Feature Document (FD)

Cellular Remote Door Lock & Unlock

<<Feature>>
(Fn010221)

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CONTENTS

List of Figures

List of Tables

1 INTRODUCTION

1.1 Document Purpose

A Feature Document (FD) document specifies **what** the feature shall do and how it shall behave from customer perspective. It should also provide reasoning and background **why** we have the feature in the vehicle.

The FD also serves as an Item Definition as defined by ISO26262 for those features, which follow the Ford Functional Safety process.

To get more information about the concept of feature, function and component level abstraction refer to the Ford RE Wiki. For details on the Ford Functional Safety (ISO26262) process refer to the Ford Functional Safety Sharepoint.

1.2 Document Scope

This Feature Document (FD) specifies the following features:

Feature ID	Feature Name	Owner	Reference
Fn010221	Cellular Remote Door Lock & Unlock (Program(s): All)	Audriene Bell, abell101	

Table 1: Features described in this FD

1.3 Document Audience

The FD is written by the feature owner of Audriene Bell, abell101. All Stakeholders, i.e., all people who have a valid interest in the feature should read and, if possible, review the FD. It needs to be guaranteed, that all stakeholders have access to the currently valid version of the FD.

*#**Hint:** The FD template has the IP Classification "Proprietary" by default. IP Classification "Confidential" might be required in some cases, e.g. by Ford Functional Safety.*

1.3.1 Stakeholder List

For the latest list of stakeholder of the feature and their influence refer to <Put VSEM Link here>.

*#**Hint:** Refer to **Ford RE Wiki – Stakeholder List** on how to create a stakeholder list. The stakeholder list should be stored in VSEM in the pseudo folder "General Data Artifacts" of the corresponding feature.*

1.4 Document Organization

1.4.1 Document Context

Refer to the Specification Structure page in the Ford RE Wiki to understand how the FD relates to other Ford Requirements Documents and Specifications.

1.4.2 Document Structure

The structure of this document is explained below:

Section 1 – Introduction how to use this document including responsibilities and requisite documents. Explains the terminology. Gives a clarification of the definitions, concepts and abbreviations used in the document.

Section 2 – Feature Description. States briefly the background and the purpose of the feature, feature variants and corresponding regions and markets. Also includes input requirements, assumptions and constraints.

Section 3 – Feature Context describes all external entities, which have an influence on the feature.

Section 4 – Feature Modeling. Contains Use Case, Driving Scenarios, State Charts to describe the functional behavior of the feature.

Section 5 – Safety. Lists System Behaviors and Safety Goals of the feature.

Section 6 – Feature Requirements. Lists functional and non-functional requirements of the feature.

Section 7 – Architecture. Shows the coarse architecture, which the feature requirements are deployed to. Describes the elements and the boundary of the feature as well as the decomposition and distribution of associated functions.

Section 8 – List of Open Concerns

Section 9 – Document Change History including a list of new or modified requirements. The requirements in this document are tagged, and this section contains different types of tables listing all, new, or changed requirements by their title and page no.

Section 10 – Appendix

*#**Hint:** All sections are mandatory, unless explicitly marked by the tag "#Classification" as "optional" or as applicable e.g. to certain domains like "Functional Safety".*

1.5 Document Conventions

1.5.1 Requirements Templates

Each requirement, use case or scenario in this specification shall follow the corresponding template given in the document template *Specification_Macros.dotm* at RE Wiki - Specification Templates.

1.5.1.1 Identification of requirements

1.5.1.2 Requirements Attributes

The templates provided by *Specification_Macros.dotm* define a list of attributes for each requirement. This helps to classify the requirement. The attributes are explained at RE Wiki - Requirements Attributes.

1.6 References

1.6.1 Ford Documents

List here all Ford internal documents, which are directly related to the feature.

Reference	Title	Doc. ID	Document Location	Revision
SRC1	Control My Car v3 ECG SPSS v1.5			
SRC2	Control My Car Implementation Guide v1.5			
SRC3	ECG Common Functions SPSS v1.1			
SRC4	ECG-TCU Interface Power State Management ECG SPSS v1.0			
SRC5	Power Management ECG SPSS v2.0			
SRC6	Stolen Vehicle Services OnBoardClient SPSS v1.9			
SRC7	Embedded Modem Reset Server v2 SPSS v1.5			
SRC8	Body Control Module Functional Specification FS-LU5T-14B476-AAC			

Reference	Title	Doc. ID	Document Location	Revision
SRC9	Control My Car FTCP Protofile			
SRC10	Vehicle to Cloud Security Spec v1.2			

Table 2: Ford internal Documents

1.6.2 External Documents and Publications

The list of external documents could include books, reports and online sources.
*#**Hint:** You may refer to IEEE Citation Reference on how to format a reference.*

Reference	Document / Publication	Document Location

Table 3: External documents and publications *(not specified in SysML model)*

1.7 Glossary

*#**Hint**: Terms, concepts and abbreviations used in the document shall be defined and illustrated here. Note that changes to terms and/or concepts described in this section tend to cause major updates to this document.*
The tables below have feature specific definitions and abbreviations. For additional, non-feature specific terms please refer to the RE Glossary

See Appendix for Definitions and Abbreviations.

1.7.1 Parameters / Values

Name	Description	Range / Resolution

Table 4: Parameters / Values used in this document *(Not supported by MagicDraw report generation)*

2 FEATURE OVERVIEW

2.1 Purpose and Description of Feature

*#**Hint:** Some descriptive text to explain the purpose and functionality of the feature.*

In order to deliver an enhanced customer experience and to evolve FORD's connectivity leadership, the FORD mobile application will include a series of command control features developed to provide an expanded suite of remote connectivity to customers.

The purpose of this Feature Document is to explain the functionality of the command and control features, specifically the Remote Door Lock and Unlock, which will be delivered to the customer and provide a series of user requirements needed to achieve this functionality.

2.2 Feature Variants

*#**Hint:** Definitions for different variants of the feature (if applicable). Give each variant a descriptive name by which it can be referenced further on in the document. If no variant exists, state "No Feature Variants".*
The Variant Description should give a short informative text which describes the variants of the feature.

Variant Name	Variant Description	Remarks
FNV2	8 Networks: MS CAN (BCM), HS CAN (PCM, Body), FD CAN (ADAS), ETHERNET – UNTRUSTED (SYNC, TCU), ETHERNET – TRUSTED (IPC), LIN, DIAG1 (OBDII), DIAG2 (OBDII)	

Table 5: Feature Variants

2.2.1 Regions & Markets

*#**Hint:** Description of purpose and functionality of the feature. If there is no variant, give feature name in first column.*

Market / Region / Variant Name	North America	South America	Europe	Middle East/Africa	Asia / Pacific	China
FNV2	Mandatory	Optional	Optional	Optional	Optional	Optional

Table 6: Regions & Markets

2.3 Input Requirements

*#**Hint:** List all input requirements, which are relevant for the feature. Typically, attribute requirements, legal requirements as well as national and international standards have to be considered.*

2.3.1 Legal Requirements

No Legal Requirements specified.

2.3.2 Trustmark Requirements

No Trustmark Requirements specified.

2.3.3 Industry Standards

- : ISO 26262
  - The system should be developed according to Ford's implementation of Functional Safety.

2.4 Lessons Learned

*#**Hint:** Additional information and lessons learned from previous development or related features. A typical source for Lessons Learned is the FMA Quality History.*
*#**Functional Safety:** In context of Functional Safety Lessons Learned and similar information will be used to check the completeness of the Functional Safety Goals and assumptions in the Hazard Analysis and Risk Assessment (HARA).*
*#**Link:** Ford Functional Safety Sharepoint*

1. Ensure all stakeholders are notified when any changes occur in CCS settings. Particularly FordPass must be able to support any changes to meta settings and feature settings.

2.5 Assumptions

*#**Classification**: Optional*
*#**Hint:** A list of known assumptions concerning the effects of the feature's behavior on other features or elements (i.e., dependencies) as well as assumptions on the behavior expected by the feature (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 remains mostly empty. For assumptions, which are relevant for the Functional Safety process refer to chapter 6.2 "Safety Assumptions"*

RS_Assump_1 Valid FordPass Account

The user has installed and created a valid login account for the FORD/LINCOLN owner mobile app

Purpose

RS_Assump_2 Provisioned VIN

The user has registered an eligible vehicle VIN (defined as a VIN which is known to have an ECG installed and has sent a provisioning message to the VSDN / TMC)

Purpose

RS_Assump_3 Authorization

The user has completed the authorization process for the eligible vehicle VIN

Purpose

RS_Assump_4 Shared Access

Shared access allows multiple users to create an account for a vehicle

Purpose

RS_Assump_5 ECG Swap

Swapping the ECG shall not affect vehicle remote controls

Purpose

3 FEATURE CONTEXT

3.1 Feature Context Diagram

*#**Hint:** High level diagram of feature interactions with the environment, people or other feature or other external entities.*
*#**Link:** RE Wiki - Context Diagram*

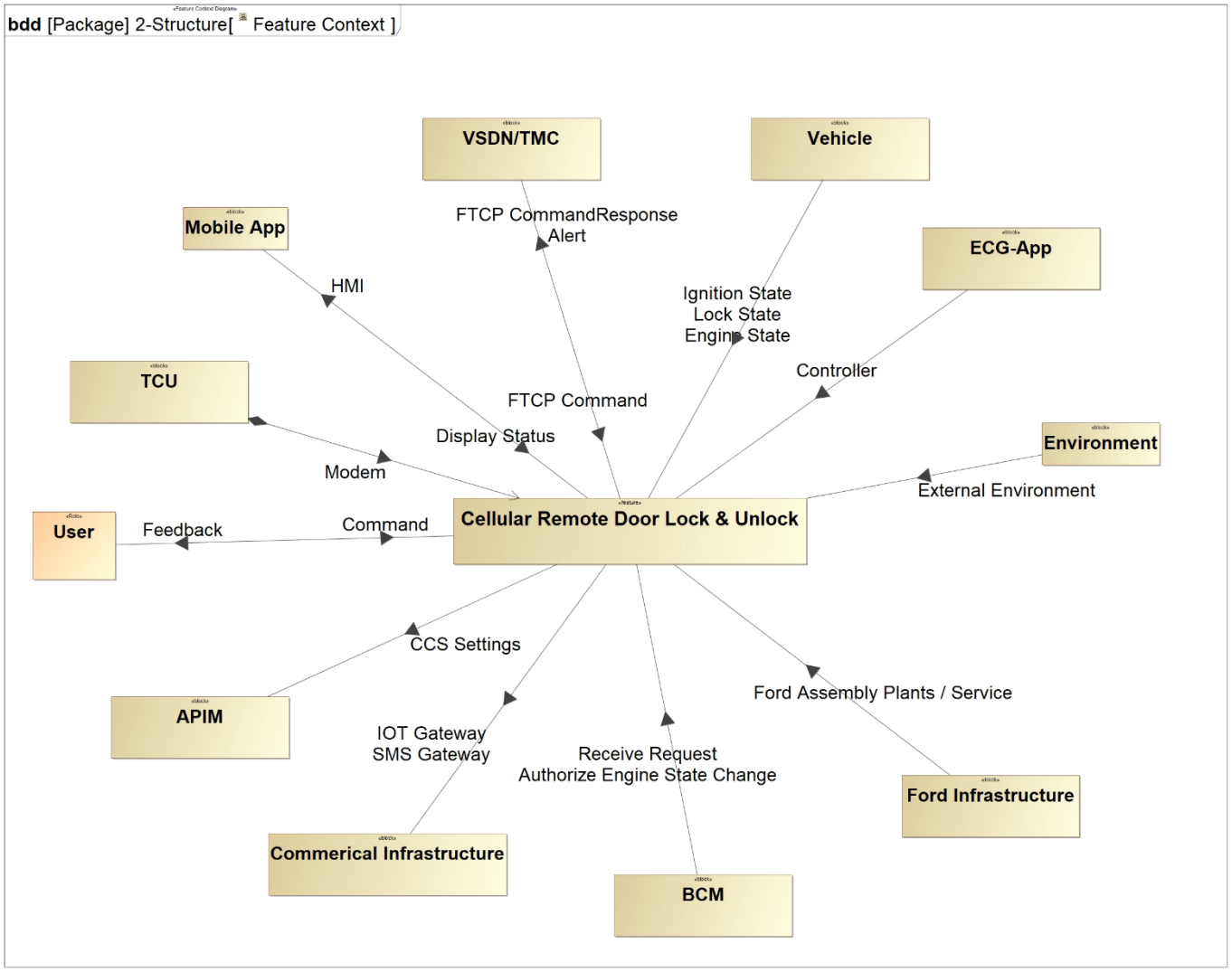

Figure 1: Feature Context

3.2 List of Influences

ID	External Entity	Influence Description
CCS Settings	Cellular Remote Door Lock & Unlock To APIM	Privacy Settings
Central Controller	ECG To Cellular Remote Door Lock & Unlock	Central controller in FNV to manage information and serve as a central computing resource
Command	Cellular Remote Door Lock & Unlock To User	Command sent to vehicle from user

Controller	ECG-App To Cellular Remote Door Lock & Unlock	Feature specific controller: Control My Car App
Display Status	Mobile App To Cellular Remote Door Lock & Unlock	View feature status
External Environment	Environment To Cellular Remote Door Lock & Unlock	External environmental effects: • EMC/ESD effects (consumer devices with LF/UHF) • Radio towers • RF barriers (buildings, vehicles); • Fluid ingress (spill on antennas); ice/snow ingress; Dust/Mud
Feedback	User To Cellular Remote Door Lock & Unlock	Feedback of request displayed to user
Ford Assembly Plants / Service	Ford Infrastructure To Cellular Remote Door Lock & Unlock	System effects due to manufacturing processes
FTCP Command	Cellular Remote Door Lock & Unlock To VSDN/TMC	Create FTCP command for request
	Mobile App To Cellular Remote Door Lock & Unlock	Create FTCP command for request
FTCP CommandResponse	VSDN/TMC To Cellular Remote Door Lock & Unlock	Decode status, create FTCP command response
HMI	Cellular Remote Door Lock & Unlock To Mobile App	Display user options and feature information
Ignition State Lock State Engine State	Vehicle To Cellular Remote Door Lock & Unlock	• Ignition Status • Vehicle Locks • Engine State
IOT Gateway SMS Gateway	Cellular Remote Door Lock & Unlock To Commercial Infrastructure	• ATT is the Mobile Network Operator for NA • China Unicom is the Network Operator for China • MNO is the interface between the FordPass/Lincoln Way apps and the VSDN / TMC Cloud
Modem	TCU To Cellular Remote Door Lock & Unlock	Connection to cellular network
Receive Request Authorize Door Lock Change	BCM To Cellular Remote Door Lock & Unlock	Determine if conditions are correct and if correct authorize door lock or unlock

Table 7: List of Influences

4 FEATURE MODELING

4.1 Operation Modes and States

*#**Classification:** Optional (Mandatory for Functional Safety)*
*#**Link:** RE Wiki – State Charts*
*#**Hint:** State Charts are a popular means to express feature behavior in terms of states and modes. An advantage of this state machine like approach is that consistency can be easily verified.*

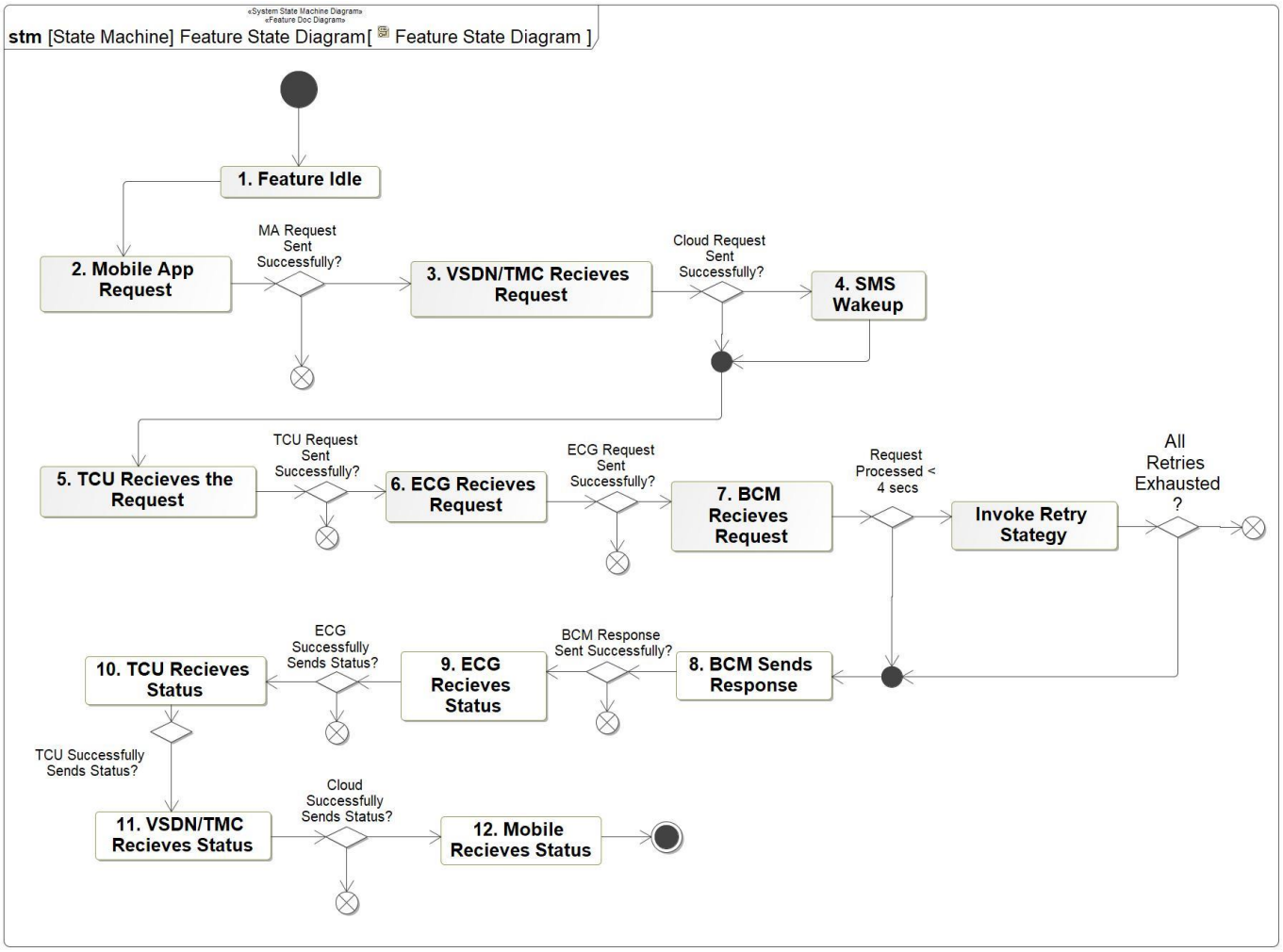

Figure 2: Feature State Diagram

State	Description	Requirements Reference (optional)
1. Feature Idle	No request has been made	
2. Mobile App Request	User initiates the request from the Mobile App	
3. VSDN/TMC Receives Request	VSDN/TMC receives the request, processes it and sends to the vehicle	
4. SMS Wakeup	SMS Wakeup message sent to vehicle for connection	

5. TCU Receives the Request	TCU receives the request and sends to the ECG	
6. ECG Receives Request	ECG processes the request and sends to the BCM	
7. BCM Receives Request	BCM receives the request, determines if conditions are correct and processes the request	
8. BCM Sends Response	BCM sends the status of the request to the ECG	
9. ECG Receives Status	ECG sends the status to the TCU	
10. TCU Receives Status	TCU sends the status to VSDN/TMC	
11. VSDN/TMC Receives Status	VSDN/TMC sends the status to the Mobile App	
12. Mobile Receives Status	Mobile App displays the status of the request	
Invoke Retry Strategy	Two retry requests in total	

Table 8: Operation Modes and States on Feature State Diagram

Transition ID	**Description**	**Requirements Reference** (optional)
T1		
T2	Name: ECG Successfully Sends Status to TCU	
T3	Name: Send Request to VSDN/TMC	
T4		
T5	Name: Send Failure Status to Mobile App	
T6	Name: Mobile App Displays Status	
T7	Name: ECG Sends the Request to the BCM	
T8	Name: ECG Successfully Recieves the Request	
T9	Name: Send Failure Status to Mobile App	
T10	Name: VSDN/TMC Sends Status to Mobile App	
T11	Name: TCU Successfully Sends Status	
T12	Name: BCM Successfully Recieves the Request	
T13	Name: Request Successfully Sent	
T14		
T15	Name: ECG Sends Status to TCU	
T16	Name: Send Failure Status to Mobile App	
T17	Name: Send request to the vehicle	
T18	Name: Request Sent to TCU Successfully	
T19	Name: Send Failure Status to Mobile App	
T20	Name: TCU Sends Status to VSDN/TMC	
T21		
T22	Name: BCM Sends Status to ECG	
T23		
T24	Name: BCM Processes the Request	

T25	Name: BCM does not process the request within 4 seconds	
T26	Name: SMS Wakeup	
T27	Name: Retry Successful	
T28	Name: Send Failure Status to Mobile App	
T29	Name: Request Successfully Sent	
T30	Name: Vehicle Wakeup Successful	
T31	Name: User selects a request on the Mobile App	
T32	Name: No Request	
T33	Name: TCU sends the request to the ECG	
T34	Name: Send Failure Status to Mobile App	
T35	Name: Send Failure Status to Mobile App	

Table 9: Transitions between Operation Modes and States on Feature State Diagram

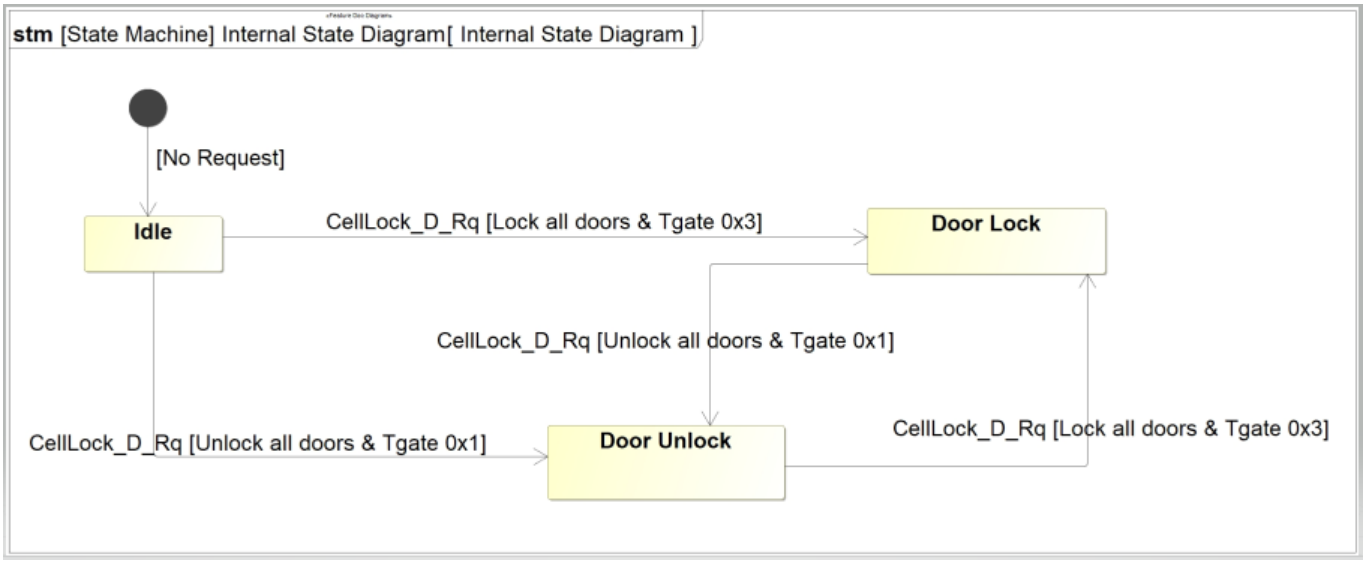

Figure 3: Internal State Diagram

State	Description	Requirements Reference (optional)
Door Lock	Veh_Lock_Status = LOCK_ALL	
Door Unlock	Veh_Lock_Status = UNLOCK_ALL	
Idle	Feature is idle	

Table 10: Operation Modes and States on Internal State Diagram

Transition ID	Description	Requirements Reference (optional)
T1	Guard: =No Request	
T2	Guard: =Lock all doors & Tgate 0x3	
T3	Guard: =Unlock all doors & Tgate 0x1	
T4	Guard: =Lock all doors & Tgate 0x3	
T5	Guard: =Unlock all doors & Tgate 0x1	

Table 11: Transitions between Operation Modes and States on Internal State Diagram

4.2 Use Cases

*#**Classification:** Optional*
*#**Link:** RE Wiki – Use Cases*

4.2.1 Use Case Diagram

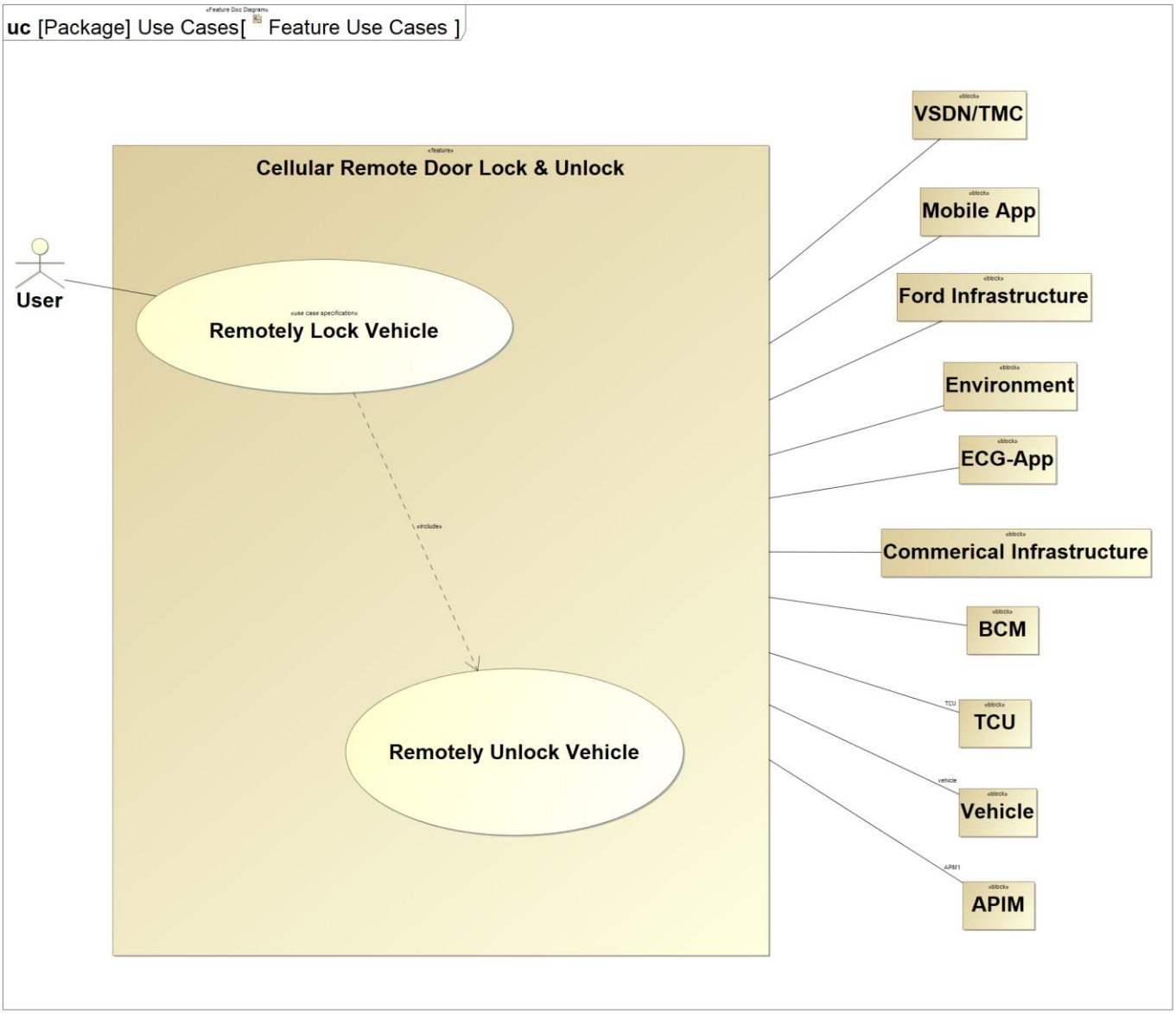

Figure 4: Feature Use Cases

4.2.2 Actors

Actor	Description
User	Customer or End-User

Table 12: List of Actors

4.2.3 Use Case Descriptions

*#**Classification:** Optional*

UC_RDLU_1 Remotely Lock Vehicle

Actors		User
Subject		Cellular Remote Door Lock & Unlock
Description		
Preconditions	PreC1	ECG / TCU has established connection with the cellular network
	PreC2	ECG / TCU installed successfully
	PreC3	ECG / TCU is authorized
	PreC4	ECG / TCU is provisioned
	PreC5	User registered and logged into the mobile app
Triggers	T1	User selects lock button on the Mobile App
Main Flow Description		Vehicle doors unlock and notification is sent to the user
Main Flow	M1	User selects the remote door lock button on the FordPass or Lincoln Way mobile app
	M2	Mobile App sends Remote Door Lock request to VSDN / TMC
	M3	VSDN / TMC receives Remote Door Lock request, processes it, converts to an FTCP Command and publishes the command to the ECG
	M4	ECG subscribes to the command, processes it and sends the request to the ECG-App
	M5	ECG-App processes the request and sends to the BCM
	M6	BCM receives the request and sends the response back to VSDN / TMC
	M7	BCM sends the status to the ECG-App
	M8	ECG-App sends the status to the ECG, which decodes the information and sends to the VSDN / TMC
	M9	VSDN / TMC sends the status of the request to the Mobile App to display to the user
Alternative Flow Description		User has turned off CCS setting Vehicle Connectivity through Sync
Alternative Flow Description		User has turned off CCS setting Vehicle Data through Sync
Alternative Flow Steps	A1	Cloud Command Processing Service determines vehicle User has turned Cloud connectivity, or Ford Cloud Control OFF through SYNC via CCS settings vehicle Connectivity Off (Remote Door Lock feature disabled)
	A2	Cloud Command Processing Service determines vehicle User has turned Vehicle Data, or Ford Cloud Control OFF through SYNC via CCS settings Vehicle Data Off (Remote Door Lock feature disabled)
Exceptional Flow Steps	E1	The Mobile App is unable to send the request to VSDN / TMC because there is no cellular or wifi connection
	E2	VSDN / TMC is unable to send the request to the vehicle because the vehicle is in deep sleep mode
	E3	The ECG-App is unable to send the request to the BCM due to a CAN error
	E4	The ECG is unable to send the command response to VSDN / TMC due to cellular disconnection between the vehicle and cloud
	E5	The ECG is unable to send the alert to the VSDN / TMC due to cellular disconnection between the vehicle and cloud
	E6	The BCM determines the conditions are not correct to lock the vehicle doors

UC_RDLU_2 Remotely Unlock Vehicle

Actors		
Subject		Cellular Remote Door Lock & Unlock
Description		
Preconditions	PreC1	CG / TCU installed successfully
	PreC2	ECG / TCU has established connection with the cellular network
	PreC3	ECG / TCU is authorized
	PreC4	ECG / TCU is provisioned
	PreC5	User registered and logged into the mobile app
Triggers	T1	User selects the unlock button on the Mobile App
Main Flow Description		Vehicle doors successfully unlock and notification is sent to the user
Main Flow	M1	User selects the Remote Door Unlock button on the Mobile App
	M2	Mobile App sends Remote Door Unlock request to VSDN / TMC
	M3	VSDN / TMC receives Remote Door Unlock request, processes it, converts to an FTCP Command and publishes the command to the ECG
	M4	ECG subscribes to the command, processes it and sends the request to the ECG-App
	M5	ECG-App processes the request and sends to the BCM
	M6	BCM receives the request and sends the response back to VSDN / TMC
	M7	BCM sends the status to the ECG-App
	M8	ECG-App sends the status to the ECG, which decodes the information to the VSDN / TMC
	M9	VSDN / TMC sends the status of the request to the Mobile App to display to the user
Alternative Flow Steps	A1	User has turned off CCS setting Vehicle Connectivity through Sync
	A2	User has turned off CCS setting Vehicle Data through Sync
Exceptional Flow Description		Cloud Command Processing Service determines vehicle User has turned Cloud connectivity, or Ford Cloud Control OFF through SYNC via CCS settings vehicle Connectivity Off (Remote Door Unlock feature disabled)
Exceptional Flow Description		Cloud Command Processing Service determines vehicle User has turned Vehicle Data, or Ford Cloud Control OFF through SYNC via CCS settings Vehicle Data Off (Remote Door Unlock feature disabled)
Exceptional Flow Steps	E1	The Mobile App is unable to send the request to VSDN / TMC because there is no cellular or wifi connection
	E2	VSDN / TMC is unable to send the request to the vehicle because the vehicle is in deep sleep mode
	E3	The ECG-App is unable to send the request to the BCM due to a CAN error
	E4	The BCM determines the conditions are not correct to the unlock the vehicle
	E5	The ECG is unable to send the command response to VSDN / TMC due to cellular disconnection between the vehicle and cloud
	E6	The ECG is unable to send the alert to the VSDN / TMC due to cellular disconnection between the vehicle and cloud

4.3 Driving and Operation Scenarios

*#**Classification:** Optional (Mandatory for Functional Safety)*
*#**Functional Safety:** Driving and operating scenarios which impact the functionality of the feature can be used to check, if the situation analysis in the HARA is complete*
*#**Link:** RE Wiki – Driving Scenarios*

4.4 Decision Tables

*#**Classification:** Optional*
*#**Link:** RE Wiki – Decision Tables.*
*#**Hint:** Use decision table, if behavior is not state based (in that case prefer state chart from ch. 4.1) and based purely on current inputs.*

Not supported by MagicDraw report generation.

5 FEATURE REQUIREMENTS

*#**Functional Safety:** In general, safety requirements are not listed here. However, it is possible that later in the development process, a non-safety requirement becomes a safety requirement. In such a case it may remain on this list.*
*#**Link:** RE Wiki – How to write good requirements.*

5.1 Functional Requirements

R_F_RDLU_1 Remote Door Lock Pre-Conditions

The following must be true before the Remote Lock command is processed:

- The battery power is not below threshold for vehicle to enter DRx mode
- The vehicle is in an area with good cell reception
- MMOTA has inhibited vehicle functionality

Requirement ID: R_F_RDLU_1

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_2 Lock Request User Interface

The user shall be able to remotely lock their vehicle using the mobile app

Requirement ID: R_F_RDLU_2

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_3 Initiate Remote Lock

The user shall select and hold the remote lock button to initiate the process

Requirement ID: R_F_RDLU_3

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_4 Lock Request to Cloud

The VSDN / TMC will receive the lock request, convert to an FTCP command and publish it to the vehicle

Requirement ID: R_F_RDLU_4

Rationale	
Acceptance Criteria	

Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_5 Publish Lock Command

The vehicle shall subscribe the Remote Door Lock command and process it

Requirement ID: R_F_RDLU_5

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_6 Publish Lock Command Response

The vehicle shall publish the Remote Door Lock command response to the VSDN / TMC

Requirement ID: R_F_RDLU_6

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_7 Mobile App Displays Lock Status

When the vehicle sends the command response back to VSDN / TMC, the mobile app will display a success message on the mobile app.

Requirement ID: R_F_RDLU_7

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_8 Remote Door Unlock Pre-Conditions

The following must be true before the Remote Unlock command is processed:

- The battery power is not below threshold for vehicle to enter DRx mode
- The vehicle is in an area with good cell reception
- MMOTA has inhibited vehicle functionality

Requirement ID: R_F_RDLU_8

Rationale			
Acceptance Criteria			
Notes	Remote Door Unlock Requirements		
Source		**Owner**	

Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_9 Unlock Request User Interface

The user shall be able to remotely unlock their vehicle using the mobile app

Requirement ID: R_F_RDLU_9

Rationale					
Acceptance Criteria					
Notes	Remote Door Unlock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

R_F_RDLU_10 Initiate Remote Unlock

The Remote Door Unlock request is sent remotely by pressing and holding the door unlock button on the Mobile App

Requirement ID: R_F_RDLU_10

Rationale					
Acceptance Criteria					
Notes	Remote Door Unlock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

R_F_RDLU_11 Unlock Request to Cloud

The VSDN / TMC will receive the unlock request, convert to an FTCP command and publish it to the vehicle

Requirement ID: R_F_RDLU_11

Rationale					
Acceptance Criteria					
Notes	Remote Door Unlock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

R_F_RDLU_12 Publish Unlock Command

The vehicle shall subscribe the Remote Door unlock command and process it

Requirement ID: R_F_RDLU_12

Rationale					
Acceptance Criteria					
Notes	Remote Door Unlock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

R_F_RDLU_13 Publish Unlock Command Response

The vehicle shall publish the Remote Door Unlock command response to the VSDN / TMC

Requirement ID: R_F_RDLU_13

Rationale					
Acceptance Criteria					
Notes	Remote Door Unlock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

R_F_RDLU_14 Mobile App Displays Unlock Status

Once the vehicle sends the remote unlock command response back to VSDN / TMC, the mobile app will display a success message on the mobile app. All other remote control functions will be re-enabled

Requirement ID: R_F_RDLU_14

Rationale					
Acceptance Criteria					
Notes	Remote Door Unlock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

R_F_RDLU_15 CVFMA Feature Capabilities

Remote Door Lock and Unlock feature capabilities shall be determined by CVFMA

Requirement ID: R_F_RDLU_15

Rationale					
Acceptance Criteria					
Notes	Feature Capability				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_16 DRX Power Mode

Remote Door Lock or Unlock requests will not be serviced when the vehicle is in DRx mode

Requirement ID: R_F_RDLU_16

Rationale					
Acceptance Criteria					
Notes	Discontinuous Reception Mode (DRx)				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_17 Ignition On

Remote Door Lock and Unlock requests will be serviced when the ignition is manually turned on

Requirement ID: R_F_RDLU_17

Rationale	
Acceptance Criteria	
Notes	Discontinuous Reception Mode (DRx)

Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_18 Battery Critical State of Charge

Remote Door Lock or Unlock requests will not be serviced when the battery state of charge falls to a critical state of charge

Requirement ID: R_F_RDLU_18

Rationale					
Acceptance Criteria					
Notes	Discontinuous Reception Mode (DRx)				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_19 Clear DRx Mode

Deep sleep mode shall be cleared by the sleep status alert, SleepStateChangeAlert (CR: 441)

Requirement ID: R_F_RDLU_19

Rationale					
Acceptance Criteria					
Notes	Discontinuous Reception Mode (DRx)				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_20 Exiting LPR Mode

An SMS message is required to wake the vehicle and process a Remote Door Lock or Unlock request when the ignition has been off for more than 30 minutes transitioning the vehicle to LPR mode

Requirement ID: R_F_RDLU_20

Rationale					
Acceptance Criteria					
Notes	Low Power Registered Mode (LPR)				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_21 Re-enter LPR Mode

When the Remote Door Lock or Unlock request is processed, the vehicle will transition back to LPR mode

Requirement ID: R_F_RDLU_21

Rationale					
Acceptance Criteria					
Notes	Low Power Registered Mode (LPR)				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_22 Authorization

The user must complete the authorization process and accept the Terms and Conditions before the feature is available

Requirement ID: R_F_RDLU_22

Rationale					
Acceptance Criteria					
Notes	Authorization				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_23 Base Feature

Remote Door Lock and Unlock features shall be available as part of the base FordPass and Lincoln Way features

Requirement ID: R_F_RDLU_23

Rationale					
Acceptance Criteria					
Notes	Subscription Management				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_24 Subscription

Remote Door Lock and Unlock feature shall not require a subscription

Requirement ID: R_F_RDLU_24

Rationale					
Acceptance Criteria					
Notes	Subscription Management				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_25 Enrollment

Remote Door Lock and Unlock features are enrolled when the vehicle is authorized

Requirement ID: R_F_RDLU_25

Rationale					
Acceptance Criteria					
Notes	Feature Enrollment				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_26 De-Authorization Functionality

Remote Door Lock and Unlock are disabled once the vehicle is de-authorized

Requirement ID: R_F_RDLU_26

Rationale	

Acceptance Criteria					
Notes	De-Authorization				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_27 Brand Connect Master Reset Functionality

An authorized user shall complete a Brand Connect Master Reset through the vehicle HMI or the mobile app to reset the embedded modem. In addition, the user shall have the option to clear user settings. When the Brand Connect Master Reset is complete, all user settings are removed and remote vehicle controls will be disabled

Requirement ID: R_F_RDLU_27

Rationale					
Acceptance Criteria					
Notes	Brand Connect Master Reset				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_28 CCS Meta Settings

Vehicle Connectivity and Vehicle Data meta settings are required to be enabled to use the Remote Door Lock and Unlock feature

Requirement ID: R_F_RDLU_28

Rationale					
Acceptance Criteria					
Notes	Consumer Connectivity Settings (CCS)				
Source				**Owner**	
Source Req.				**V&V Method**	
Type	New	**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_29 Vehicle Connectivity

When Vehicle Connectivity is disabled, the Remote Door Lock and Unlock feature shall be disabled

Requirement ID: R_F_RDLU_29

Rationale					
Acceptance Criteria					
Notes	Consumer Connectivity Settings (CCS				
Source				**Owner**	
Source Req.				**V&V Method**	
Type	New	**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_30 Vehicle Data Settings

When Vehicle Data is disabled, the Remote Door Lock and Unlock feature shall be disabled

Requirement ID: R_F_RDLU_30

Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	

Type	New	Priority		Status	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_31 Slamlock Regions

CR 248 – Slamlock Compensation logic for China and Europe: EU and China vehicles shall be equipped with slamlock

Requirement ID: R_F_RDLU_31

Rationale					
Acceptance Criteria					
Notes	Regional Requirements				
Source				Owner	
Source Req.				V&V Method	
Type		Priority		Status	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_32 Slamlock Definition

CR 248 – Slamlock Compensation logic for China and Europe: The vehicle shall be configured to enable slamlock where if the door is ajar, the vehicle will successfully lock and subsequently unlock all doors

Requirement ID: R_F_RDLU_32

Rationale					
Acceptance Criteria					
Notes	Regional Requirements				
Source				Owner	
Source Req.				V&V Method	
Type		Priority		Status	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_33 Slamlock Implementation

CR 258 –The VVSDN / TMC will monitor the VSTAT message from the command response and door ajar signal for the ajar state of the doors

Requirement ID: R_F_RDLU_33

Rationale					
Acceptance Criteria					
Notes	Regional Requirements				
Source				Owner	
Source Req.				V&V Method	
Type		Priority		Status	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_34 Status Code

CR 258 -If the VVSDN / TMC determines one or more door is ajar, the VSDN / TMC will modify the response sent to the mobile app and the status code

Requirement ID: R_F_RDLU_34

Rationale					
Acceptance Criteria					
Notes	Regional Requirements				
Source				Owner	
Source Req.				V&V Method	
Type		Priority		Status	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_35 EU ad China Modified Response

CR 258 - For EU and China regions, the VVSDN / TMC will modify the response to "Door Lock Fail"

Requirement ID: R_F_RDLU_35

Rationale					
Acceptance Criteria					
Notes	Regional Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_36 NA Modified Response

CR 258 - For NA regions, the VSDN / TMC will modify the response to "Door locked & Ajar"

Requirement ID: R_F_RDLU_36

Rationale					
Acceptance Criteria					
Notes	Regional Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_37 Hood, Tailgate, Trunk Ajar

CR 440 - A warning status is included for the Trunk, Hood and Tailgate is ajar and sending a Remote Door Lock request

Requirement ID: R_F_RDLU_37

Rationale					
Acceptance Criteria					
Notes	Regional Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_38 NA Additional Modified Response

CR 440 - The message displayed on the mobile app for vehicles that have Trunk, Hood or Tailgate ajar are:
Doors locked, but your hood is ajar
Doors locked, but your trunk is ajar
Doors locked, but your tailgate is ajar

Requirement ID: R_F_RDLU_38

Rationale					
Acceptance Criteria					
Notes	Regional Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_39 Wearables Supported

Android and iOS wearables shall be supported

Requirement ID: R_F_RDLU_39

Rationale					
Acceptance Criteria					
Notes	Wearables Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_40 Request Lock/Unlock Using Wearables

Remote Door Lock and Unlock requests shall be sent using Android or iOS wearables

Requirement ID: R_F_RDLU_40

Rationale					
Acceptance Criteria					
Notes	Wearables Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_41 Wearables: Display Progress

When the remote request is sent using the wearable, the progress shall be displayed on the wearable

Requirement ID: R_F_RDLU_41

Rationale					
Acceptance Criteria					
Notes	Wearables Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_42 Wearables: Gray Out Buttons

While a remote command is in process, the remaining remote buttons shall be disabled and grayed out

Requirement ID: R_F_RDLU_42

Rationale					
Acceptance Criteria					
Notes	Wearables Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_43 Wearables: Push Notifications

Once the request is complete, a push notification is displayed on the wearable indicating success or failure

Requirement ID: R_F_RDLU_43

Rationale			
Acceptance Criteria			
Notes	Wearables Requirements		
Source		**Owner**	
Source Req.		**V&V Method**	

Type		Priority		Status	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_44 Amazon Integration

Amazon Alexa, Dot, etc. shall be supported

Requirement ID: R_F_RDLU_44

Rationale					
Acceptance Criteria					
Notes	Amazon Alexa Integration				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_45 Linking Amazon Account

FordPass and Lincoln Way apps shall be linked with the users Amazon account

Requirement ID: R_F_RDLU_45

Rationale					
Acceptance Criteria					
Notes	Amazon Alexa Integration				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_46 Monitoring Web Services

Ford VSDN / TMC shall track and monitor web services sent from an external service

Requirement ID: R_F_RDLU_46

Rationale					
Acceptance Criteria					
Notes	Amazon Alexa Integration				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_47 Cloud Synchronization of Timezones

The cloud shall synchronize the user's timezone with the mobile app for Daylight Savings Time (DST)

Requirement ID: R_F_RDLU_47

Rationale					
Acceptance Criteria					
Notes	CR 421: Time Zone and Daylight Savings Synchronization in SDN				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_48 Remote Door Lock and Unlock Notification Timestamps

When Remote Door Lock and Unlock is requested during DST, the correct timezone shall be reflected on the push notification

Requirement ID: R_F_RDLU_48					
Rationale					
Acceptance Criteria					
Notes	CR 421: Time Zone and Daylight Savings Synchronization in SDN				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_49 Signal Mapping for Trunk

The correct mapping for the Trunk signal is DrStatTgate_B_Act.

Requirement ID: R_F_RDLU_49					
Rationale					
Acceptance Criteria					
Notes	Correct Trunk / Tailgate Signals Mapping in VSDN				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_50 Signal Mapping for Tailgate

The correct mapping for the Tailgate signal is DrStatInnrTgate_B_Actl.

Requirement ID: R_F_RDLU_50					
Rationale					
Acceptance Criteria					
Notes	Correct Trunk / Tailgate Signals Mapping in VSDN				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_51 Mapping in the Cloud

The tailgate and trunk signals shall be mapped in the cloud.

Requirement ID: R_F_RDLU_51					
Rationale					
Acceptance Criteria					
Notes	Correct Trunk / Tailgate Signals Mapping in VSDN				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_52 Honk Horn & Flash Lights with Remote Lock Request

One lock command shall flash the vehicle lights and two lock commands in succession within 3 seconds shall flash the lights and honk the horn.

Requirement ID: R_F_RDLU_52			
Rationale			
Acceptance Criteria			
Notes	Third Party Applications		
Source		**Owner**	

Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_53 Third Party Vehicle Location

When a third party user is within distance to a vehicle, they shall have the option to use a third party mobile application to honk horn & flash lights to audibly and visually determine the vehicle's location by sending a lock command in succession.

Requirement ID: R_F_RDLU_53

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_54 CR 859: Visual and Audible Identify Vehicle Using Lock Command

The ECG shall execute multiple lock commands a determined number of times to honk horn & flash lights for third party vehicle location

Requirement ID: R_F_RDLU_54

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_55 Vehicle Security When Sending Lock Command

The event counter and roll code shall be implemented to maintain vehicle security.

Requirement ID: R_F_RDLU_55

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_56 Third Party Vehicle Access

Third Party Vendors shall be allowed to gain access to the trunk/tailgate/liftgate for delivery purposes using a separate third party mobile application.

Requirement ID: R_F_RDLU_56

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_57 Panic Command

The panic command shall flash the vehicle lights and honk the horn for a configurable time.

Requirement ID: R_F_RDLU_57

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_58 CR 859: Visual and Audible Identify Vehicle (Honking Horn / Flashing Lights) Using Panic Command

When a third party user is within distance to a vehicle, they shall have the option to use a third party mobile application to honk horn & flash lights to audibly and visually determine the vehicle's location by sending the panic command.

Requirement ID: R_F_RDLU_58

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_59 Vehicle Security When Sending Panic Command

The panic command shall have an associated event counter and roll code to maintain vehicle security

Requirement ID: R_F_RDLU_59

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_60 Chirp Command

The cell chirp command shall chirp / honk the vehicle horn.

Requirement ID: R_F_RDLU_60

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_61 CR 858: Audible Identify Vehicle Using Chirp Command

When a third party user is within distance to a vehicle, they shall have the option to use a third party mobile application to chirp / honk the vehicle horn to audibly determine the vehicle's location by sending the chirp command.

Requirement ID: R_F_RDLU_61

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_62 Vehicle Security When Sending a Chirp Command

The chirp command shall have an associated event counter and roll code to maintain vehicle security.

Requirement ID: R_F_RDLU_62

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_63 Third Party App Response

When the third party user selects to find the vehicle via chirp / honk horn, door lock or alarm the third party mobile app will display a response

Requirement ID: R_F_RDLU_63

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_64 Command Response

The third party mobile app shall display a success or failure message for each command requested.

Requirement ID: R_F_RDLU_64

Rationale					
Acceptance Criteria					
Notes	Third Party Applications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_65 MMOTA Update

When an MMOTA is needed that shall inhibit vehicle function, the vehicle shall send a notification VSDN. VSDN will send notification to FordPass that the vehicle is inhibited; FordPass shall not allow the user to request any Command & Control functionality

Requirement ID: R_F_RDLU_65

Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_66 Key Fob and Mobile App Synchronization

When a remote start is requested from the key fob, a non-correlated shall be sent to the cloud so that the Mobile App shall be able to display the remote start timer, extend and stop buttons

Requirement ID: R_F_RDLU_66

Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

R_F_RDLU_67 Key Fob and Mobile App Synchronization II

If a remote start is initiated from the key fob, the user shall be able to stop or extend the remote start from the mobile app

Requirement ID: R_F_RDLU_67

Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

5.1.1 Error Handling

R_F_RDLU_68 Vehicle Lock Status Failure

If the CAN bus does not indicate that the vehicle doors are locked, the vehicle shall send a failure command response to VSDN / TMC

Requirement ID: R_F_RDLU_68

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_69 Network Connectivity Error

If the Mobile App does not have cellular or wifi connectivity, an error message shall be displayed on the Mobile App

Requirement ID: R_F_RDLU_69

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_70 Command Response Timeout

When the VSDN/TMC sends the lock or unlock command to the the vehicle, it shall wait for a response for 90 seconds before the command times outs

Requirement ID: R_F_RDLU_70

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_71 Maximum Response Time Between ECG-App and BCM

The ECG-App shall wait for 4 seconds for a response when sending the lock or unlock request to the BCM

Requirement ID: R_F_RDLU_71

Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_72 Retry Between ECG-App and BCM

When the Remote Door Lock command is received by the vehicle, there shall be a configurable time that the vehicle shall respond. If the vehicle does not respond after two retries, the command will be considered as failed and feedback will be displayed to the user on the mobile app

Requirement ID: R_F_RDLU_72

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_73 Mobile App Error Notifications

Error messaging displayed to the end user in the event that a Remote Door Lock or Unlock fails.. The FordPass or LincolnWay app will display pop-up messages and/or notifications to clearly alert the user that the feature did not act as expected. In addition, steps may be given to guide the user in how to remedy the error

Requirement ID: R_F_RDLU_73

Rationale	
Acceptance Criteria	

Notes	Error Handling				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_74 VSDN / TMC

The VSDN / TMC must have an active connection to the vehicle through the ECG and ECG. If the connection between the VSDN / TMC and vehicle is lost, a connection retry strategy will be implemented
If the VSDN / TMC does not receive a command response from the vehicle, the process will time out and a notification is sent to the mobile app. The failure message can include one of the following:
• No connectivity to network
• Vehicle to VSDN / TMC connection error
• Vehicle in unable to execute the command
• Other failure
• VSDN / TMC is not available
• ECG data invalid
• ECG is not authorized

Requirement ID: R_F_RDLU_74

Rationale					
Acceptance Criteria					
Notes	Error Handling				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_75 ECG

ECG specific errors defined in the protofile will be expanded by the Command and Control team in order to make error processing simpler for the user to understand. Refer to CR 422 for additional details

Requirement ID: R_F_RDLU_75

Rationale					
Acceptance Criteria					
Notes	Error Handling				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_76 BCM

The ECG will wait for a configurable time to receive a response from the BCM. If the response from the BCM is not received within that configurable time, a retry strategy will be implemented. If all retries fail, the ECG will send the status back to the VSDN / TMC to display an error on the mobile app. The configurable time is defined by DIDCode = 0xFD10 and DIDName = Command Response Timeout

Requirement ID: R_F_RDLU_76

Rationale					
Acceptance Criteria					
Notes	Error Handling				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

5.2 Non-Functional Requirements

*#**Hint:** Non-functional requirements specify some performance criteria in addition to the functional behavior given defined by the functional requirements. Timing (if not already included in the functional requirements), security details (e.g. how secure does an algorithm have to be) reliability (e.g. mean time between failure) or maintainability could be specified in this section.*

5.2.1 Safety

*#**Hint:** Only those safety requirements, which are not related to Functional Safety (ISO26262) should go here. For Functional Safety refer to chapter 6 "Functional Safety".*

Not supported by MagicDraw report generation.

5.2.2 Security

R_F_RDLU_77 Event Counter Implementation

An event counter shall be implemented to keep count of every remote door unlock command requested

Requirement ID: R_F_RDLU_77

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_78 Incrementation of Event Counter

The ECG shall increment the event counter by one at every remote door unlock command request

Requirement ID: R_F_RDLU_78

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_79 Roll Code Implmentation

A rolling code shall be implemented to prevent replay attacks and clone the unlock signal sent to the vehicle

Requirement ID: R_F_RDLU_79

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_80 Roll Code at Ignition Off

The rolling code shall not increment when the ignition is off

Requirement ID: R_F_RDLU_80

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_81 Stored Roll Codes at Ignition On

The ECG shall store the last 4 received roll codes from the BCM in volatile memory when the ignition is on

Requirement ID: R_F_RDLU_81

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_82 Stored Roll Codes at Ignition Off

The ECG shall store the last received roll code from the BCM in non-volatile memory when the ignition is off

Requirement ID: R_F_RDLU_82

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_83 Unlock and Roll Code Message

When a remote door unlock request is made, the ECG shall send the CAN signal to unlock the vehicle and the roll code to the BCM in the same message

Requirement ID: R_F_RDLU_83

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_84 Successful Unlock Request

The remote door unlock request shall be completed only if the roll code transmitted by the ECG is one of the last 4 roll codes published by the BCM while ignition is not off

Requirement ID: R_F_RDLU_84

Rationale			
Acceptance Criteria			
Notes	Security		
Source		**Owner**	
Source Req.		**V&V Method**	

Type		Priority		Status	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_85 Master Reset and Roll Code

If a master reset is performed the roll code transmitted by the ECG is reset to all zeros

Requirement ID: R_F_RDLU_85

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_86 Power Reset and Roll Code

If a power reset is peformed the roll code transmitted by the ECG is reset to all zeros

Requirement ID: R_F_RDLU_86

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_87 Roll Code Update

After a master or power reset, the ECG shall update the roll code to the value transmitted by the BCM

Requirement ID: R_F_RDLU_87

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_88 Transmission from Backend Request

The ECG shall only transmit the roll code if a request to unlock the vehicle is received from the backend

Requirement ID: R_F_RDLU_88

Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_89 Retry Request

During a retry request of the remote door unlock command, the ECG shall transmit the latest/last rolling code that is stored in memory

Requirement ID: R_F_RDLU_89					
Rationale					
Acceptance Criteria					
Notes	Security				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

5.2.3 Reliability

No Reliability Requirements specified.

5.3 HMI Requirements

*#**Hint:** Requirements in this section could specify details of e.g. the icons, the GUI or the sounds.*

R_F_RDLU_90 Lock Button

The mobile app shall display a dedicated lock and unlock button on the screen

Requirement ID: R_F_RDLU_90					
Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_91 Animated Lock Button

The perimeter of the mobile app lock and unlock button will change color and move clockwise while s elected

Requirement ID: R_F_RDLU_91					
Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_92 Disable Remote Control Buttons

All other remote command buttons are grayed out once the lock or unlock button is selected

Requirement ID: R_F_RDLU_92					
Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_93 API Request|Command In Progress|Polling Indicator

The mobile app shall send the Get Status API to the vehicle to poll for status to display the progress of the remote lock or unlock command while in progress and displays an icon to indicate the request is in progress

Requirement ID: R_F_RDLU_93

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_94 Mobile App Button Functions

All other remote buttons shall become ungrayed after the remote lock or unlock request is complete

Requirement ID: R_F_RDLU_94

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_95 Refresh Button

When refreshing the mobile app screen, the app will refresh data related to remote lock or unlock and status

Requirement ID: R_F_RDLU_95

Rationale					
Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_96 Status Information

The vehicle shall pass status information to the cloud and the cloud shall send a notification to all authorized users with a customized status information message.

Requirement ID: R_F_RDLU_96

Rationale					
Acceptance Criteria					
Notes	Extend C&C Process to Send Push Notifications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_97 Command Complete

When the remote command is complete, a notification shall be displayed informing the user of the result.

Requirement ID: R_F_RDLU_97

Rationale	
Acceptance Criteria	
Notes	Extend C&C Process to Send Push Notifications

Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_98 Mobile App Screen Update

"Lock" will be displayed on the mobile app when the vehicle doors are locked

Requirement ID: R_F_RDLU_98

Rationale					
Acceptance Criteria					
Notes	HMI Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_99 Status Bar Success Message

The mobile app will display a success message on the status bar when the Remote Door Lock or request is successful

Requirement ID: R_F_RDLU_99

Rationale					
Acceptance Criteria					
Notes	HMI Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_100 Success Message Displayed for Configurable Time

The mobile app will display the success message when the vehicle doors lock for a configurable time in seconds before returning to the default state

Requirement ID: R_F_RDLU_100

Rationale					
Acceptance Criteria					
Notes	HMI Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_101 Status Bar Failure Message

The mobile app will display a failure message on the status bar when the Remote Door Lock or Unlock request fails

Requirement ID: R_F_RDLU_101

Rationale					
Acceptance Criteria					
Notes	HMI Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_102 Failure Message Displayed for Configurable Time

The mobile app will display the failure message for a configurable time in seconds before returning to the default state

Requirement ID: R_F_RDLU_102					
Rationale					
Acceptance Criteria					
Notes	HMI Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_103 Failure Message Text Color

The warning message shall contain red colored text

Requirement ID: R_F_RDLU_103					
Rationale					
Acceptance Criteria					
Notes	HMI Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_104 Button Perimeter

A red circle around the perimeter of the Lock or Unlock button will be displayed when the remote operation fails

Requirement ID: R_F_RDLU_104					
Rationale					
Acceptance Criteria					
Notes	HMI Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_105 Remote Door Unlock

"Unlock" will be displayed on the mobile app when the vehicle doors are unlocked

Requirement ID: R_F_RDLU_105					
Rationale					
Acceptance Criteria					
Notes	Mobile App Notifications				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_106 Mobile App Paging

The user shall be able to page through the mobile app without affecting the Remote Door Lock or Unlock request

Requirement ID: R_F_RDLU_106	
Rationale	

Acceptance Criteria					
Notes	Remote Door Lock Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

R_F_RDLU_107 DRx Power Mode Message

When the vehicle in deep sleep mode, the Mobile App shall display a message indicating that the vehicle needs to be manually started to service the request

Requirement ID: R_F_RDLU_107

Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	In-Progress

Req. Template Version 6.0 End of Requirement

5.4 Other Requirements

5.4.1 Design Requirements

*#**Hint:** Requirements of a Logical Function should be typically agnostic of their SW/HW implementation. If for specific reasons the function owner needs to define explicitly design constraints on the solution, it can be done in this chapter.*

Not supported by MagicDraw report generation.

5.4.2 Manufacturing Requirements

No Manufacturing Requirements specified.

5.4.3 Service Requirements

*#**Hint:** Requirements in this section could specify, e.g. what needs to be considered, if individual ECUs are replaced or new SW is flashed to ECUs (parameter set in non-volatile memory might get inconsistent and needs also to be updated).*

R_F_RDLU_108 Transfer of Ownership of Vehicle

If the Vehicle is to be sold or transferred to another Owner, the current Owner of the Vehicle should perform the following:
• Initiate Brand Connect Master Reset to remove remote control functionality for the current users

Requirement ID: R_F_RDLU_106

Rationale					
Acceptance Criteria					
Notes	After Sales Requirements				
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	Approved

Req. Template Version 6.0 End of Requirement

5.4.4 After Sales Requirements

*#**Hint:** Requirements in this section could specify, e.g. input for the Owner's Manual could be gathered.*

No After Sales Requirements specified.

5.4.5 Process Requirements

*#**Hint**: Requirements in this section are relevant for the development process of the feature, e.g. ISO26262 compliance.*

No Process Requirements specified.

6 FUNCTIONAL SAFETY

*#**Classification**: Functional Safety only*
*#**Hint:** This section is dedicated to the Ford Functional Safety (ISO26262) process. For details of this process refer*
*#**Link:** Ford Functional Safety Sharepoint*
*#**Contact:** RE Wiki Roles & Responsibilities page – Role: Application Functional Safety Engineer*

6.1 System Behaviors for HARA

*#**Classification**: Functional Safety only*
*#**Hint:** List of selected system behaviors is an input to the Hazard Analysis and Risk Assessment (HARA). There needs to be a rationale why other system behaviors / functions are not considered.*
No System Behaviors specified.

6.2 Safety Assumptions

*#**Hint:** Copy the assumptions from the document "FFSD 02 Hazard Analysis and Risk Assessment", Tab. "2 - Assumptions" with "Ref/ID", "Name", "Category", "Description", "Purpose". In this document, additionally a reference to the requirement ID is inserted.*
*#**Link:** Functional Safety Sharepoint – HARA*

No Safety Assumptions specified

6.3 Safety Goals

*#**Classification**: Functional Safety only*
*#**Hint:** The list of Functional Safety Goals is an output of the Hazard Analysis and Risk Assessment (HARA) and therefore not required during the initial creation of the Feature Document.*
*#**Link:** Functional Safety Sharepoint – HARA*

No Safety Goal specified.

6.4 Functional Safety Requirements

*#**Classification**: Functional Safety only*
*#**Hint:** The section lists the Functional Safety Requirements (FSRs) derived from*
- a Safety Goal (list in subsections 6.4.1 and following)
in this case each FSR should trace back to a safety goal in ch. 6.3
- and Assumptions (list in subsection 6.4.2).
in this case each FSR should trace back to an assumption in ch. 6.2.
*In section 6.5**Error! Reference source not found.** "ASIL Decomposition of Functional Safety Requirements" the initial FSRs from chapters 6.4.1 to 6.4.2 may be decomposed, if required.*
*#**Link:** Functional Safety Sharepoint – Functional Safety Concept*
RE Wiki - Requirements Attributes
*#**Classification**: Functional Safety only*
*#**Hint:** The section lists the Functional Safety Requirements (FSRs) derived from a Safety Goal and Assumptions. The following should be noted for the use of the attribute fields for FSRs*
- The "Source Req" trace link field in each FSR should have a reference to
- a safety goal in ch. 6.3 "Safety Goals" or
- an assumption in ch. 6.2 "Safety Assumptions"
*#**Link:** Functional Safety Sharepoint – Functional Safety Concept*
RE Wiki - Requirements Attributes
No Safety Goal specified.

6.4.1 Derivation of Functional Safety Requirements on Assumptions

*#**Classification**: Functional Safety only*
*#**Hint:** Derive requirements from the Assumptions (refer to section "Safety Assumptions"*

No Functional Safety Requirements tracing to Assumptions specified.

6.5 ASIL Decomposition of Functional Safety Requirements

*#**Classification:** Functional Safety Only*
*#**Hint:** For ASIL D features additional measures like a requirements decomposition might be required. Fill out the following table for each ASIL D decomposition applied in the feature. The decomposition rationale is the reason why the decomposition was performed, whereas the rationale for each requirement expresses the reason and thought behind that particular requirement and should include how the requirement is able to independently fulfill the needs of the parent requirement.*
*#**Link:** Functional Safety Sharepoint - Functional Safety Concept*

No Functional Safety Requirements with ASIL Decompositions specified.

7 ARCHITECTURE

7.1 Functional Architecture

*#**Classification:** Mandatory for Functional Safety – otherwise optional*
*#**Hint**: This section depicts the coarse Functional Architecture. This architectural step is needed to find the right functional partitioning for the function level. The function shown here are those, which are specified on function level. Either SysML activity diagrams or Data Flow Diagrams could be used to depict such a Functional Architecture. For bigger features, which are decomposed in a hierarchical manner down to atomic functions (and which do not follow the Functional Safety process), a function tree could be given here.*
*#**Links:***
- *Functional Decomposition: RE Wiki – Functional Decomposition*
- *SysML - Activity Diagrams or RE Wiki - Data Flow Diagrams*
- *Data Flow Diagram: RE Wiki – Data Flow Diagram*

7.1.1 List of Functions

*#**Hint:** The functions shown in the Functional Architecture should be listed and described in the table below*

7.2 Logical Architecture

*#**Classification:** Functional Safety Analysis only*
*#**Hint:** FS Analysis requires a description of the boundary of the feature and its elements. A simple block diagram or a SysML Internal Block Diagram could be used to depict the Logical Architecture*
*#**Link:** Ford Functional Safety Sharepoint*

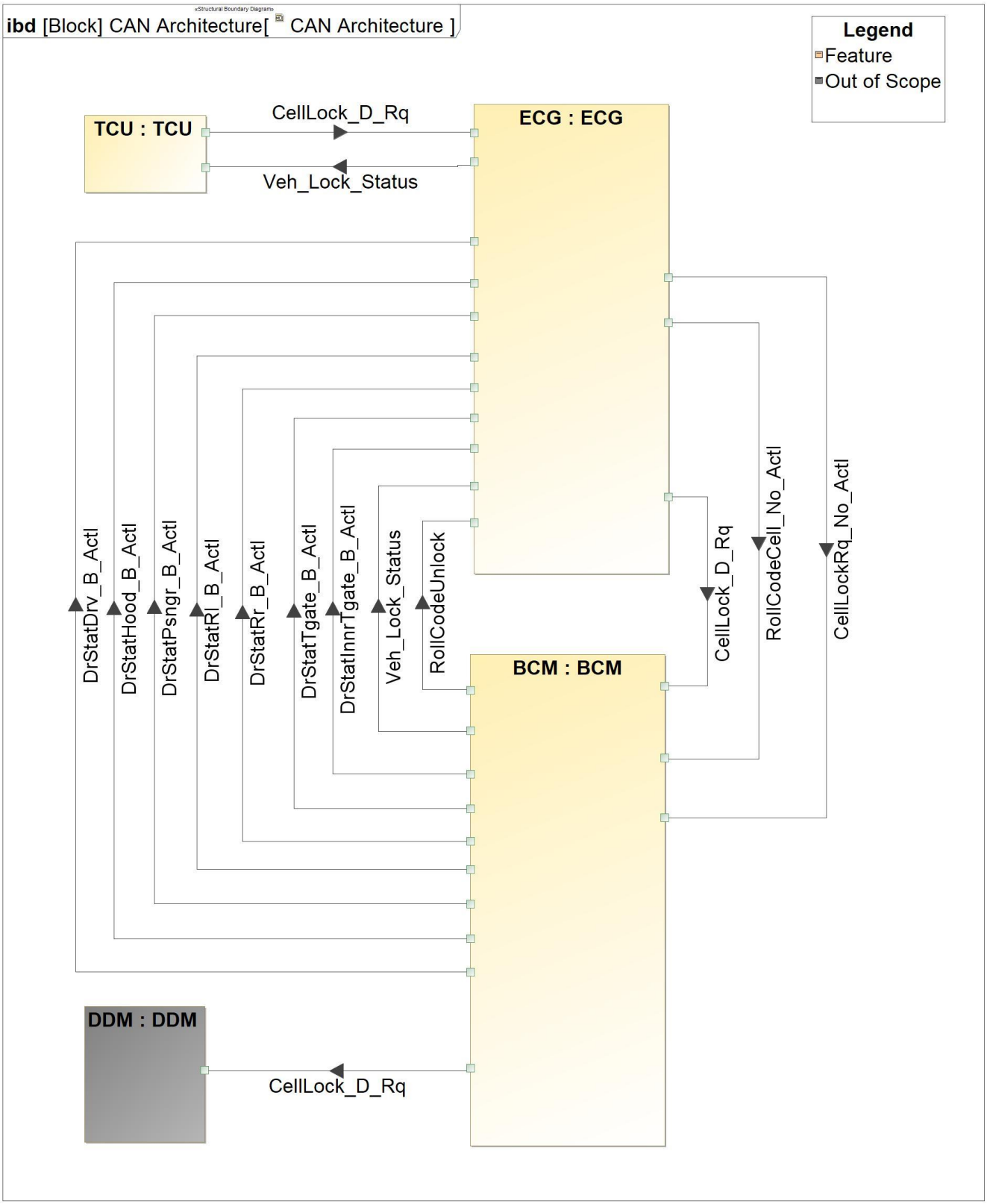

Figure 5: CAN Architecture

Element Name	Description	Allocated Functions	Comments
BCM	The BCM receives the Remote Door Lock or Unlock requests, processes		

	the requests and sends the responses to the ECG		
Cellular Remote Door Lock & Unlock	In order to deliver an enhanced customer experience and to evolve FORD's connectivity leadership, the FORD mobile application will include a series of command control features developed to provide an expanded suite of remote connectivity to customers. The purpose of this Feature Document is to explain the functionality of the command and control features, specifically the Remote Door Lock and Unlock, which will be delivered to the customer and provide a series of user requirements needed to achieve this functionality.		
DDM	Module that controls the vehicle door locks		
ECG	Serves as a central controller in FNV to manage information and serve as a central computing resource		
ECG-App	Binary application on the ECG called ControlMyCar that performs an action based on a command from the VSDN/TMC and report the results back to VSDN/TMC		
Mobile App	The Mobile Apps displays HMI to the user to select a request and send to the VSDN/TMC		
Off-Board Systems	Systems used to process requests and responses outside of the vehicle		
On-Board Systems	Systems used to process requests and responses inside of the vehicle		
TCU	The TCU acts as a pass-through for commands, responses and alerts		
User	Customer		
VSDN/TMC	VSDN/TMC is the gateway between the Mobile App and the vehicle, is responsible for decoding APIs and converting to FTCP messages and contains logic for some feature functionality. VSDN/TMC is the gateway between the Mobile App and the vehicle, is responsible for decoding APIs and converting to FTCP messages and contains logic for some feature functionality		

Table 13: Logical Elements

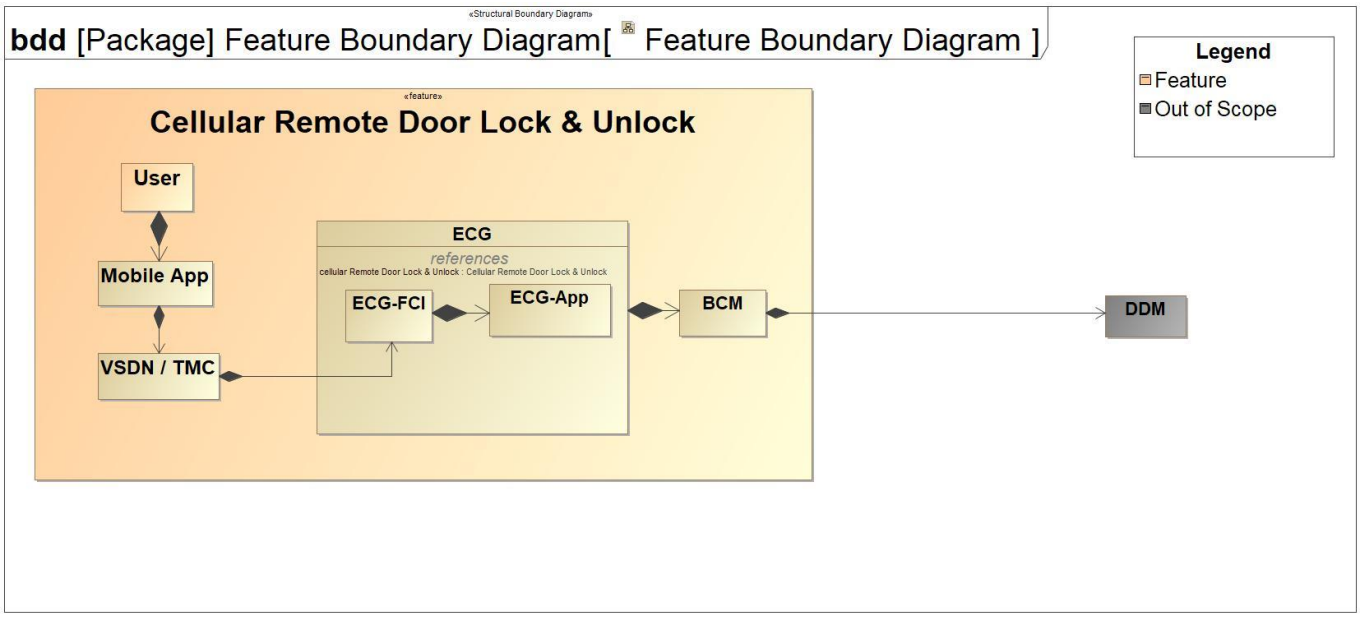

Figure 6: Feature Boundary Diagram

Interface	Direction	Description	Value Range
CellLockRq_No_Actl	p4 (ECG) To p2 (BCM)	Event counter for lock, unlock and trunk release requests from cellular remote device; transmitted from ECG to BCM	
CellLock_D_Rq	p1 (TCU) To p1 (ECG)	Request from a cellular device module to BCM for door-lock, unlock and trunk-related commands	
	p3 (ECG) To p1 (BCM)	Request from a cellular device module to BCM for door-lock, unlock and trunk-related commands	
	p5 (BCM) To p1 (DDM)	Request from a cellular device module to BCM for door-lock, unlock and trunk-related commands	
DrStatDrv_B_Actl	p13 (BCM) To p13 (ECG)	Indicates the status of the driver's door	
DrStatHood_B_Actl	p12 (BCM) To p12 (ECG)	Indicates the status of the hood	
DrStatInnrTgate_B_Actl	p7 (BCM) To p8 (ECG)	Indicates the status of the Inner Tailgate Door / Glass	
DrStatPsngr_B_Actl	p11 (BCM) To p11 (ECG)	Indicates the status of the Passenger Door	
DrStatRl_B_Actl	p10 (BCM) To p10 (ECG)	Indicates the status of the rear left door	
DrStatRr_B_Actl	p9 (BCM) To p9 (ECG)	Indicates the status of the rear right door	
DrStatTgate_B_Actl	p8 (BCM) To (ECG)	Indicates the status of the Tailgate / Boot	
RollCodeCell_No_Actl	p5 (ECG) To p3 (BCM)	Network Security Rolling Code for ECG signal requests; signal transmitted from ECG to BCM	
RollCodeUnlock	p4 (BCM) To p6 (ECG)	The 16 bit Rolling Code that is generated by Network Security and transmitted over CAN; transmitted from BCM to ECG	
Veh_Lock_Status	p2 (ECG) To p2 (TCU)	Broadcast status of last electrically driven lock motor command	
	p6 (BCM) To p7 (ECG)	Broadcast status of last electrically driven lock motor command	

Table 14: Feature Interactions on CAN Architecture

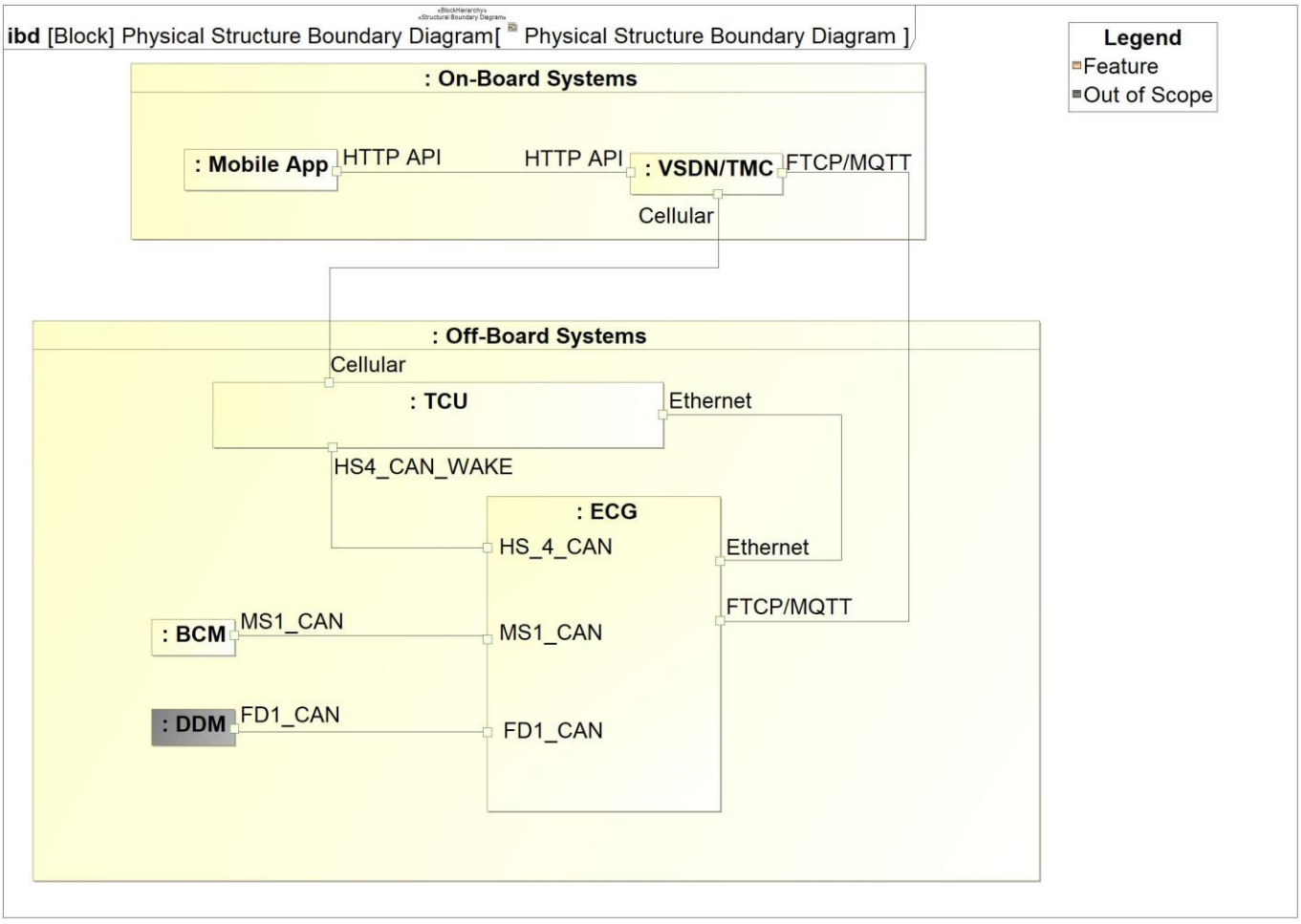

Figure 7: Physical Structure Boundary Diagram

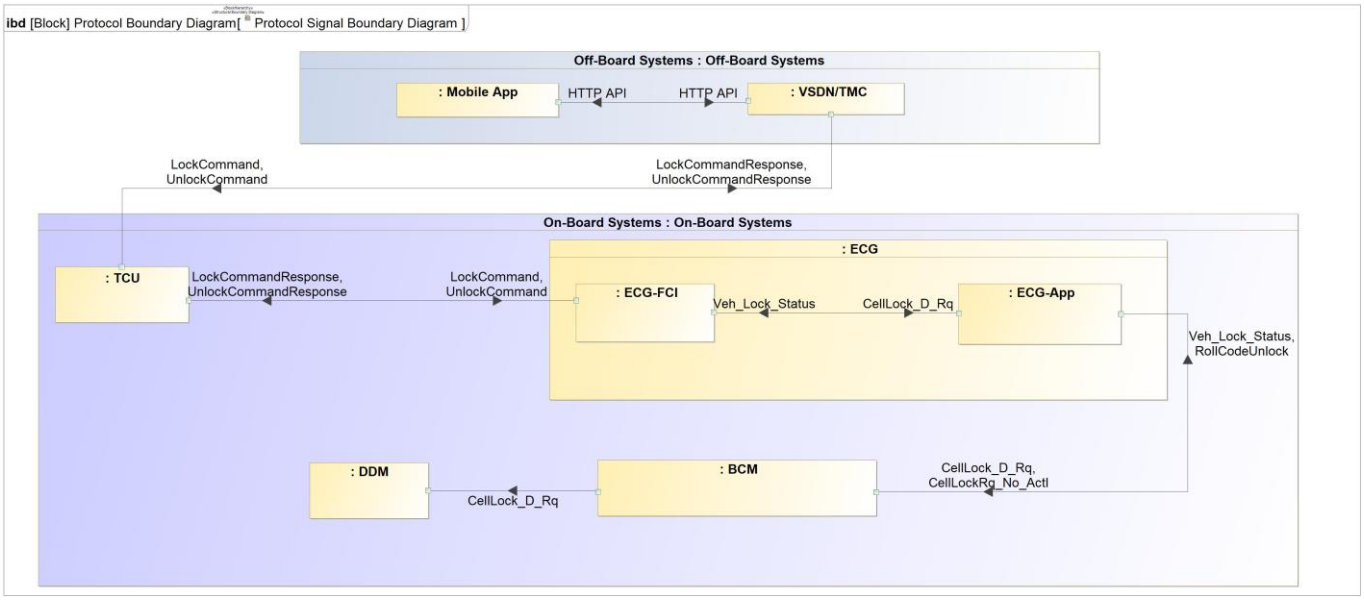

Figure 8: Protocol Signal Boundary Diagram

Interface	Direction	Description	Value Range
CellLockRq_No_Actl	p2 (ECG-App) To p1 (BCM)	Event counter for lock, unlock and trunk release requests from cellular remote device; transmitted from ECG to BCM	
CellLock_D_Rq	p2 (BCM) To p1 (DDM)	Request from a cellular device module to BCM for door-lock, unlock and trunk-related commands	
	p2 (ECG-App) To p1 (BCM)	Request from a cellular device module to BCM for door-lock, unlock and trunk-related commands	
	p2 (ECG-FCI) To p1 (ECG-App)	Request from a cellular device module to BCM for door-lock, unlock and trunk-related commands	
HTTP API	p1 (Mobile App) To p1 (VSDN/TMC)	Communication protocol between the Mobile App and the VSDN/TMC	
	p1 (VSDN/TMC) To p1 (Mobile App)	Communication protocol between the Mobile App and the VSDN/TMC	
LockCommand	p2 (TCU) To p1 (ECG-FCI)	FTCP command sent to the vehicle from VSDN/TMC to lock the vehicle doors	
	p2 (VSDN/TMC) To Cellular (TCU)	FTCP command sent to the vehicle from VSDN/TMC to lock the vehicle doors	
LockCommandResponse	Cellular (TCU) To p2 (VSDN/TMC)	FTCP command response sent from the vehicle to VSDN/TMC to indicate status of the lock request	
	p1 (ECG-FCI) To p2 (TCU)	FTCP command response sent from the vehicle to VSDN/TMC to indicate status of the lock request	
RollCodeUnlock	p1 (BCM) To p2 (ECG-App)	The 16 bit Rolling Code that is generated by Network Security and transmitted over CAN; transmitted from BCM to ECG	
UnlockCommand	p2 (TCU) To p1 (ECG-FCI)	FTCP command sent to the vehicle from the VSDN/TMC to unlock the vehicle doors	
	p2 (VSDN/TMC) To Cellular (TCU)	FTCP command sent to the vehicle from the VSDN/TMC to unlock the vehicle doors	
UnlockCommandResponse	Cellular (TCU) To p2 (VSDN/TMC)	FTCP command response sent from the vehicle to VSDN/TMC to indicate status of the unlock request	

	p1 (ECG-FCI) To p2 (TCU)	FTCP command response sent from the vehicle to VSDN/TMC to indicate status of the unlock request	
Veh_Lock_ Status	p1 (BCM) To p2 (ECG-App)	Broadcast status of last electrically driven lock motor command	
	p1 (ECG-App) To p2 (ECG-FCI)	Broadcast status of last electrically driven lock motor command	

Table 15: Feature Interactions on Protocol Signal Boundary Diagram

7.3 Sequence Diagrams

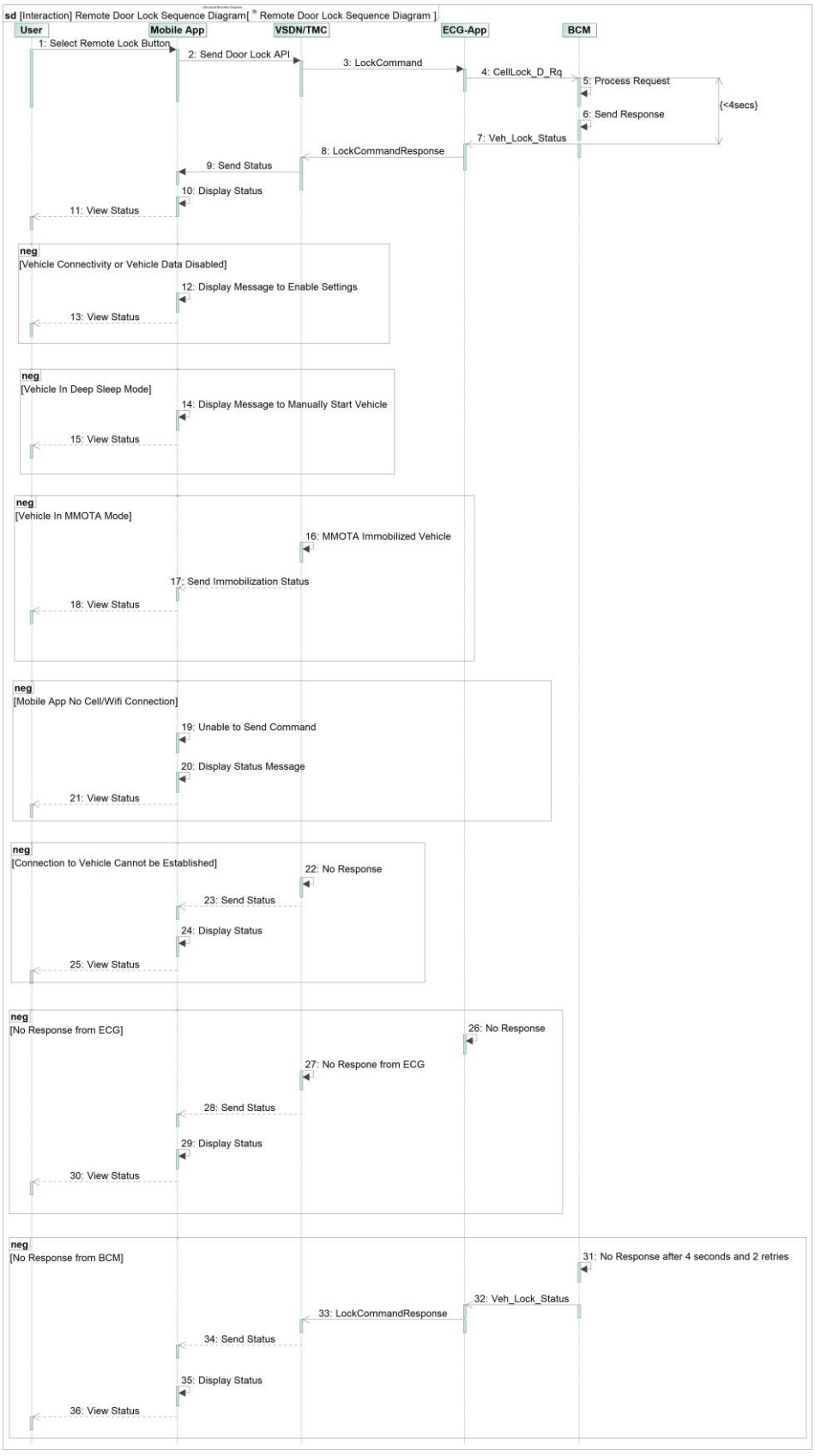

Figure 9: Remote Door Lock Sequence Diagram

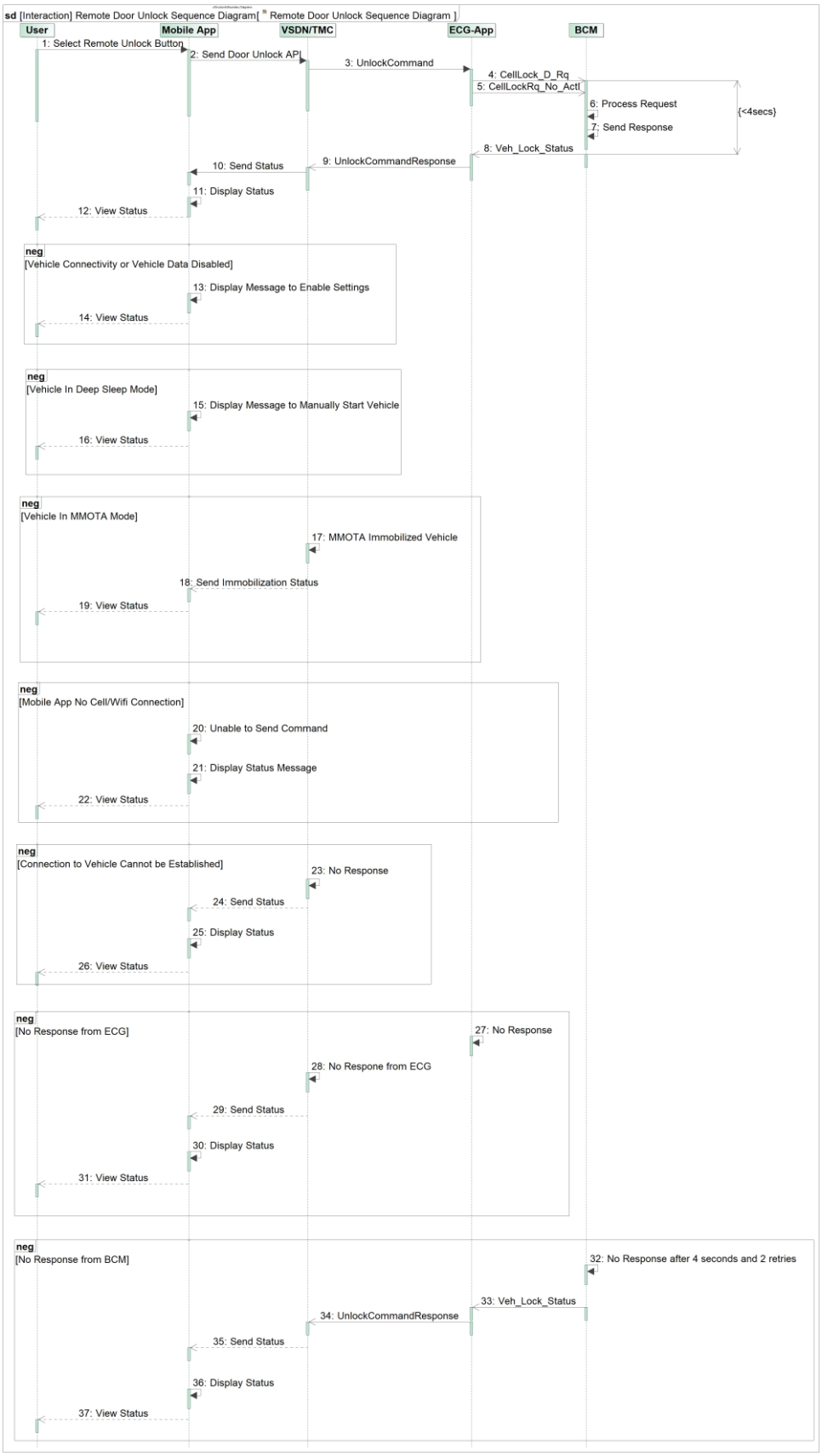

Figure 10: Remote Door Unlock Sequence Diagram

or elements.

8 OPEN CONCERNS

*#**Hint:** The following list presents open concerns, which have to be discussed or clarified over the course of the on-going requirements engineering.*

ID	Concern Description	e-Tracker / Reference	Responsible	Status	Solution
1					

Table 16: Open Concerns *(Not supported by MagicDraw report generation)*

9 REVISION HISTORY

*#**Hint:** A new version number is assigned to a document with a given revision each time it is checked in to Team Center (TCSE). After release of a revision, the document cannot be edited and no new versions can be created on that revision. When updating the document after that, a new revision has to be created and new versions on that revision will be created upon checking in.*

Revision	Author	Description	Sections Affected	Release Date
1.0	Audriene Bell	- Creation of MagicDraw Feature Document -Requirement number changed to accommodate new document structure -New Requirements CCS Settings Meta & Feature Settings Change 10 R_F_RDLU_28 11 R_F_RDLU_29 12 R_F_RDLU_30	All	5/30/2020

13 APPENDIX

13.1CAN Signals

###TSG_R_F_RDLU_00001### CellLock_D_Rq

Request from a cellular device module to BCM for door-lock, unlock and trunk-related commands

Init Default Value		No Request
Encoding Type Name		CellDeviceLock_D_Rq_ET1
Value (Discrete Encoding)	0x0	No Request
	0x1	Unlock all doors & Tgate
	0x3	Unlock driver's door
	0x4	Lock all doors & Tgate
	0x5	Trnkrel.popglas.lg.cargo
	0x6	Cabin unlock
	0x7	Cargo unlock
	0x8	BEC Enable
Unit		

###TSG_R_F_RDLU_00002### CellLockRq_No_Actl

Event counter for lock, unlock and trunk release requests from cellular remote device; transmitted from ECG to BCM

Init Default Value		0 unitless
Encoding Type Name		UnitlessValue8bit_ET
Value (Continuous Encoding)	Min Value	0
	Max Value	255
	Resolution	1
	Offset	0
Unit		

###TSG_R_F_RDLU_00003### DrStatDrv_B_Actl

Indicates the status of the drivers door

Init Default Value		Closed
Encoding Type Name		DrStat_ET
Value (Discrete Encoding)	0x0	Closed
	0x1	Ajar
Unit		

###TSG_R_F_RDLU_00004### DrStatHood_B_Actl

Indicates the status of the hood

Init Default Value	Closed
Encoding Type Name	DrStat_ET

Value (Discrete Encoding)	0x0	Closed
	0x1	Ajar
Unit		

###TSG_R_F_RDLU_00005### DrStatInnrTgate_B_Actl

Indicates the status of the Inner Tailgate Door / Glass

Init Default Value		Closed
Encoding Type Name		DrStat_ET
Value (Discrete Encoding)	0x0	Closed
	0x1	Ajar
Unit		

###TSG_R_F_RDLU_00006### DrStatPsngr_B_Actl

Indicates the status of the Passenger Door

Init Default Value		Closed
Encoding Type Name		DrStat_ET
Value (Discrete Encoding)	0x0	Closed
	0x1	Ajar
Unit		

###TSG_R_F_RDLU_00007### DrStatRl_B_Actl

Indicates the status of the rear left door

Init Default Value		Closed
Encoding Type Name		DrStat_ET
Value (Discrete Encoding)	0x0	Closed
	0x1	Ajar
Unit		

###TSG_R_F_RDLU_00008### DrStatRr_B_Actl

Indicates the status of the rear right door

Init Default Value		Closed
Encoding Type Name		DrStat_ET
Value (Discrete Encoding)	0x0	Closed
	0x1	Ajar
Unit		

###TSG_R_F_RDLU_00009### DrStatTgate_B_Actl

Indicates the status of the Tailgate / Boot

Init Default Value		Closed
Encoding Type Name		DrStat_ET
Value (Discrete Encoding)	0x0	Closed
	0x1	Ajar
Unit		

###TSG_R_F_RDLU_00010### RollCodeCell_No_Actl

Network Security Rolling Code for ECG signal requests; signal transmitted from ECG to BCM

Init Default Value		0 unitless
Encoding Type Name		UnitlessValue16bit_ET
Value (Continuous Encoding)	Min Value	0
	Max Value	65535
	Resolution	1
	Offset	0
Unit		unitless

###TSG_R_F_RDLU_00011### RollCodeUnlock

The 16 bit Rolling Code that is generated by Network Security and transmitted over CAN; transmitted from BCM to ECG

Init Default Value		0 unitless
Encoding Type Name		UnitlessValue16bit_ET
Value (Continuous Encoding)	Min Value	0
	Max Value	65535
	Resolution	1
	Offset	0
Unit		unitless

###TSG_R_F_RDLU_00012### Veh_Lock_Status

Broadcast status of last electrically driven lock motor command

Init Default Value		LOCK_ALL
Encoding Type Name		Veh_Lock_Status_ET
Value (Discrete Encoding)	0x0	LOCK_DBL
	0x1	LOCK_ALL
	0x2	UNLOCK_ALL
	0x3	UNLOCK_DRV
Unit		

13.2 Definitions

Definition	Description
API	Application Programming Interface: Messaging type between Mobile App and VSDN/TMC
Authorization	Authorization is the process of verifying that the requester has permission to submit the request
BCM	Body Control Module: is responsible for monitoring and controlling the power windows, power mirrors, air conditioning, immobilizer system, central locking, etc.
CCS	Customer Connectivity Setting: Settings on Sync HMI that allows the user to change privacy settings
ECG	Enhanced Central Gateway: Core Module on FNV2.0 architecture that: - Performs advanced and traditional domains - Allows development between domains to be decoupled - Expose services of traditional modules with no changes required to these modules
FCI	Ford Cloud Interface for Ford Networked Vehicle 2 - FNV2
FNV2	Fully Networked Vehicle 2.0 is the Ford product development program that includes Modem, ECG and SYNC 4
FordPass App / Mobile App	Mobile app used to present information, configure and command Ford vehicles
FTCP	Ford Telecommunication Protocol: Ford Telematics Communication Protocol. A google protobuf definition of binary payloads that are passed over specific topics between the ECG and the MQTT broker. FTCP payloads are routed to appropriate backend application servers based on the topics and the content of the payload
HMI	Human Machine Interface: Device in which the user interacts with the system to send commands and view responses
MMOTA	Multi-Module Over-the-Air: ability to update modules in a vehicle using Over-the-Air (OTA) technology
SMS	Short Message Service: VSDN / TMC shall send this SMS message prior to sending any command if the TCU is not connected to the broker. The payload of the SMS message shall be empty and SyncP encoded and signed
System	System refers to the overall eco-system from the cloud to the vehicle
TCU	Telematics Control Unit: Acts as a pass-through
TMC	Transport Mobility Cloud: A collection of cloud services hosted by AuAutonomic.ai
VIN	A vehicle identification number (VIN), also called a chassis number, is a unique code, including a serial number, used by the automotive industry to identify individual motor vehicles, towed vehicles, motorcycles, scooters and mopeds, as defined in ISO 3833
VSDN	Vehicle Service Delivery Network: Ford cloud

Table 17: Definitions used in this document

13.3 Abbreviations

No acronyms specified.

Document ends here.