\_WithHighBeams\_Cfg = INHIBIT, and Auto High Beam Control feature turns High Beams on with fast ramp-up (Ramping\_Speed = FAST), **FogLampOffDelayFast\_Cfg** is the delay from the beginning of High Beam ramp-up until Front Fog turn-off.

**FogLampOnDelayFast\_Cfg** : When FrontFog\_WithHighBeams\_Cfg = INHIBIT, and Auto High Beam Control feature turns High Beams off with fast ramp-down (Ramping\_Speed = FAST), **FogLampOnDelayFast\_Cfg** is the delay from the beginning of High Beam ramp-down until Front Fog turn-on.

**FogLampOffDelaySlow\_Cfg** : When FrontFog\_WithHighBeams\_Cfg = INHIBIT, and Auto High Beam Control feature turns High Beams on with slow ramp-up (Ramping\_Speed = SLOW), **FogLampOffDelaySlow\_Cfg** is the delay from the beginning of High Beam ramp-up until Front Fog turn-off.

**FogLampOnDelaySlow\_Cfg** : When FrontFog\_WithHighBeams\_Cfg = INHIBIT, and Auto High Beam Control feature turns High Beams off with slow ramp-down (Ramping\_Speed = SLOW), **FogLampOnDelaySlow\_Cfg** is the delay from the beginning of High Beam ramp-down until Front Fog turn-on.

**FogLampOffDelayMid\_Cfg :** When FrontFog\_WithHighBeams\_Cfg = INHIBIT, and Auto High Beam Control feature turns High Beams on with medium ramp-up (Ramping\_Speed = MEDIUM), **FogLampOffDelayMid\_Cfg** is the delay from the beginning of High Beam ramp-up until Front Fog turn-off.

**FogLampOnDelayMid\_Cfg :**  When FrontFog\_WithHighBeams\_Cfg = INHIBIT, and Auto High Beam Control feature turns High Beams off with medium ramp-down (Ramping\_Speed = MEDIUM), **FogLampOnDelayMid\_Cfg** is the delay from the beginning of High Beam ramp-down until Front Fog turn-on.

#### Fog Debounce Function

For a Front Fog Lighting Switch which is a non-latching mechanically momentary type switch, a debounce of the switch input to the BCM is required. Parameter FogLampSwitchType\_Cfg provides the input request type. The debounce function requires the battery voltage to be within a NORM\_V range. The requirements for debouncing of the hardwired input circuit gets executed irrespective of whether it is a hardwired or LIN switch input. Parameter for debounce is [Front\_Fog\_Lamp\_DbncV](#LPR_D_Front_Fog_Lamp_DbncV_00051).

###R\_FNC\_Fog\_Delay\_0012### Front\_Fog\_Delay\_Duration

The Front Fog (not relevant to rear fog) shall have a delay option to delay turning ON or to delay turning Off as High Beams ramp up or ramp down (optional) or after High Beams ramp up or ramp down. The High Beam ramp has the following category of ramp speeds: IMMEDIATELY, FAST, SLOW, and MEDIUM. These High Beam ramp speeds will be associated with each rise and fall of the fog lamp configuration parameters shown below:

**FogLampOffDelayFast\_Cfg , FogLampOnDelayFast\_Cfg, -> FAST (HIGH BEAM RAMP SPEED)**

**FogLampOffDelaySlow\_Cfg, FogLampOnDelaySlow\_Cfg, -> SLOW (HIGH BEAM RAMP SPEED) FogLampOffDelayMid\_Cfg, FogLampOnDelayMid\_Cfg, -> MEDIUM (HIGH BEAM RAMP SPEED)**

**a**nd **Numeric\_Zero -> IMMEDIATELY (HIGH BEAM RAMP SPEED)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_FNC\_Fog\_Delay\_00035### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Design | | | **Priority** | Medium (Highly Recommended) | **Status** | Draft | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

###R\_FNC\_Fog\_SW\_Debounce\_0013### Fog\_SW\_Debounce

The Front Fog Lighting Switch, which is a non-latching mechanically momentary type switch, shall be debounced by the BCM using the debounce parameter [Front\_Fog\_Lamp\_DbncV](#LPR_D_Front_Fog_Lamp_DbncV_00051).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_FNC\_Fog\_SW\_Debounce\_00037### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Interface | | | **Priority** | High (Mandatory) | **Status** | Draft | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

###R\_FNC\_Operational Voltage Range for Fog\_0014### Voltage effect on Fog

Conform to ELCOMP - RQT-191001-009906. The operational voltage ranges shall be controlled by other functions and do not need to be considered by the fog lamp feature. Therefore, will not to be considered be effected by the fog lamp function.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_FNC\_Operational Voltage Range for Fog\_00034### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Functional | | | **Priority** | High (Mandatory) | **Status** | Draft | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

##### Function Requirements

***#Hint:*** *The table “Component Specific Requirements” below lists those requirements of the Logical Function, which are removed/modified/added in context of the specific component, which the Technology Function is allocated to. If “Modification” is set to “Replaced” or “Added” specify the new requirement in subsection “Component Specific Requirements”. Ideally, the table should remain empty (100% reuse/carry over of the Logical Function requirements). That is, modifications of the requirement set in context of the FIS should be kept to a minimum.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement ID**  (of Logical Function) FS | **Requirement Title** | **Modification** | **Requirement ID**  (of Technology Function) FIS | **Comment** |
| R\_FNC\_Front Fog Active-US\_00002 | Front Fog Lamp Active Input Conditions | Unchanged |  |  |
| R\_FNC\_Front Fog Active-EU\_00020 | Front Fog Active Input Conditions | Unchanged |  |  |
| R\_FNC\_Front Fog InActive\_00003 | Front Fog InActive Input Conditions | Unchanged |  |  |
| R\_FNC\_Front Fog Turn OFF-EU\_00021 | Front Fog Turn OFF-EU | Unchanged |  |  |
| R\_FNC\_Front Fog Turn OFF-US\_00022 | Front Fog Turn OFF-US | Unchanged |  |  |
| R\_FNC\_Rear Fog Active\_00004 | Rear Fog Active Input Conditions | Unchanged |  |  |
| R\_FNC\_Rear Fog Trailer-ALLOW\_00023 | Rear Fog Trailer Light-ALLOW | Unchanged |  |  |
| R\_FNC\_Rear Fog Trailer-INHIBIT\_00024 | Rear Fog Trailer Light-INHIBIT | Unchanged |  |  |
| R\_FNC\_Rear Fog Disable-EU\_00026 | Rear Fog Disable Conditions-EU | Unchanged |  |  |
| R\_FNC\_Rear Trailer Mode\_00007 | Rear Trailer Configuration | Unchanged |  |  |
| R\_FNC\_Ext Lighting Ign Status\_00012 | Ext Lighting Ign Status | Unchanged |  |  |
| R\_FNC\_Head Beam Ramp Speed\_00008 | Head Beam Ramp Speed | Unchanged |  |  |

Table 5‑5: Component Specific Requirements

***#Hint:*** *Optionally, the table “Inherited Requirements” below defines which requirements of the corresponding Logical Function are reused without change by the ECU. This table is optional, because the set of unchanged requirements can be derived implicitly from the list of requirements of the Logical Function and those listed in the table “Component Specific Requirements”.*

|  |  |  |
| --- | --- | --- |
| **Requirement ID**  (of Logical Function) | **Requirement Title** | **Comment** |
|  |  |  |
|  |  |  |
| … |  |  |

Table 5‑6: Inherited Requirements

###### Component Specific Requirements

***#Hint:*** *If in table “Component Specific Requirements” requirements of the Logical Function are marked as modified/added place the modified/added requirements in this section.*

#### (Technology) Function “Front Fog Function\_Component1”

### Component 2 – HCM - Variant C

###### HCM Inputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Ignition\_Status | Ignition\_Status:  Off, ACC, Run, Start |  | TX from BCM through GWM (TX) to  HCM (RX) | BodyInfo\_3\_FD3  0x3B3 |
| Parklamp\_Status ( HeadLamp\_HMI\_SW\_PositionLight) | Parklamp\_Status:  Off, ON |  | TX from BCM through GWM (TX) to  HCM (RX) | BodyInfo\_3  0x3B3 |
| Rear\_Fog\_Switch\_Status | FogLghtRearOn\_B\_Stat:  Off, ON |  | TX from BCM through GWM (TX) to  HCM (RX) | BodyInfo\_3  0x3B3 |
| Front\_Fog\_Light\_Rqst | FogLghtFrontOn\_B\_Stat:  Off, ON |  | TX from BCM through GWM (TX) to  HCM (RX) | BodyInfo\_3  0x3B3 |
| HeadLampLoActv\_B\_Stat | HeadLampLoActv\_B\_Stat:  Off, ON |  | TX from BCM through GWM (TX) to  HCM (RX) | BCM\_Lamp\_Stat\_FD3  03C3 |
| HeadLampLoFlOn\_B\_Stat | HeadLampLoFlOn\_B\_Stat:  Not\_Low,  Low |  | TX from BCM through GWM (TX) to  HCM (RX) | BCM\_Lamp\_Stat\_FD3  03C3 |
| HeadLampLoFrOn\_B\_Stat | HeadLampLoFrOn\_B\_Stat:  Not\_Low,  Low |  | TX from BCM through GWM (TX) to  HCM (RX) | BCM\_Lamp\_Stat\_FD3  03C3 |
| HeadLghtHiOn\_B\_Stat | HeadLghtHiOn\_B\_Stat:  Off, ON |  | TX from BCM through GWM (TX) to  HCM (RX) | BCM\_Lamp\_Stat\_FD3  03C3 |
| Headlight\_Status ( HeadLamp\_HMI\_SW\_PositionLight) | HeadLghtSwtch\_D\_Stat:  Off, Parklamp, Headlamp, Autolamp |  | TX from BCM through GWM (TX) to  HCM (RX) | BCM\_Lamp\_Stat\_FD3  03C3 |
| TesterPhysicalResLDCMA | TesterPhysicalResLDCMA |  | LDCMB and LDCMA  To HCM TSTR (RX) | TesterPhysicalResLDCMA 0x6FE |
| TesterPhysicalResLDCMB | TesterPhysicalResLDCMB |  | LDCMB and LDCMA  To HCM TSTR (RX) | TesterPhysicalResLDCMB  0x6FF |
| FTP\_Status | HeadLghtHiFlash\_D\_Actl:  Flash\_to\_Pass  HIGH |  | GWM (TX) to  HCM\_FD1 | Steering\_Data\_FD1  0X83 |
| Hight\_Beam\_Indicator\_Rqst | HeadLghtHiCtrl\_D\_RqAhb:  Lo/HI Beam  Flash  Auto\_Lo/HI Beam |  | GWM  To BCM and  HCM\_FD1 | Steering\_Data\_FD1  0X83 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ambient Light Sensor | LghtAmb\_D\_Sns |  | From GWM  To BCM and  HCM\_FD1 | Steering\_Data\_FD1  0X83 |
| Front\_Telltale\_Lamp | FogLghtFrontON\_B\_Stat |  | BCM (TX) to  IPMA\_ADAS\_FD1  HCM\_FD1 | BodyInfo\_3  0x3B3 |
| Rear\_Telltale\_Lamp | FogLghtRearON\_B\_Stat |  | BCM (TX) to  IPMA\_ADAS\_FD1  HCM\_FD1 | BodyInfo\_3  0x3B3 |

Table 5‑7: Input Signal mappings of Fog Function

###### HCM Outputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details**  *(Conditional)* | **Publisher Interface** | **Connection**  *(Optional)* |
| Ignition\_Status | Ignition\_Status:  Off, ACC, Run, Start |  | HCM (TX)  To  LDCMB and LDCMA | VehicleOperationgModes  0x55  BodyInfo\_3\_HS2  0x3B3 |
| Front\_Fog\_Actv\_Rq | Front\_Fog\_Actv\_Rq:  Front Fog OFF  Front Fog ON |  | HCM (TX)  To  LDCMB and LDCMA | BaseFeaturesActvRq  0x50 |
| LowBeam\_Stat | LowBeam\_Stat  Default  Low Beam Active |  | HCM (TX)  To  LDCMB and LDCMA | BaseFeaturesActvRq  0x50  E2E\_BCMtoLDCM  0x320 |

Table 5‑8: Output Signal mappings of Fog LogicalFunction

###### HCM Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Name should be a Word reference to the “*Logical Parameters*” name bookmark in the Data Dictionary | Name should be a Word reference to the “*Technical Parameters*” name bookmark in the Data Dictionary | If mapping is not 1:1 you might reference a Mapping description object from the *Mappings* section | Choose an item. | Depends on Method selection. For Method 2 a DID including start bit and length could be given. For Central Car Config a signal could be referenced |
|  |  |  |  |  |
|  |  |  |  |  |

Table 5‑9: Parameter mappings of Fog Function

### Component 3 - SCCM

###### SCCM Inputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Ignition\_Status | Ignition\_Status:  Off, ACC, Run, Start |  | TX from BCM through GWM (TX) to  SCCM | BodyInfo\_3\_FD3  0x3B3 |
| HeadLampLoFlOn\_B\_Stat | HeadLampLoFlOn\_B\_Stat:  Not\_Low,  Low |  | GWM (TX)  SCCM (RX) | BCM\_Lamp\_Stat\_FD3  03C3 |
| HeadLampLoFrOn\_B\_Stat | HeadLampLoFlOn\_B\_Stat:  Not\_Low,  Low |  | GWM (TX)  SCCM (RX) | BCM\_Lamp\_Stat\_FD3  03C3 |

Table 5‑10: Input Signal mappings of Fog Function

###### SCCM Outputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details**  *(Conditional)* | **Publisher Interface** | **Connection**  *(Optional)* |
| HeadLightHiFlash\_D\_Actl |  |  | SCCM to BCM | HS2-CAN |
| HeadLghtHiCtrl\_D\_RqAhb |  |  | SCCM to BCM | HS2-CAN |

Table 5‑11: Output Signal mappings of Fog Logical Function

###### SCCM Parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
|  |  |  |  |  |
|  |  |  |  |  |

Table 5‑12: Parameter mappings of Fog Function

### Component 3 – LDMs (LDCMA and LDCMB)

###### LDM Inputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Parameter Name** | **Technical Parameter Name** | **Mapping Details** *(Conditional)* | **Method** | **Method Details** |
| Ignition\_Status | Ignition\_Status:  Off, ACC, Run, Start |  | HCM (TX)  To  LDCMB and LDCMA | VehicleOperationgModes  0x55  BodyInfo\_3\_HS2  0x3B3 |
| Front\_Fog\_Actv\_Rq | Front\_Fog\_Actv\_Rq:  Front Fog OFF  Front Fog ON |  | HCM (TX)  To  LDCMB and LDCMA | BaseFeaturesActvRq  0x50 |
| LowBeam\_Stat | LowBeam\_Stat  Default  Low Beam Active |  | HCM (TX)  To  LDCMB and LDCMA | BaseFeaturesActvRq  0x50  E2E\_BCMtoLDCM  0x320 |
| Ignition\_Status | Ignition\_Status |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 0 |
| Ignition\_Status | Ignition\_Status |  | BCM to LINHSM | BCM\_LIN\_Frm01(7) |
| Parklamp\_Status | Parklamp\_Status |  | BCM to LINHSM | BCM\_LIN\_Frm01(7) |
| HeadLghtEnbl\_B\_Stat | HeadLghtEnbl\_B\_Stat |  | BCM to LINHSM | BCM\_LIN\_Frm01(7) |
| HS\_Ind\_Pos | HS\_Ind\_Pos |  | BCM to LINHSM | BCM\_LIN\_Frm01(7) |
| FTP\_Status | FTP\_Status |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 15 |
| High\_Beam\_Status | High\_Beam\_Status |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 14 |
| Rear\_Fog\_HMI\_Status | Rear\_Foglamp\_Rqst |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 29 |
| Front\_Fog\_HMI\_Status | Front\_Foglamp\_Rqst |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 30 |
| HeadLamp\_HMI\_SW\_AutoLamp | Autolamp\_Rqst |  | BCM to LDM | LIN  BCM\_L5\_FC1(0) - 23 |

Table 5‑13: LDM Inputs

###### LDM Outputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details**  *(Conditional)* | **Publisher Interface** | **Connection**  *(Optional)* |
| Exterior\_RF\_Rear\_Fog\_Lamp | LF FOG\_LP (Name taken from BP\_PHY\_20181102. pdf) |  | LDCMA | Hardwired output to Fog Ckt  FET\_Ctrl\_Index 23 |
| Exterior\_LF\_Rear\_Fog\_Lamp | RF FOG\_LP (Name taken from BP\_PHY\_20181102. pdf) |  | LDCMB | Hardwired output to Fog Ckt  FET\_Ctrl\_Index 23 |
|  | RF\_EELLINStatus |  | LF\_EEL to BCM |  |
|  | LF\_EELLINStatus |  | RF\_EEL to BCM |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TesterPhysicalResLDCMA | TesterPhysicalResLDCMA |  | LDCMB and LDCMA  To HCM TSTR (RX) | TesterPhysicalResLDCMA 0x6FE |
| TesterPhysicalResLDCMB | TesterPhysicalResLDCMB |  | LDCMB and LDCMA  To HCM TSTR (RX) | TesterPhysicalResLDCMB  0x6FF |

Table 5‑14: LDM Outputs

### Component 3 – APIM (CDC and CIM)

###### APIM Inputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Front\_Fog\_Light\_Rqst | FogLghtFrontON\_B\_Stat |  | BCM (TX) to  APIM\_CDC / APIM\_CIM | BodyInfo\_3  0x3B3 |
| Rear\_Fog\_Light\_Rqst | FogLghtRearON\_B\_Stat |  | BCM (TX) to  APIM\_CDC / APIM\_CIM | BodyInfo\_3  0x3B3 |

###### APIM Outputs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Logical Signal Name** | **Technical Signal Name** | **Mapping Details** *(Conditional)* | **Subscriber Interface** | **Connection**  (*Optional)* |
| Front\_Fog\_Switch\_Request | FogLghtFrontButtn\_B\_Rq |  | From APIM\_CDC / APIM\_CIM to BCM |  |
| Rear\_Fog\_Switch\_Request | FogLghtRearButtn\_B\_Rq |  | From APIM\_CDC / APIM\_CIM to BCM |  |

###### APIM Parameters

###### Interface Requirements

###R\_FNC\_Front\_Fog\_Soft\_Button\_0016### Front\_Fog\_Soft\_Button\_Request\_APIM

CAN based Front Fog Lamp soft button (APIM) shall transmit the front fog lamp request (FogLghtFrontButtn\_B\_Rq) when the screen button is pressed. The default value of this signal is Not Pressed.

###R\_FNC\_Rear\_Fog\_Soft\_Button\_0017### Rear\_Fog\_Soft\_Button\_Request\_APIM

CAN based Rear Fog Lamp soft button (APIM) shall transmit the rear fog lamp request (FogLghtRearButtn\_B\_Rq) when the screen button is pressed. The default value of this signal is Not Pressed.

###R\_FNC\_Front\_Fog\_Soft\_Button\_0018### Minimum\_timing\_required\_to\_send\_the\_signal

APIM module shall publish the signal FogLghtFrontButtn\_B\_Rq to active state at minimum 100msec for any switch event (Pressed or Not Pressed), before default to Not Pressed state. See figure 5-1.

###R\_FNC\_Rear\_Fog\_Soft\_Button\_0019### Minimum\_timing\_required\_to\_send\_the\_signal

APIM module shall publish the signals FogLghtRearButtn\_B\_Rq to active state at minimum 100msec for any switch event (Pressed or Not Pressed), before default to Not Pressed state. See figure 5-1



Figure 5-1

###R\_FNC\_Front\_Fog\_Activation\_Status\_0020### Front\_Fog\_Activation\_Status

APIM shall receive the front fog status from CAN signal FogLghtFrontON\_B\_Stat

###R\_FNC\_Rear\_Fog\_Activation\_Status\_0021### Rear\_Fog\_Activation\_Status

APIM shall receive the rear fog status from CAN signal FogLghtRearON\_B\_Stat

###R\_FNC\_Front\_Fog\_Light\_Status\_0022### Front\_Fog\_Status\_BCM Connection Lost for less than 5 seconds

When the FogLghtFrontON\_B\_Stat signal is delayed or missing for less than 5 seconds, the APIM shall keep the last BCM received signal status.

###R\_FNC\_Rear\_Fog\_Light\_Status\_0023### Rear\_Fog\_Status\_BCM Connection Lost for less than 5 seconds

When the FogLghtRearON\_B\_Stat signal is delayed or missing for less than 5 seconds, the APIM shall keep the last BCM received signal status.

###R\_FNC\_Front\_Fog\_Light\_Status\_0024### Front\_Fog\_Status\_BCM Connection Lost for more than 5 seconds

When the FogLghtFrontON\_B\_Stat signal is delayed or missing for more than 5 seconds, the APIM shall keep the last BCM received signal status.

###R\_FNC\_Rear\_Fog\_Light\_Status\_0025### Rear\_Fog\_Status\_BCM Connection Lost for more than 5 seconds

When the FogLghtRearON\_B\_Stat signal is delayed or missing for more than 5 seconds, the APIM shall keep the last BCM received signal status.

## Requirements on Connections

### Networks

#### “CAN Bus xxx” FD1\_CAN

***#Hint:*** *For CAN most requirements are defined by Netcom and referenced in* [*VSEM “Multiplexing Specifications” section*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=xcbJ6OwAx3NrTDAAAAAAAAAAAAA&servername=Production_Server)*. Put in this section only those requirements, which deviate from that standard specification.*

*The CAN messages relevant for this feature are listed in the section “Messages” of the “Data Dictionary”.*

##### Protocol Requirements

**#Hint:** *For CAN Ford currently mandates FNOS as SW implementation for the CAN protocol stack. This includes the CAN Network Management and Transport Protocol. If you deviate from this assumption or if you have specific requirements on FNOS, which are not contained in the standard package, put requirements in this section. F*or details the FNOS user guide and application notes could be referenced.

##### Electrical Requirements

**#Hint:** List requirements here, only if they deviate from the SDS CAN.

#### “LIN Bus xxx” LIN\_05

**#Hint:** Place requirements here, which are common to all LIN nodes, but not covered by some SDS LIN.

*The LIN messages relevant for this feature are listed in the section “Messages” of the “Data Dictionary”.*

##### Protocol Requirements

###### Schedule Table

***#Hint:*** *The LIN Schedule Table should be documented in the LDF file. The LDF file could be referenced here*

##### Electrical Requirements

***#Hint:*** *The LIN Schedule Table should be documented in the LDF file. The LDF file could be referenced here*

#### “Ethernet xxx”

***#Hint:*** *On Ethernet (wired or wireless) we will see most likely the DoIP, MQTT or V2x protocols. Those protocols are described in separate specifications and are implemented in the Ford AUTOSAR stack. While DoIP might be not that relevant in this scope, MQTT (together with the Google Protocol Buffer (GPB) serialization of the payload) will become important for all features, which are mapped to a Service Oriented Architecture/Communcation (SoC). Application data (SOA APIs), which is transmitted via MQTT, are listed in the data dictionary section “AUTOSAR Interfaces*

#Hint: Those AUTOSAR Classic (Sender/Receiver and Client/Server) Interfaces, which are used by the feature but not managed in a central repository yet, should be listed here.

SOA Service *”.*

***#Link:***[*http://www.mqtt.org*](http://www.mqtt.org)*, https://developers.google.com/protocol-buffers/docs/proto*

### HW I/Os

**#Hin**t: This section lists all hardwired signals relevant for the feature deployment. Those get typically mapped to VSEM EDAS signals – refer to list of connections in corresponding table in chapter ”E/E Architecture → E/E Connections”. If any specific protocol is used to send/receive signal information or multiplex/demultiplex signals on the HW circuit.

#### “HW I/O”

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Connection Name | **Connection Type** | **Protocol**  Only if ‘Connection Type’ is “Network”/”RF-Digital” | **Description** | **Allocated Messages**  Only if ‘Connection Type’ is “Network”/”RF-Digital” | **Connected Nodes** |
| RF FOG LAMP and LF FOG LAMP (Hardwire from BCM to Front Fog Ckt. on Variant A) | PMW | n/a | Direct  Harwired Signal | … | … |
| PDB (Power Distribution Box) | Static ON or OFF. |  | Direct  Harwired Signal |  |  |

## Requirements on Development Process

# Open Concerns

***#Hint:*** *The following list presents known issues that have to be discussed or clarified over the course of the on-going requirements engineering.*

| ID | Concern Description | e-Tracker Reference | Status | Solution |
| --- | --- | --- | --- | --- |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |

Table 6‑1: Open Concerns

# Revision History

## Template Revisions

*#Important: Do not change this section*

No revision history found.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Version | Rev. | Date | Description | Responsible |
| 0 | 2 | 2015-08-05 | * TOC corrected * Document Properties adapted to match needs of VBA macros | Awegman1 |
| 1 | 0 | 2015-11-16 | * Revision History moved to chapter 7 * Table-Styles removed | Awegman1 |
| 1 | 1 | 2016-03-02 | * Rework according to PCL example | Jbaden1 |
| 1 | 2 | 2016-03-22 | * V1.3: Footer formating corrected (Issue 19) * “Constraints” chapter renamed to “Input Requirements” (Issue 20) | Jbaden1 |
| 1 | 3 | 2016-04-20 | * Broken Wiki links repaired | Jbaden1 |
| 2 | 0 | 2016-05-23 | * Prepared for Specification\_Macros.dotm v2.0 * Additional explanations added to ch. 2.2 “Input Requirements” (ARL and SDS requirements often go here) | Jbaden1 |
| 2 | 1 | 2016-07-08 | * Template version added to footer | Jbaden1 |
| 2 | 2 | 2016-07-15 | * Sample SysML diagrams added * Data Dictionary reworked * Alignment with relevant sections in SRD templated | Jbaden1 |
| 3 | 0 | 2016-09-05 | * Lessons learned from IPRB incorporated | Jbaden1 |
| 4 | 0 | 2016-09-27 | * Alignment with QPIP Feature Function Ownership workstream. Platform Spec renamed to Feature Implementation Spec | Jbaden1 |
| 4 | 1 | 2016-11-04 | * Chapters “Purpose” and “Scope” reworked. | Jbaden1 |
| 4 | 1 | 2016-11-10 | * Subsection for “Logical Service Interfaces” added. | Jbaden1 |
| 5 | 0 | 2017-01-13 | * Meta data updated for specification macros, version 3.1 * SW Unit chapter removed for the time being * Green boxes added for user hints | Jbaden1 |
| 5 | 1 | 2017-01-18 | * Minor editorial changes (e.g. hyperlinks highlighted in comments) | Jbaden1 |
| 5 | 1b | 2017-01-20 | * Some editorial corrections * Substructure of old Network Communication (now Connections) moved to Requirements on Connections | Jbaden1 |
| 6 | 0 | 2018-07-24 | * CR53: * Add new cover sheet * Add disclaimer section * Add the following meta-data to the doc properties for the the new cover sheet   + DocGis1ItemNumber   + DocGis2Classification   + DocType   + DocStatus   + DocIssueDate   + DocReleaseDate * CR63: Update FuSa sharepoint references in templates | Jbaden1 |
| 6 | 0 | 2018-08-06 | * CR81: Incorporate lessons learned from System Service Spec pilot (Vehicle Speed) into AFS and FIS | Jbaden1 |
| 6 | 0 | 2018-09-28 | * Broken links to RE Wiki repaired | Jbaden1 |
| 6 | 0 | 2018-10-31 | * Minor corrections on cover sheet and in footer to be more GIS compliant and VSEM aligned * “Overview” and “Description” exchanged in headings (following common sense) | Jbaden1 |
| 6 | 0 | 2018-11-30 | * Update of Functional Safety sections after review by Functional Safety Team * Initial support for variant handling | Jbaden1 |
| 6 | 0 | 2018-12-01 | * Variant condition fields added consistently * Links updated | Jbaden1 |
| 6 | 0 | 2018-12-11 | * Variant condition fields removed from mapping/allocation tables * Mapping tables simplified * Explanatory text for “Variants” sections revised | Jbaden1 |
| 6 | 0a | 2019-01-04 | * Chapter heading “Inherited Function Requirements” removed. Corresponding table renamed to “Requirements not cascaded”. * E/E Connection table got another column for allocated messages * Naming conventions for Implemented Functions corrected (FncName\_CmpName instead of FncName\_on\_CmpName) * Editorial corrections on the cover sheet * Explanatory text added to “Ethernet” section in chapter “Requirements on Connections” * AIS templates updated. Linked to Wiki page | Jbaden1 |
| 6 | 0a | 2019-01-04 | * Minor restructuring in FuSa chapter – after aligning with ECU Functional Spec * Bugfix: table 13 renamed from FTTI table to FHT table, includes a bug fix: each FSR is allocated to only one ECU/component | Jbaden1 |
| 6 | 0b | 2019-02-04 | * Change: Chapter “Interface Requirements” added to “Implemented Function xxx” section (to have a single chapter for to collect subscriber/publisher interface and mapping requirements which to not conform to the corresponding Data Dictionary objects) * Change: “CAN Interface” subsection renamed to “AIS Interfaces” again. Although several Subscriber/Publisher interface attributes are probably CAN bus specific, other attributes seem to be well suited for other networks than CAN. * Change: Chapter “ECU Specific Requirements” renamed to “Component Specific Requirements” in chapter “Implemented Function xxx”. Table “Requirements not cascaded” renamed to “Component Specific Requirements” and refined to describe changes from Logical Function requirements set more formally. This is also to help during VSEM import to identify those requirements of the Logical Function which cannot be simply carried over to the ECU. * Change: Explanatory text in section “Implemented Function xxx” improved. | Jbaden1 |
| 6 | 0c | 2019-02-05 | * Change: Layout of AIS Interfaces in Data Dictionary reworked to enable Excel Import | Jbaden1 |
| 6 | 0c | 2019-02-20 | * Bugfix: In AIS Interfaces none-picklist fields formatted as invisible | Jbaden1 |
| 6 | 1a | 2019-02-05 | Functional Safety related changes:   * Table “Architectural Redundancy Summary” updated * Section “Functional Flows for FTTI ‘xyz’” added to chapter “Component Interaction Diagrams” * Fault Tolerant Time Summary section added to Functional Safety chapter * Chapter “HW Metrics” added | Jbaden1 |
| 6 | 1a | 2019-04-02 | Headings of “Architectural Redundancy Summary” table clarified | Jbaden1 |
| 6 | 1a | 2019-04-10 | * ASIL Decomposition table moved from Function Spec into the Feature Implementation Spec (ASIL Decomposition of Technical Safety Requirements) * 2 alternative versions of the Function Allocation Table (Standard variant vs. Functional Safety variant) placed next to each other. | Jbaden1 |
| 6 | 1a | 2019-05-31 | * Function Allocation Table split into a base (non FuSa) part and a FuSa part to allow a more flexible mapping of MBSE functions (Logical and Technology) to RE functions (Atomic Logical and Implemented). | Jbaden1 |
| 6 | 1a | 2019-05-31 | * “Input Requirement” section reworked (symmetrically to all other templates). * Sections “Functional Flows for FTTI xyz” and “Fault Tolerant Time Summary” removed, because guidance is not available yet. * “Reference” and “Glossary” section moved back to introduction, i.e., to the very beginning of the document (such that also section 2 can already rely on it). * Some mostly editorial changes per request from FuSa team. | Jbaden1 |
| 6 | 1a | 2019-07-02 | * "Important" box added on cover sheet which points to the macros * “Input Requirements” section renamed to Input Information (after discussion with FuSa team) | Jbaden1 |
| 6 | 1a | 2019-07-17 | * Chapter “Message List” removed from CAN and LIN specific chapters of section “Requirements on Connections” | Jbaden1 |
| 6 | 1a | 2019-10-08 | * Chapter “ASIL Decomposition of Technical Safety Requirements”: Input TSRs are specified in the chapter right above the decomposition table. | Jbaden1 |
| 6 | 1a | 2019-10-09 | * Chapter “Service Oriented Communication” moved to section “Messages” in the Data Dictionary. Details from Central SW Wiki about FNV2 SOA added | Jbaden1 |
| 6 | 1a | 2019-10-25 | * Minor updates for HW IOs/Signals * Subsection “Functional Safety” removed from chapter “Feature Implementation Modeling”. Per requrest from FuSa team since no guidance is available how to model e.g. FHT timing diagram. | Jbaden1 |
| 6 | 1a | 2019-05-11 | * Copyright notice shortened and moved to cover sheet and added to footer (to be compliant [with Ford copyright guidelines](http://www.fgti.ford.com/client/NewFGTI/CopyrightNotice.html)) * Term “Disclaimer” no longer used for what is actually only a copyright notice | Jbaden1 |
| 6 | 1a | 2019-22-11 | * Some minor modifications for the SOA APIs/MQTT Messages in the section “Messages” of the Data Dictionary (section references Service Contracts via the API name) * Some minor updates of the Input/Output mapping tables in section “Requirements on Components” for mappings to SOA APIs and EDAS signals. | Jbaden1 |
| 6 | 1a | 2019-12-05 | * Upstream Documents section added to “Input Requirements/Documents” table * Custom style table formatting removed | Jbaden1 |
| 6 | 1a | 2020-01-07 | * Some fine tuning for naming conventions of E/E components and connections. * List of HW I/O signal types reduced to RF-A, RF-D, D, A, Networked and PWM. * Protocol column added to the E/E connection table | Jbaden1 |
| 6 | 1a | 2020-01-07 | * “HW Metric” and “Architecture Redundancy Summary” sections removed per request from the Functional Architecture Team (based on Governance Board decision [FSTGB-97](mailto:TrackLite%20%23%20FSTGB-97:%20https://www.tracklite.ford.com/prweb/PRAuth/TrackLiteSSO?pyActivity=@baseclass.RedirectAndRunWraper&ThreadName=WorkLinkThread&bPurgeTargetThread=true&AccessGroupName=FSTGB:ProjectAdministrators&Location=pyActivity%3DWork-.Open%26Action%3DReview%26HarnessPurpose%3DReview%26InsHandle%3DFORD-FSTGB-WORK+FSTGB-97)) * “Functional Safety” chapter moved to “Feature Implementation Requirements” section. “Function Allocation” chapter seemed no longer appropriate. | Jbaden1 |
| 6 | 1a | 2020-01-07 | * Ordering of fields in AIS interfaces tables modified to conform with the Macro Template and the Importer Sheet * Page Header: no longer in bold letters | Jbaden1 |
| 6 | 1a | 2020-03-09 | * Missing doc property “LatestSigMappingID” and “LatestAisInterfaceID” added * doc property “CopyrightDate” re-formatted to text and copyright date field in footer corrected * Version numbering re-initialized as 0.1 * Init value of version/revision date set to “yyyy/mm/dd” instead of “yyyy-mm-dd” to be in line with the “Edit Document Property” dialog * Type of “Latest….ID” doc properties changed from Text to Number | Jbaden1 |
| 6 | 1a | 2020-03-11 | * “Mapping” table removed from template. Has been migrated to macro. | Jbaden1 |
| 6 | 1a | 2020-03-13 | * Separate chapter “Technical Safety Requirements” removed. Content already covered by Allocation Table in chapter Function Allocation. * “Implemented Function” replaced by term “Technology Function” | Jbaden1 |

# Appendix

## Data Dictionary

### Logical Signals

**#Hint:** Logical Signals are managed in VSEM in the [*RE Data Dictionary*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SoYl_k7px3NrTD&servername=Production_Server).

**#Link**: [*RE Wiki – Adding a Logical Signal or Parameter*](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Logical+Signal+or+Parameter)

**#Macro**: Add Ins -> Add Requirement macro (select “Logical Signal” as type)

### Logical Parameters

**#Hint:** Logical Parameters are managed in VSEM in the [*RE Data Dictionary*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SoYl_k7px3NrTD&servername=Production_Server).

**#Link**: [*RE Wiki – Adding a Logical Signal or Parameter*](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Logical+Signal+or+Parameter)

**#Macro:** Add Ins -> Add Requirement macro (select “Logical Parameter” as type)

### Technical Signals

**#Hint:** This section lists all GSDB + GDT + SW signals relevant for the feature deployment.

**#Link**: [*RE Wiki – Adding a Technical Signal or Parameter*](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Technical+Signal+or+Parameter)

**#Macro:** Add Ins -> Add Requirement macro (select “Technical Signal” as type)

#### GSDB Signals

**#Hint:** This part of the Data Dictionary lists signals, which should go to the GSDB in VSEM, but do not exist in the GSDB in VSEM yet, but are or will be requested for the GSDB. Those would go temporarily to this section in the [*RE Data Dictionary*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SoYl_k7px3NrTD&servername=Production_Server) in VSEM.

#### HW I/Os

**#Hint:** This chapter lists signals, which will be mapped to hardwired I/Os. Those get typically refer to VSEM EDAS signals (or input/output signals of device transmittals in VSEM GDT).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

#### Diagnostic Interfaces

**#Hint:** This chapter lists Diagnostic Interfaces (DTCs and DIDs), which get mapped to Logical Parameters in context of the Technology Functions in chapter “BCM Parameters” of the Function Interfaces. Those DTC/DID names should match the names in the diagnostics specification (Part 2).

**#ToDo:** Currently the template below is just a proposal. A macro still needs to be created

##### DTCs

(Extracted from DS-NU5T-14B476-AAA001)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DTC (Hex) | DTC (display) | DTC Type | Root Description | Failure Type Byte Description |
| 0x904611 | B1046-11 | CD | Front Fog Lamp Control Switch | Circuit Short To Ground |
| 0x904711 | B1047-11 | CD | Rear Fog Lamp Control Switch | Circuit Short To Ground |
| 0x9A7911 | B1A79-11 | CD | Rear Fog Lamp | Circuit Short To Ground |
| 0x9A7915 | B1A79-15 | CD | Rear Fog Lamp | Circuit Short To Battery or Open |
| 0x914229 | B1142-29 | D | Ignition Status 1 | Signal Invalid |
| 0xF00A01 | U300A-01 | C | Ignition Switch | General Electrical Failure |
| 0x914711 | B1147-11 | CD | Left Front Fog Lamps | Circuit Short To Ground |
| 0x914715 | B1147-15 | CD | Left Front Fog Lamps | Circuit Short To Battery or Open |
| 0x914811 | B1148-11 | CD | Right Front Fog Lamps | Circuit Short To Ground |
| 0x914815 | B1148-15 | CD | Right Front Fog Lamps | Circuit Short To Battery or Open |
| 0x943E11 | B143E-11 | C | Headlamp Switch Input | Circuit Short To Ground |
| 0x943B11 | B143B-11 | D | Autolamp On Input | Circuit Short To Ground |
| 0x943E15 | B143E-15 | C | Headlamp Switch Input | Circuit Short To Battery or Open |
| 0x944711 | B1447-11 | D | Parklamp On Switch Input | Circuit Short To Ground |
| 0x944912 | B1449-12 | CD | Trailer Tow Park/Tail Lamp Output | Circuit Short To Battery |
| 0x944914 | B1449-14 | CD | Trailer Tow Park/Tail Lamp Output | Circuit Short To Ground or Open |
| 0x94B612 | B14B6-12 | CD | Snow Plow Output | Circuit Short To Battery |
| 0x94B614 | B14B6-14 | C | Snow Plow Output | Circuit Short To Ground or Open |
| 0x953302 | B1533-02 | CD | Headlamp Switch Module | General Signal Failure |
| 0x953308 | B1533-08 | CD | Headlamp Switch Module | Bus Signal / Message Failure |
| 0x953349 | B1533-49 | CD | Headlamp Switch Module | Internal Electronic Failure |
| 0x953356 | B1533-56 | CD | Headlamp Switch Module | Invalid / Incompatible Configuration |
| 0xC21287 | U0212-87 | C | Lost Communication With Steering Column Control Module | Missing Message |
| 0xC15587 | U0155-87 | C | Lost Communication With Instrument Panel Cluster (IPC)  Control Module | Missing Message |

DTC Type is decoded as follows:

C = Continuous DTC

D = On-Demand DTC

CD = Continuous and On-Demand DTC

##### DIDs

**#Hint**: This section lists diagnostic DID which Technical Parameters get mapped to.

**#Todo**: A proper template derived from the Part 2 spec still needs to be created.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DID | Type | Size(Byte) | Name | 0x01 | 0x02 | 0x03 | Audience | Dependencies |
| 0x3B52 | BM | 4 | Trailer Status | R |  | R |  |  |
| 0x40A8 | BM | 4 | Ignition Switch/Start Button Combined Switch Status | R |  | R |  |  |
| 0x40D6 | SED | 1 | Ignition Key Switch Status | R |  | R |  |  |
| 0x41EC | SED | 1 | Left Front Fog Lamps Output | R |  | RC\* |  |  |
| 0x41F1 | SED | 1 | Rear Fog Lamps Output | R |  | RC\* |  |  |
| 0x41F3 | SED | 1 | Right Front Fog Lamps Output | R |  | RC\* |  |  |
| 0x41F6 | SED | 1 | Trailer Tow Park/Tail Lamp Output | R |  | RC\* |  |  |
| 0x426A | SED | 1 | Snow Plow Output | R |  | RC\* |  |  |
| 0x429F | PKT | 15 | Headlamp Input Status | R |  | R |  |  |
| 0x42BB | BM | 4 | Trailer Backup Assist Load Sequencing Request Status | R |  | RC\* |  |  |
| 0xFDA1 | UN | 2 | Autolamp\_Sensor\_Input\_ATD | R |  | R |  |  |
| 0xFDFA | UN | 1 | Rear Foglamp Output Target RMS Voltage Status | R |  | R |  |  |
| 0xFDFB | SED | 1 | Rear Foglamp Output PWM Frequency Status | R |  | R |  |  |
| 0x40A5 | BM | 4 | Exterior Lights | R |  | RC\* |  |  |

**Note 1:**

The value in the session shall contain between 0 to 4 characters, indicating whether or not each DID supports the following services in each session. If the value is blank for a given DID in a particular session, then this DID is not supported via any of the following services in that session.

R = DID is readable (i.e., supports diagnostic service $22 – ReadDataByIdentifier)

W = DID is writeable (i.e., supports diagnostic service $2E – WriteDataByIdentifier)

C = DID is controllable (i.e., supports diagnostic service $2F – InputOutputControlByIdentifier)

S = DID supports scaling information (i.e., supports diagnostic service $24 – ReadScalingDataByIdentifier)

RP = DID is readable periodically (i.e., supports diagnostic service $2A -ReadDataByPeriodicIdentifier)

\* = The functionality indicated by the preceding letter is locked by security access.

### Technical Parameters

**#Hint:** This section lists all Method 2, Method 3 and calibration parameters relevant for the feature deployment.

**#Link**: [*RE Wiki – Adding a Technical Signal or Parameter*](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Technical+Signal+or+Parameter)

**#Macro:** [Add Ins -> Add Requirement macro](http://wiki.ford.com/display/RequirementsEngineering/How+to+use+the+Specification+Templates#HowtousetheSpecificationTemplates-AddNewRequirement) (select “Technical Parameter” as type)

### Mappings

**#Hint**: This section lists mapping objects for Logical Signals / Parameters to their GSDB + GDT + SW counterparts (1:N mapping is supported). Mapping objects are managed in VSEM in the [*RE Data Dictionary*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SoYl_k7px3NrTD&servername=Production_Server).

**#Link:** [RE Wiki – Adding a Signal or Parameter Mapping](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Signal+or+Parameter+Mapping)

**#Macro:** Add Ins -> Add Requirement macro (select “Mapping” as type)

### Technical Interfaces

**#Hint:** This section lists port/interface details, which define how network/SW/HW signals are f / subscribed.

**#Link:** [*RE Wiki – Adding a Technical Interface*](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Technical+Interface)

#### AIS Interfaces

**#Hint:** This chapter lists the AIS subscriber and publisher interface objects (managed in VSEM), which are needed to deploy the feature to the E/E architecture. If AIS interfaces do not yet exist in VSEM, those may temporarily be managed as a workaround in the [*RE Data Dictionary*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SoYl_k7px3NrTD&servername=Production_Server).

**#Link:** [System Engineering Portal – AIS Release 3.2](https://pd3.spt.ford.com/sites/fede/vsem-spls/Shared%20Documents/02-ais/methods/AIS%20Methods%20Document.pptx?web=1)  
[RE Wiki - AIS Interfaces](http://wiki.ford.com/display/RequirementsEngineering/Adding+a+Technical+Interface#AddingaTechnicalInterface-AisInterfaces)

[*Publisher Interface AIS in VSEM*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=zjYtY3Jcx3NrTDAAAAAAAAAAAAA&servername=Production_Server)

[*Subscriber Interface AIS in VSEM*](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=LSYtewY7x3NrTDAAAAAAAAAAAAA&servername=Production_Server)

**#Macro:** Add Ins -> Add Requirement macro (select “AIS Subscriber If” or “AIS Publisher If” as type)

##### Publisher Interfaces

##### Subscriber Interfaces

#### AUTOSAR Ports

**#Hint:** Those AUTOSAR Classic (provided and required) ports, which are used by the feature but are not managed in a central repository yet, could be listed here.

### Messages/APIs

#### CAN Bus “FD1\_CAN” BCM to HCM

**#Hint:** This section gives the relevant extract from the [Central Message Database (CMDB) in VSEM](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=jXfpx2PHx3NrTDAAAAAAAAAAAAA&servername=Production_Server) .

###<MSG\_MessageID### MessageName

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CAN ID** | **Transmission Mode** | **Period** | **Signal Names** | **Transmitter(s)** | **Receiver(s)** |
| BodyInfo\_3 0x3B3 | EventPeriodic | 500 | FogLghtFrontOn\_B\_Stat | BCM | HCM |
| Ignition\_Status |
| Parklamp\_Status |
| FogLghtRearOn\_B\_Stat |
|  |
| BCM\_Lamp\_Stat 0x3C3 | EventPeriodic | 1000 | HeadLightHiOn\_B\_Stat | BCM | HCM |
| HeadLghtSwitch\_D\_Stat |
| HeadLampLoActv\_B\_Stat |
| HeadLampLoFIOn\_B\_Stat |
| HeadLampLoFrOn\_B\_Stat |
|  |
|  |
|  |
|  |
| Compressor\_Req\_FD1, 0x326 | NoMsgSendType | 0 | SnowPlowMde\_B\_Enbl | BCM | HCM |
|  |
|  |
|  |
|  |
| Steering\_Data\_FD,0X83 | NoMsgSendType | 0 | HeadLghtHiFlash\_D\_Actl | GWM | HCM |
|  |
|  |
|  |
|  |
|  |  |  |  |  |  |

#### CAN Bus “LIGHTING\_PRIVATE\_CAN” – HCM to LDM

**#Hint:** This section gives the relevant extract from the [Central Message Database (CMDB) in VSEM](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=jXfpx2PHx3NrTDAAAAAAAAAAAAA&servername=Production_Server) .

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| CAN Standard 0x50 | EventPeriodic | 500 | Front\_Fog\_Actv\_Rq | HCM | LDCMA and LDCMB |
|  |
|  |
|  |
|  |
| CAN Standard 0x55 | EventPeriodic | 20 | Ignition\_Status | HCM | LDCMA and LDCMB |
|  |
|  |
|  |
|  |
| CAN Standard 0x50 | EventPeriodic | 500 | LowBeam\_Stat | HCM | LDCMA and LDCMB |
|  |
|  |
|  |
|  |
| CAN Standard 0x6F6 | Event | 0 | TesterPhysicalResLDCMA | LDCMA | HCM |
|  |
|  |
|  |
|  |
| CAN Standard 0x6F7 | Event | 0 | TesterPhysicalResLDCMB | LDCMB | HCM |
|  |
|  |
|  |
|  |

#### CAN Bus “MS2\_CAN”

**#Hint:** This section gives the relevant extract from the [Central Message Database (CMDB) in VSEM](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=jXfpx2PHx3NrTDAAAAAAAAAAAAA&servername=Production_Server) .

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size (bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min** | **Max** |
| FogLghtFrontButtn\_B\_Rq | 1 | 005849/A -PressedNotPressed\_ET | SED | 1 | 0 |  |  |  |
|  |  | NOT PRESSED |  |  |  | (0x0) |  |  |
|  |  | PRESSED |  |  |  | (0x1) |  |  |
| FogLghtRearButtn\_B\_Rq | 1 | 005849/A -PressedNotPressed\_ET | SED | 1 | 0 |  |  |  |
|  |  | NOT PRESSED |  |  |  | (0x0) |  |  |
|  |  | PRESSED |  |  |  | (0x1) |  |  |

#### LIN Bus for MLS (LINHSM) to BCM VARIANT 1.0 (ABS)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Signal Name** | **Size (bits)** | **Detail** | **Units** | **Res.** | **Offset** | **State Encoded** | **Min** | **Max** |
| Abs\_Pos\_Stat\_LINHSM | 4 | LINHSM\_LIN\_Frm01 (54) | SED | 1 | 0 |  | 0 (0x0h) | 1 (0xFh) |
|  |  | OFF |  |  |  | (0x00h) |  |  |
|  |  | POSITION |  |  |  | (0x01h) |  |  |
|  |  | HEADLAMPS |  |  |  | (0x02h) |  |  |
|  |  | AUTOLAMPS |  |  |  | (0x03h) |  |  |
|  |  | NOTUSED1 |  |  |  | (0x04h) |  |  |
|  |  | NONE |  |  |  | (0x05h) |  |  |
|  |  | NOTUSED2 |  |  |  | (0x06h) |  |  |
|  |  | NOTUSED3 |  |  |  | (0x07h) |  |  |

#### LIN Bus for MLS (LINHSM(96)) from BCM - VARIANT 1.1 (RELATIVE)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HS\_Ind\_Pos | 4 | BCM\_LIN\_Frm01(40) | SED | 1 | 0 |  | 0 (0x0h) | 1 (0xFh) |
|  |  | OFF |  |  |  | (0x00h) |  |  |
|  |  | POSITION |  |  |  | (0x01h) |  |  |
|  |  | HEADLAMPS |  |  |  | (0x02h) |  |  |
|  |  | AUTOLAMPS |  |  |  | (0x03h) |  |  |
|  |  | NOTUSED1 |  |  |  | (0x04h) |  |  |
|  |  | NONE |  |  |  | (0x05h) |  |  |
|  |  | NOTUSED2 |  |  |  | (0x06h) |  |  |
|  |  | NOTUSED3 |  |  |  | (0x07h) |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ignition\_Status | 4 | BCM\_LIN\_Frm01(36) | SED | 1 | 0 |  | 0 (0x0h) | 1 (0xFh) |
|  |  | UNKNOWN |  |  |  | (0x00h) |  |  |
|  |  | OFF |  |  |  | (0x01h) |  |  |
|  |  | ACCESSORY |  |  |  | (0x02h) |  |  |
|  |  | RUN |  |  |  | (0x03h) |  |  |
|  |  | START |  |  |  | (0x04h) |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parklamp\_Status | 2 | BCM\_LIN\_Frm01(34) | SED | 1 | 0 |  | 0 (0x0h) | 1 (0xFh) |
|  |  | OFF |  |  |  | (0x00b) |  |  |
|  |  | ON |  |  |  | (0x01b) |  |  |
|  |  | UNKNOWN |  |  |  | (0x10b) |  |  |
|  |  | INVALID |  |  |  | (0x11b) |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HeadLghtLvlEnbl\_B\_Stat | 1 |  | SED | 1 | 0 |  | 0 (0x0) | 1  (0x1) |
|  |  | OFF |  |  |  | (0x0b) |  |  |
|  |  | ON |  |  |  | (0x1b) |  |  |

#### AUTOSAR Interfaces

**#Hint:** Those AUTOSAR Classic (Sender/Receiver and Client/Server) Interfaces, which are used by the feature but not managed in a central repository yet, should be listed here.

#### SOA Service Contracts

**#Hint:** This part of the Data Dictionary lists Service APIs/MQTT messages and embedded data elements, which are used for the Service Oriented Architecture (SOA). If those APIs/MQTT messages already exist e.g. in the [*Central SW Service Catalog*](http://wiki.ford.com/display/CS/Service+Catalog), simply add a reference to those yet.

Information on FNV2 SOA can be found in the ECG wiki page

* MQTT Topic Naming: [*FNV2-SOA: MQTT Topic and Message Structure*](https://www.eesewiki.ford.com/display/ecg/FNV2-SOA%3A+MQTT+Topic+and+Message+Structure?src=sidebar)
* message syntax and proper naming can be found [*SOA API Messaging Guidelines*](https://www.eesewiki.ford.com/x/Q7rKAg)

For examples what to fill into the table fields below refer to [*Central SW Service Catalog*](http://wiki.ford.com/display/CS/Service+Catalog)

###<ServiceContractID>### Service Contract Name

<Service contract purpose/behavior>

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Messaging Pattern | Frequency  (For Data Broadcast Only) | Message Data Element(s)  (Must Match GPB) or applicable CAN signal | Description of Data Element(s) | Topic Name |
| Choose an item. |  | GBP Data element / CAN Signal name 1 | Detailed encoding of data element 1 |  |
| … |  |  |
| GBP Data element / CAN Signal name 1 | Detailed encoding of data element 3 |  |

### Encoding Types

**#Link:** [*RE Wiki – Adding Encoding Types*](http://wiki.ford.com/display/RequirementsEngineering/Adding+an+Encoding+Type)

**#Macro:** Add Ins -> Add Requirement macro (select “Encoding Type” as type)

Document ends here.