



**Research & Vehicle Technology**  
**“Infotainment Systems Product Development”**

**Feature – Message Center Server v3**

**Infotainment Subsystem Part Specific  
Specification (SPSS)**

Version 1.1

**UNCONTROLLED COPY IF PRINTED**

Version Date: August 23, 2019

**FORD CONFIDENTIAL**



## Revision History

Date	Version	Notes	
April 12, 2019	1.0	Initial Release	
August 23, 2019	1.1	Updated Release	
	MCv3-IIR-REQ-347376/B-MessageCenterServer_Rx		hzubert: MCCenterStackHmiNotification_St
	MCv3-MD-REQ-362275/A-MCCenterStackHmiNotification_St		hzubert: initial revision
	UCD-REQ-348254/B-Use Case Diagram Message Center System		hzubert: added "Broadcast Center Stack HMI Notification Capability"
	MCv3-FUN-REQ-362264/A-Message Center Broadcast Notification Capability Status		hzubert: initial revision
	MCv3-UC-REQ-362265/A-Broadcast Center Stack HMI Notification Capability		hzubert: initial revision
	MCv3-ACT-REQ-362266/A-Broadcast Center Stack HMI Notification Capability		hzubert: initial revision
	MCv3-SD-REQ-362267/A-Broadcast Center Stack HMI Notification Capability at Startup		hzubert: initial revision
	MCv3-SD-REQ-362268/A-Broadcast Center Stack HMI Notification Capability changes to On		hzubert: initial revision
	MCv3-SD-REQ-362271/A-Broadcast Center Stack HMI Notification Capability changes to Off		hzubert: initial revision



# Table of Contents

REVISION HISTORY .....	2
1 DEFINITIONS / ACRONYMS .....	5
2 ARCHITECTURAL DESIGN.....	6
2.1 Overview.....	6
2.2 Deployment .....	6
2.2.1 DEP-REQ-348163/A-Message Center v3 Deployment.....	6
2.3 MCv3-IIR-REQ-347379/A-MessageCenterServer_Tx .....	7
2.3.1 MCv3-MD-REQ-347052/A-MCEventNotification_Rq .....	7
2.4 MCv3-IIR-REQ-347376/B-MessageCenterServer_Rx.....	8
2.4.1 MCv3-MD-REQ-347049/A-MCPresentation_St .....	8
2.4.2 MCv3-MD-REQ-347050/A-MCConfirmationSelection_Ind .....	9
2.4.3 MCv3-MD-REQ-362275/A-MCCenterStackHmiNotification_St .....	10
3 GENERAL REQUIREMENTS .....	11
4 FUNCTIONAL DEFINITION .....	12
4.1 UCD-REQ-348254/B-Use Case Diagram Message Center System.....	12
4.2 MCv3-FUN-REQ-347041/A-Message Center Notification Presentation.....	13
4.2.1 Requirements .....	13
4.2.2 Use Cases .....	13
4.2.3 Activity Diagrams.....	14
4.2.4 Sequence Diagrams .....	15
4.3 MCv3-FUN-REQ-347036/A-Message Center Notification Confirmation .....	40
4.3.1 Requirements .....	40
4.3.2 Use Cases .....	40
4.3.3 Activity Diagrams.....	41
4.3.4 Sequence Diagrams .....	42
4.4 MCv3-FUN-REQ-347031/A-Message Center Notification Choice Selection .....	46
4.4.1 Requirements .....	46
4.4.2 Use Cases .....	46
4.4.3 Activity Diagrams.....	47
4.4.4 Sequence Diagrams .....	48
4.5 MCv3-FUN-REQ-347869/A-Message Center Deallocate All Messages At Once .....	49
4.5.1 Requirements .....	49
4.5.2 Use Cases .....	49
4.5.3 Activity Diagrams.....	50
4.5.4 Sequence Diagrams .....	51
4.6 MCv3-FUN-REQ-348224/A-Message Center Global Alert Notification .....	54
4.6.1 Requirements .....	54
4.6.2 Use Cases .....	54
4.6.3 Activity Diagrams.....	55
4.6.4 Sequence Diagrams .....	56
4.7 MCv3-FUN-REQ-362264/A-Message Center Broadcast Notification Capability Status.....	59
4.7.1 Requirements .....	59
4.7.2 Use Cases .....	59
4.7.3 Activity Diagrams.....	59
4.7.4 Sequence Diagrams .....	59



5	APPENDIX A: EXAMPLE OF LOOKUP TABLE USED IN THIS SPEC.....	63
6	APPENDIX B: EXAMPLE TABLE OF DYNAMIC DATA TYPES USED IN THIS SPEC .....	65



## 1 Definitions / Acronyms

DDx – Dynamic Data with number “x” e.g. 1, 2 or 3
MC – Message Center

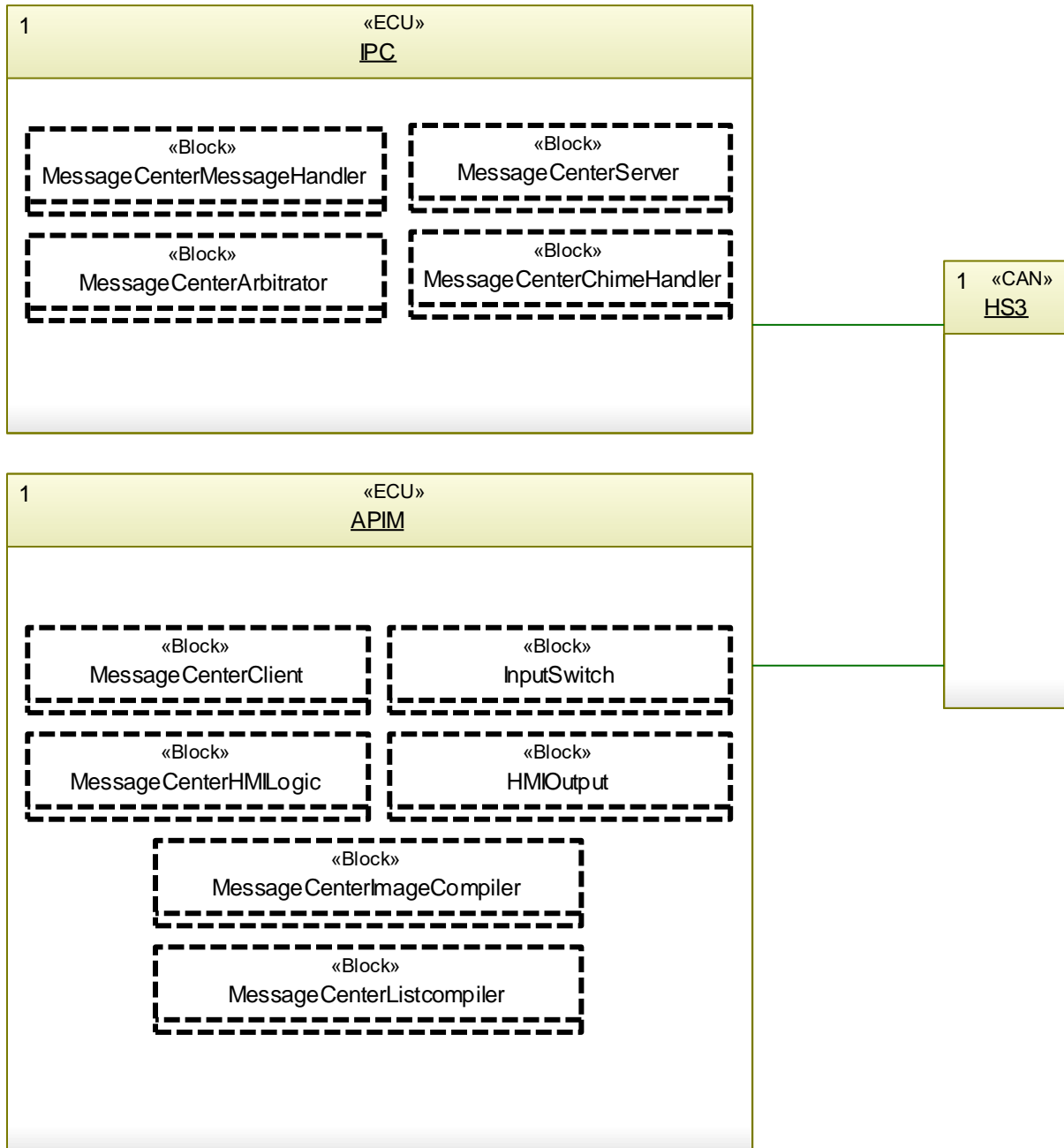


## 2 Architectural Design

### 2.1 Overview

### 2.2 Deployment

#### 2.2.1 DEP-REQ-348163/A-Message Center v3 Deployment





## 2.3 MCv3-IIR-REQ-347379/A-MessageCenterServer\_Tx

### 2.3.1 MCv3-MD-REQ-347052/A-MCEventNotification\_Rq

Message Type: Status

This method is used from MessageCenter Server to inform MessageCenter Client that a Message Center notification update occurred.

Name	Literals	Value	Description
MsgID	-	-	
	ID	0x00 – 0x7FF	The "Message ID" parameter is used to indicate which MessageCenter notification is updated (see lookup table for more information)
MsgStatus	-	-	"MsgStatus" is used to indicate actual status of MessageCenter events.
	Invalid	0x0	"Invalid" is used if data of this message is invalid e.g. if no data is available e.g. at startup or if no MessageCenter notification is active. As well as MsgID, HighlightedChoice and DynamicData1 to 3 do not have valid information.
	Activate	0x1	"Activate" (new warning) is used if a MessageCenter notification is set to active (-> allocated).
	Update	0x2	"Update" (old warning) is used if a MessageCenter notification, which was "Active" before, shall be shown again. Including data update.
	Deactivate	0x3	"Deactivate" is used if an active MessageCenter notification is set to inactive (-> deallocated).
HighlightedChoice	-	-	"Highlighted Choice" is used to indicate the highlighted choice
	NoChoice	0x0	"NoChoice" is used if no choice element is highlighted
	Choice1	0x1	"Choice 1-7" is used if one of choice 1 to 7 is highlighted.
	Choice2	0x2	
	...	...	
	Choice7	0x7	
DynamicData1	-	-	Dynamic Data 1 with up to 2 Bytes
	RAW	2 Byte	
DynamicData2	-	-	Dynamic Data 2 with up to 2 Bytes
	RAW	2 Byte	
DynamicData3	-	-	Dynamic Data 3 with up to 2 Bytes
	RAW	2 Byte	



## 2.4 MCv3-IIR-REQ-347376/B-MessageCenterServer\_Rx

### 2.4.1 MCv3-MD-REQ-347049/A-MCPresentation\_St

Message Type: Status

This method is used from MessageCenter Client to MessageCenter Server to indicate current display status for an active Message Center notification.

Name	Literals	Value	Description
MsgID	-	-	
	MsgID	0x0 – 0x7FF	The "MsgID" parameter is used to indicate which Message Center notification status is updated. (see lookup table for more information)
MsgStatus	-	-	
	0x0	Invalid	Is used to state out that MsgID & PresentationStatus do not have valid information
	0x1	Valid	Is used to state out that MsgID & PresentationStatus do have valid information
PresentationStatus	-	-	The "PresentationStatus" parameter is used to indicate the current status of a Message Center notification. It is also used to indicate if a chime shall be played or stopped.
	Inactive	0x0	"Inactive" is used if the status is unknown (e.g. at startup while booting).
	ActiveGranted	0x1	"ActiveGranted" (new warning) is used to indicate that an active Message Center notification is presented via car HMI.
	UpdateGranted	0x2	"UpdateGranted" (old warning) is used to indicate that an updated Message Center notification is presented via car HMI.
	Deactivated	0x3	"Deactivated" is used to indicate that a Message Center notification is discarded from the car HMI.
	NotUsed_1	0x4	Reserved for future extensions
	NotUsed_2	0x5	
	NotUsed_3	0x6	
	NotUsed_4	0x7	



**2.4.2 MCv3-MD-REQ-347050/A-MCConfirmationSelection\_Ind**

Message Type: Indication

This method is used from the MessageCenter Client to the MessageCenter Server to indicate which type of confirmation/selection the user made on the currently granted Message Center notification.

Name	Literals	Value	Description
MsgID	-	-	
	MsgID	0x0 – 0x7FF	The "MsgID" parameter is used to indicate which Message Center notification was selected by the user (see lookup table for more information).
MsgStatus	-	-	
	Invalid	0x0	Is used to state out that MsgID & SelectionStatus do not have valid information
	Valid	0x1	Is used to state out that MsgID & SelectionStatus do have valid information
SelectionStatus	-	-	The SelectionStatus is used to indicate if a warning is confirmed via OK input or if a selection has been chosen.
	OK	0x0	"OK" is used to indicate that the user confirmed an OK input.
	Choice1	0x1	"Choice1-7" is used to indicate that the user made a selection on a choice element.
	Choice2	0x2	
	...	...	
	Choice7	0x7	

**2.4.3 MCv3-MD-REQ-362275/A-MCCEnterStackHmiNotification\_St**

Message Type: Status

This method is used from MessageCenter Client to MessageCenter Server to reflect actual HMI notification status. This works like a heartbeat and is transmitted periodically.

Name	Literals	Value	Description
Status	-	-	The "Notification Status" parameter is used to indicate the current status of the Message Center Client HMI and if it is capable to present notifications to the user.
	Off	0x0	"Off" is used if the status shows "not capable" to present notifications. This can be while boot up or while some failure cases HMI is not capable to present notifications.
	On	0x1	"On" is used if the status shows "capable" to present notifications via car HMI.

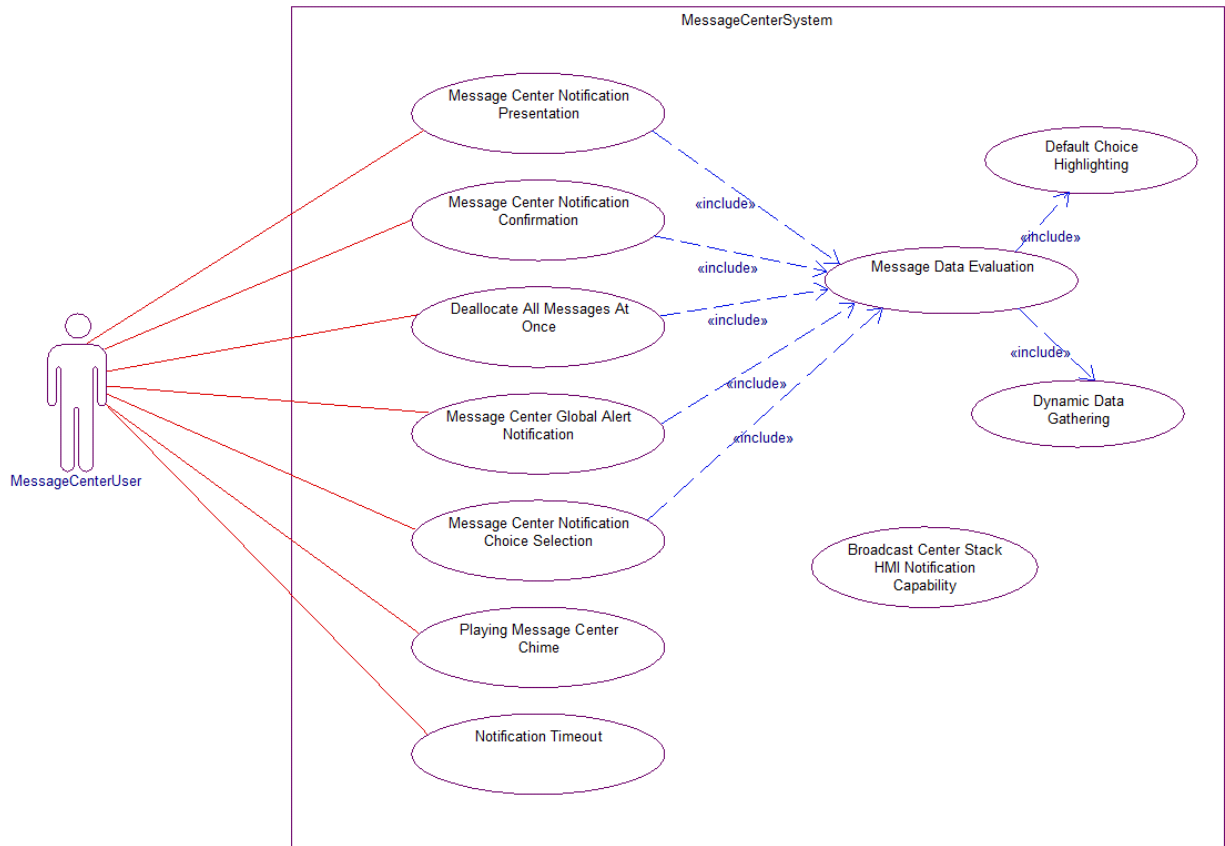


### 3 General Requirements



## 4 Functional Definition

### 4.1 UCD-REQ-348254/B-Use Case Diagram Message Center System





## 4.2 MCv3-FUN-REQ-347041/A-Message Center Notification Presentation

### 4.2.1 Requirements

### 4.2.2 Use Cases

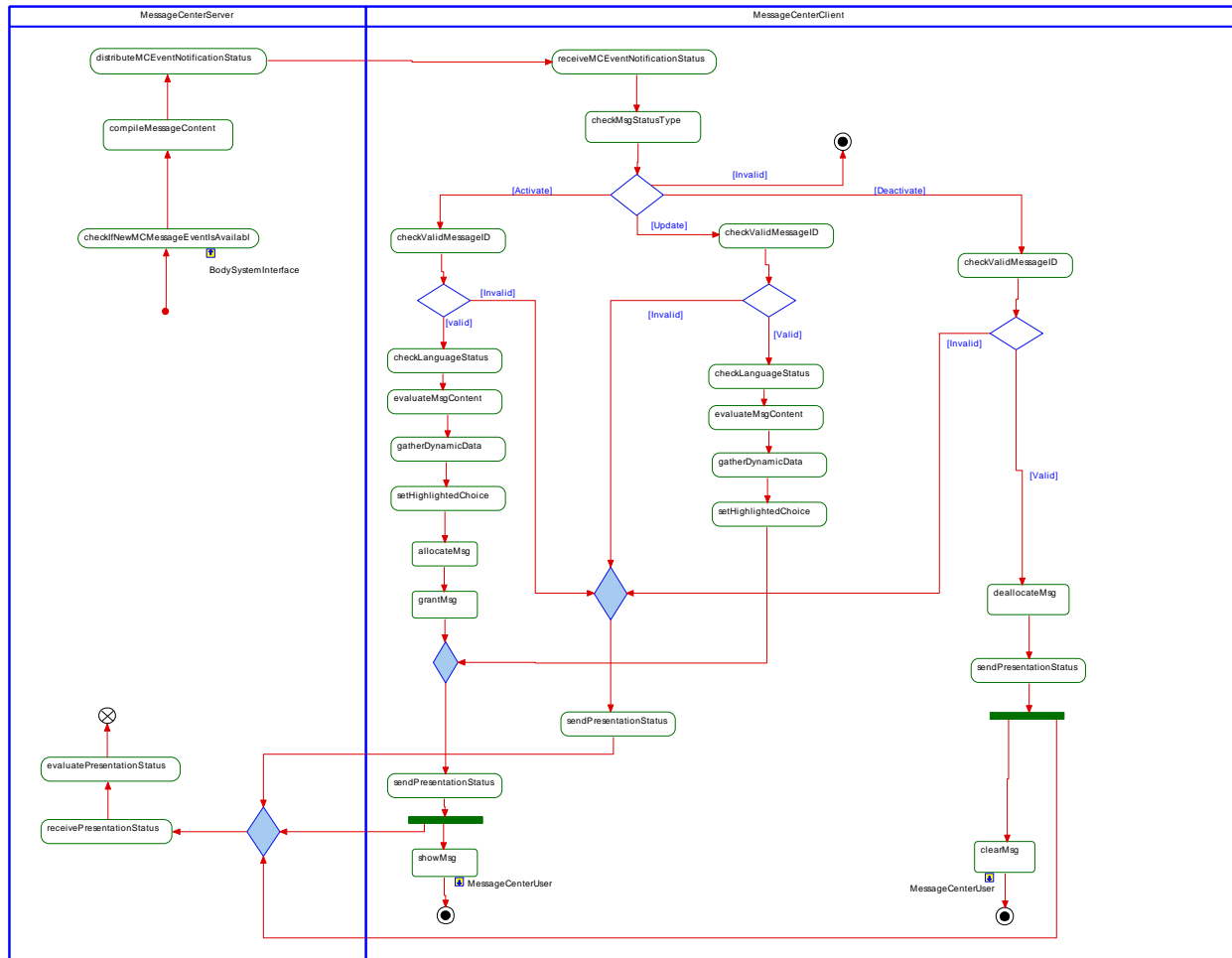
#### 4.2.2.1 MCv3-UC-REQ-347043/A-Message Center Notification Presentation

<b>Actors</b>	Message Center User Vehicle System
<b>Pre-conditions</b>	A trigger for a Message Center notification occurred
<b>Scenario Description</b>	MessageCenter Server compiles related message content and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID), checks in lookup table if any choice fields or similar is available, actual set language status, evaluates content of received bus message, reads and acquires type of all dynamic data raw fields, interprets these accordingly, reads if to highlight any choice element, allocates and displays or deactivates this notification and sends according status back to MessageCenter Server
<b>Post-conditions</b>	Message Center notification is created (activated) and displayed, presented to user again (updated) or removed (deactivated).
<b>List of Exception Use Cases</b>	NA
<b>Interfaces</b>	G-HMI MCEventNotification_Rq MCPresentation_St

### 4.2.3 Activity Diagrams

#### 4.2.3.1 MCv3-ACT-REQ-347044/A-Message Center Notification Presentation

## Activity Diagram





#### 4.2.4 Sequence Diagrams

##### 4.2.4.1 *MCv3-SD-REQ-347045/A-Message Center Notification Presentation\_ StatusType is Activate, No Message Granted*

###### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 15 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID), checks in lookup table that no choice field or similar is available, checks actual set language status, evaluates content of received bus message, reads and acquires type of all dynamic data raw fields and sees no data to be used, reads to highlight no choice element, allocates, grants and displays this notification and sends active granted status back to MessageCenter Server.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

###### Constraints

###### Pre-condition

System is on.

###### Pre-condition

Trigger for a new notification occurred.

###### Pre-condition

No Message granted (message stack is empty).

###### Post-condition

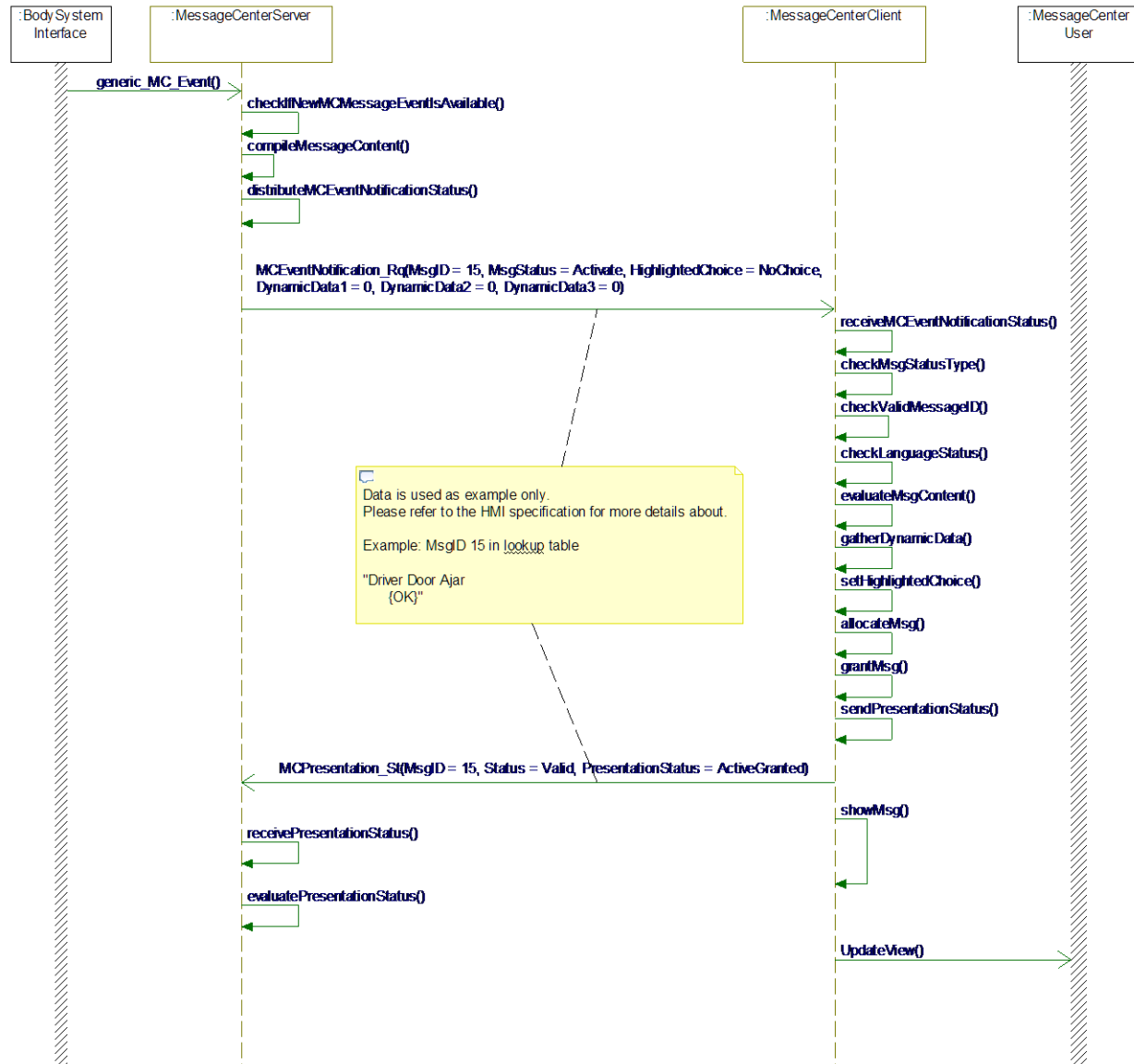
New MC notification is presented to the user.

###### Post-condition

An "active" presentation state is sent back to MessageCenter Server.



## Sequence Diagram







#### 4.2.4.2 MCv3-SD-REQ-347372/A-Message Center Notification Presentation\_ StatusType is Deactivate, Received Event is Granted, Stack is Empty

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 15 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID), deallocates this notification (removing it from screen and stack) and sends deactivated status back to MessageCenter Server.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

Trigger for this message ID is not available any more.

###### Pre-condition

The MC notification with this message ID is granted.

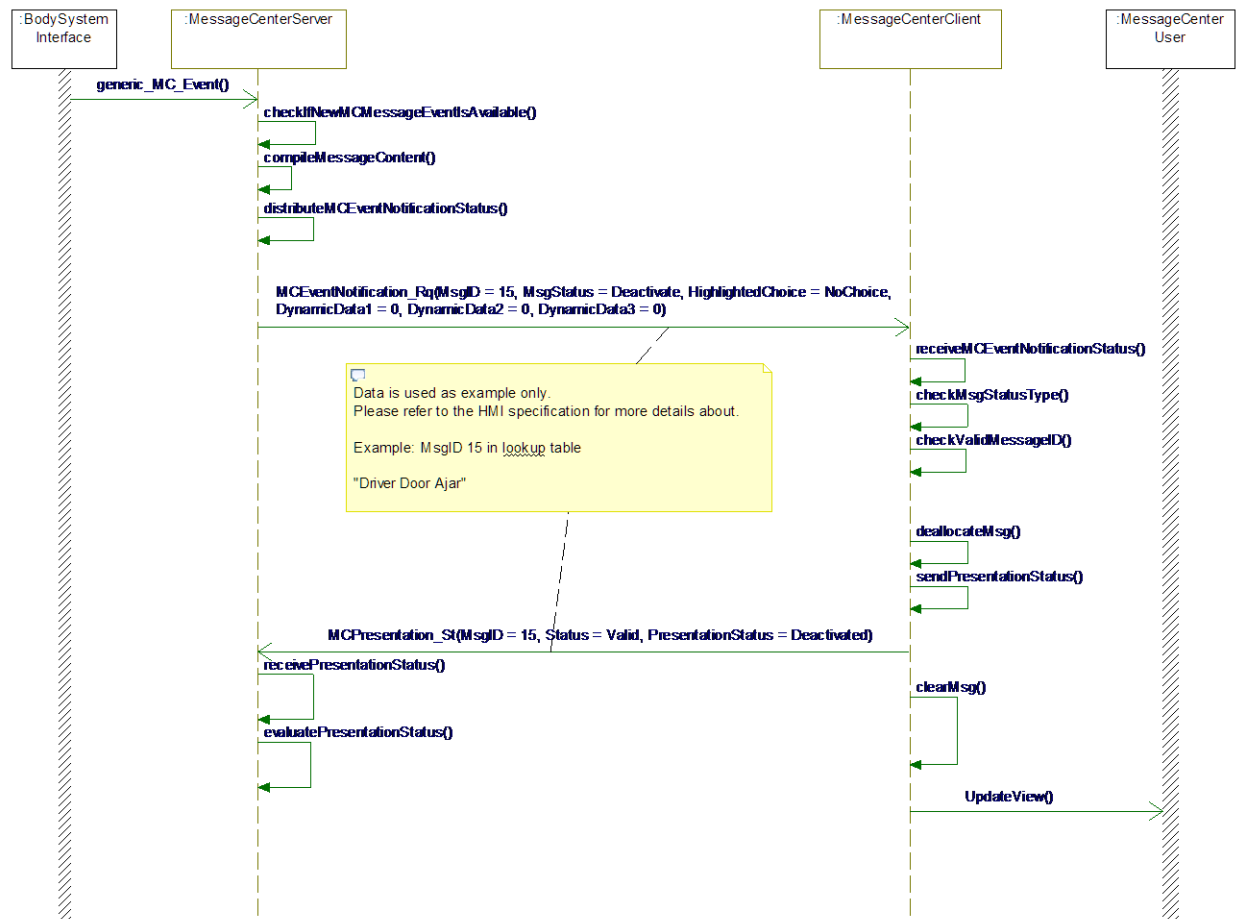
###### Post-condition

This MC notification has been removed from screen and stack.

###### Post-condition

An actual presentation state is sent back to MessageCenter Server.

##### Sequence Diagram





#### 4.2.4.3 *MCv3-SD-REQ-347373/A-Message Center Notification Presentation\_StatusType is Activate, Choice 1 highlighted, No Message Granted*

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 124 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID), checks in lookup table that two choice fields are available, checks actual set language status, evaluates content of received bus message, reads and acquires type of all dynamic data raw fields and sees no data to be used, reads to highlight first choice element, allocates, grants and displays this notification and sends active granted status back to MessageCenter Server.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

Trigger for a new notification occurred.

###### Pre-condition

No Message granted (message stack is empty).

###### Post-condition

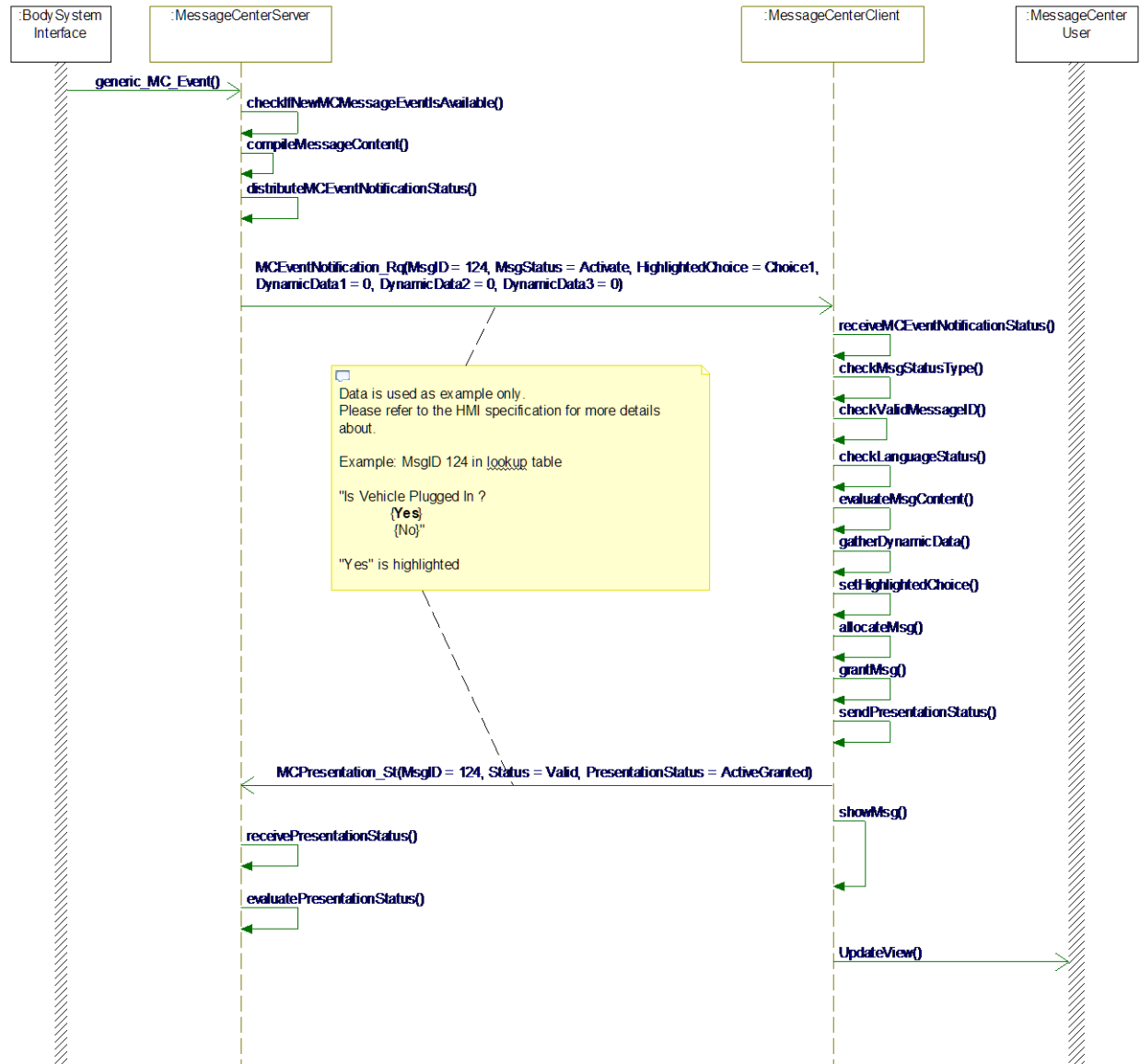
New MC notification is presented to the user.

###### Post-condition

An "active" presentation state is sent back to MessageCenter Server.



## Sequence Diagram





#### 4.2.4.4 MCv3-SD-REQ-347374/A-Message Center Notification Presentation\_StatusType is Activate, No Message Granted\_LocalDynamicData

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 211 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID), checks in lookup table that no choice field or similar is available, checks actual set language status, evaluates content of received bus message, reads and acquires type of all dynamic data raw fields and sees, data to be shown, is locally taken from, reads to highlight no choice element, allocates, grants and displays this notification and sends active granted status back to MessageCenter Server.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

Trigger for a new notification occurred.

###### Pre-condition

No Message granted (message stack is empty).

###### Post-condition

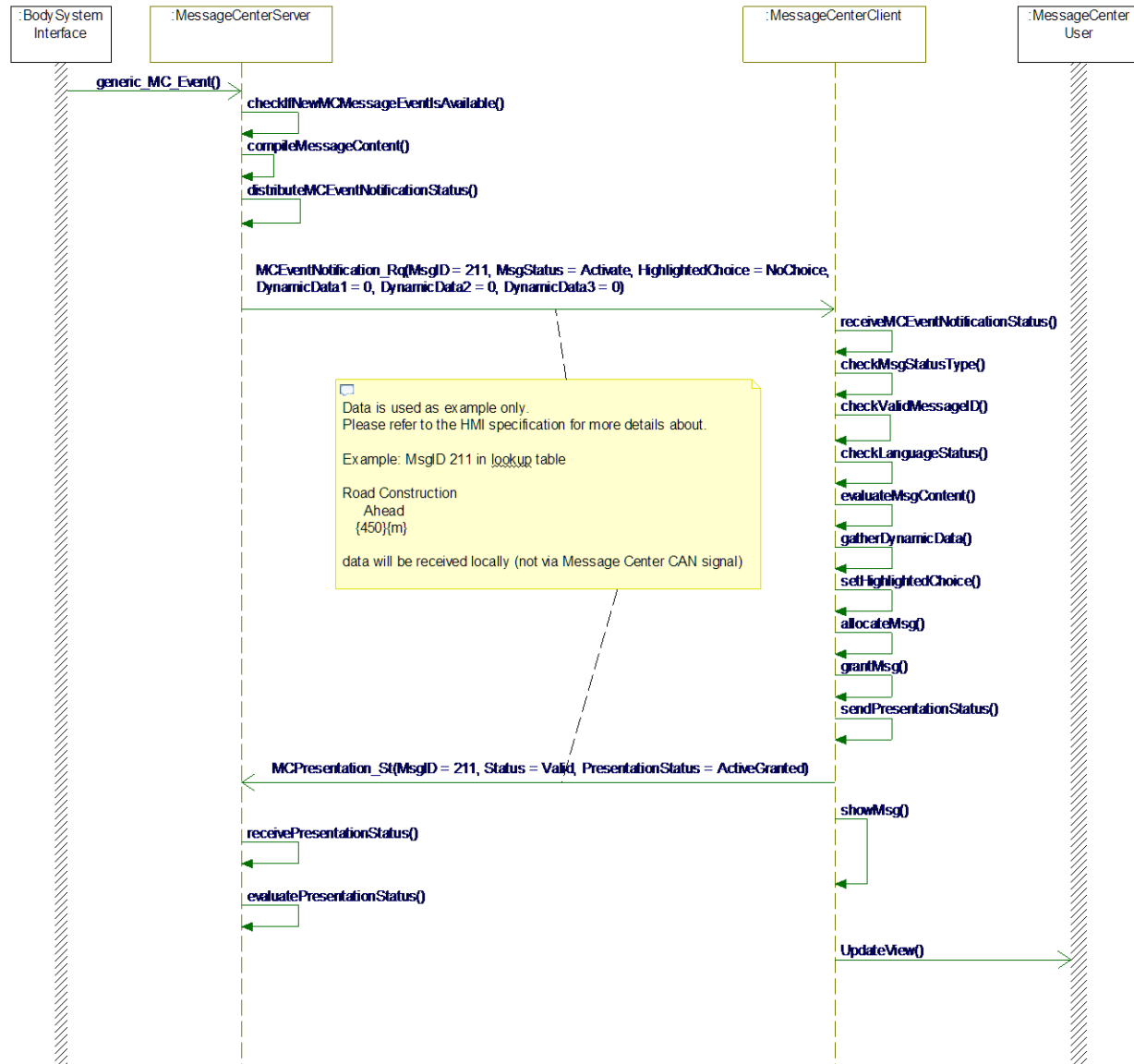
New MC notification is presented to the user.

###### Post-condition

An "active" presentation state is sent back to MessageCenter Server.



## Sequence Diagram





#### 4.2.4.5 MCv3-SD-REQ-347445/A-Message Center Notification Presentation\_StatusType is Activate, No Message Granted\_2DynamicDataAsOneInteger

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 158 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID), checks in lookup table that no choice field or similar is available, checks actual set language status, evaluates content of received bus message, reads and acquires type of all dynamic data raw fields.

In this case, due to entry in lookup table, both (MessageCenter Server and Client) do know to interpret DD1 (=DynamicData1-field) and DD2 as one integer and DD3 as an enumeration literal to present 7 digits (-> see MCv3-FUN-REQ-347021-Dynamic Data Gathering for more details). Then it reads to highlight no choice element, allocates, grants and displays this notification and sends active granted status back to MessageCenter Server.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

Example (please refer to the HMI specification for more details about data):  
MsgID 158 in lookup table with DD3 for 7 digits to show.

Factory Keypad  
Code  
{ 4 3 7 5 9 2 4 }

use DD1 and DD2 as one integer:

DD1 = 0x42, DD2 = 0xC574 => value is 0x42C574

how to calculate manually to verify:

DD2 = 0xC574 -> 0xC574 -> 50548  
DD1 = 0x42 -> 0x420000 -> 4325376  
-----  
4375924

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

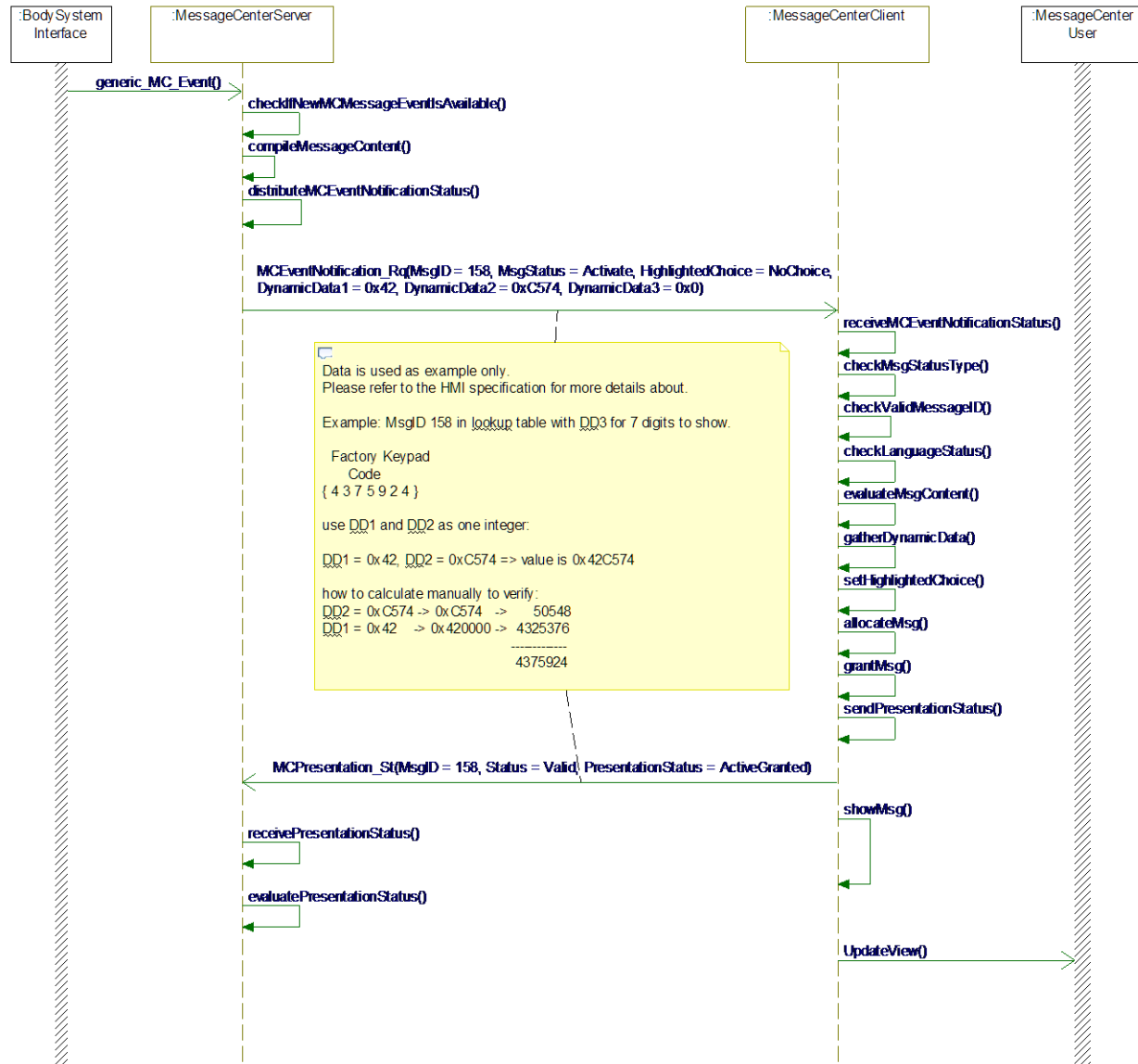
No message granted.

###### Post-condition

New MC notification is presented to the user.



## Sequence Diagram





#### 4.2.4.6 MCv3-SD-REQ-348253/A-Message Center Notification Presentation\_StatusType is Activate, No Message Granted\_2DynamicDataAsOneInteger\_leading zeros

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 158 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID), checks in lookup table that no choice field or similar is available, checks actual set language status, evaluates content of received bus message, reads and acquires type of all dynamic data raw fields.

In this case, due to entry in lookup table, both (MessageCenter Server and Client) do know to interpret DD1 (=DynamicData1-field) and DD2 as one integer and DD3 as an enumeration literal to present 5 digits (-> see MCv3-FUN-REQ-347021-Dynamic Data Gathering for more details). Then it reads to highlight no choice element, allocates, grants and displays this notification and sends active granted status back to MessageCenter Server.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

Example (please refer to the HMI specification for more details about data):  
MsgID 158 in lookup table with DD3 for 5 digits to show.

Factory Keypad  
Code  
{ 0 0 1 2 3 }

use DD1 and DD2 as one integer:

DD1 = 0x0, DD2 = 0x7B => value is 0x7B

how to calculate manually to verify:

DD2 = 0x7B -> 0x007B -> 00123

DD1 = 0x0 -> 0x0000 -> 00000

-----  
0000000123 -> 5 digits -> "00123"

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

No message granted.

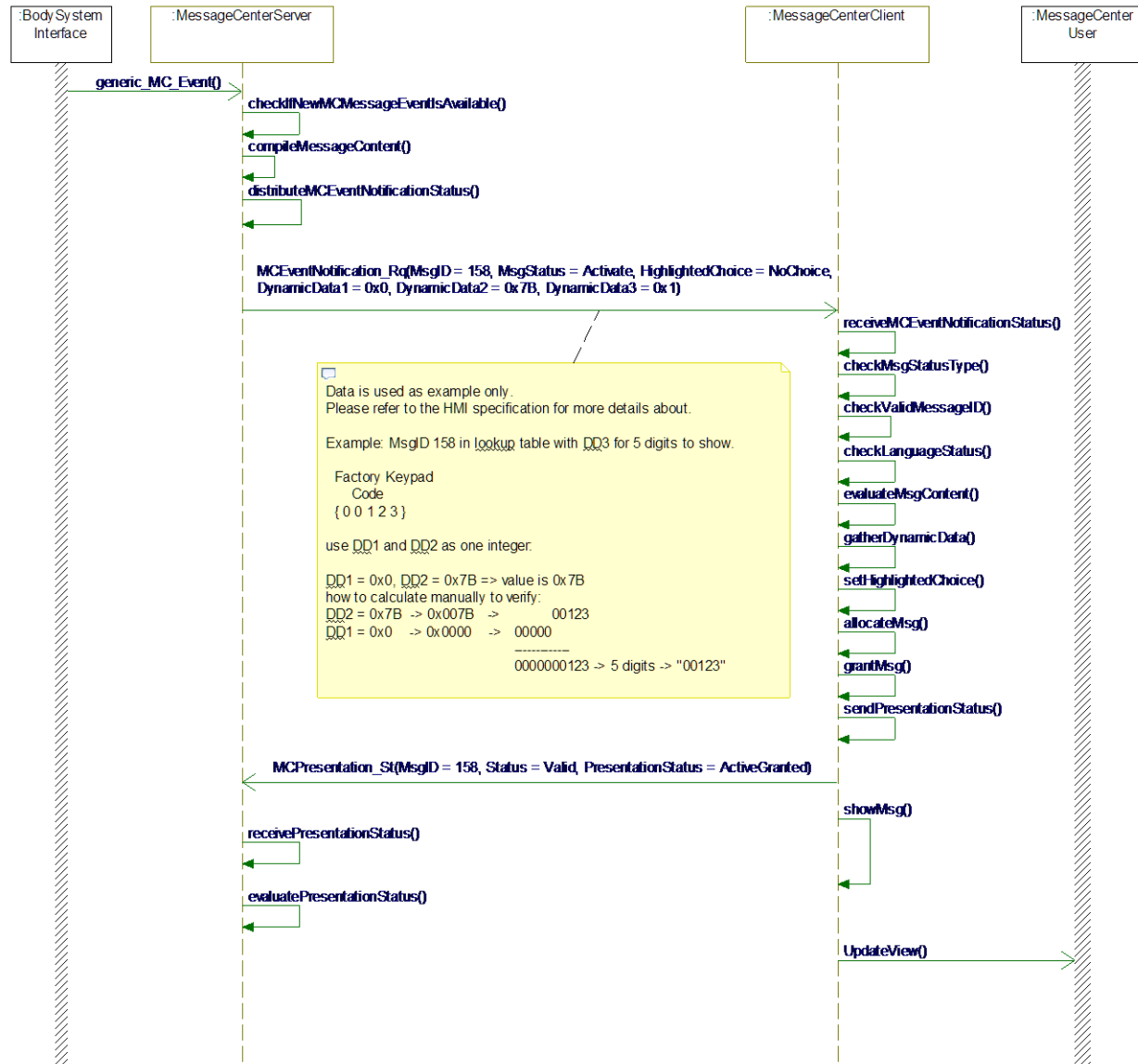
###### Post-condition

New MC notification is presented to the user.





## Sequence Diagram





#### 4.2.4.7 MCv3-SD-REQ-347446/A-Message Center Notification Presentation\_ StatusType is Activate, MsgID is not available

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of an unknown MsgID (here e.g. 444) with MsgStatus of activate, update or deactivate and transmits this notification message to MessageCenter Client.

MessageCenter Client checks if message type and message ID are valid. In this case, it can't find this message ID in lookup table and only sends inactive presentation status back to indicate an error.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

MsgID is not available in lookup table.

###### Post-condition

MessageCenter Client sends back an „Inactive“ presentation status to MessageCenter Server.

##### Sequence Diagram





#### 4.2.4.8 MCv3-SD-REQ-347945/A-Message Center Notification Presentation\_StatusType is Activate, Received Event is already Granted

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 15 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID) and sees an activation on an already granted notification.

MessageCenter Client is acting like on a new message (-> see MCv3-SD-REQ-347045-Message Center Notification Presentation\_StatusType is Activate, No Message Granted) and sends active granted status back to MessageCenter Server.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

Note: This is a robustness reaction and is not part of normal behavior.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

Event is already granted or „updated“ the last time.

###### Post-condition

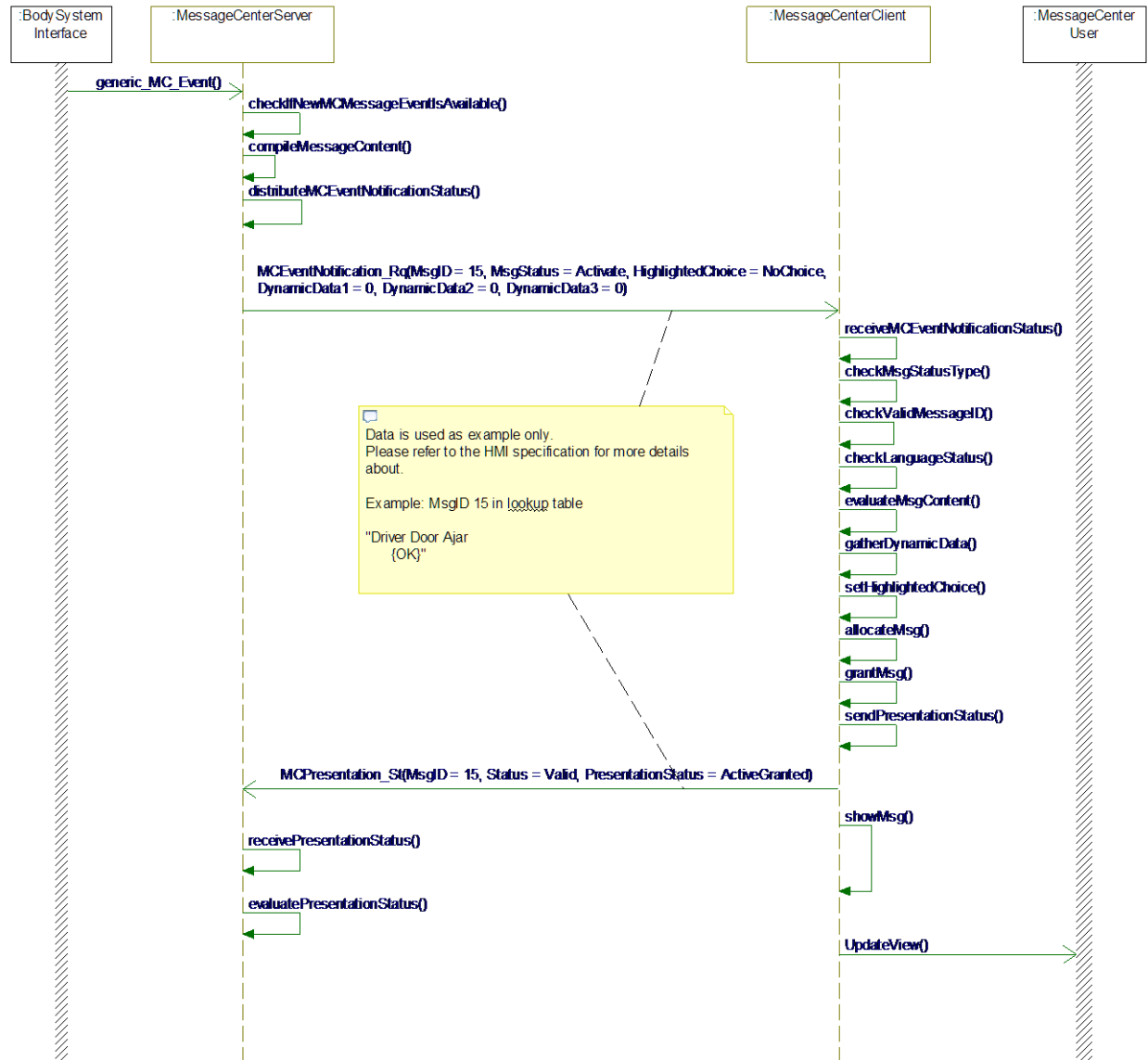
New MC notification is presented to the user.

###### Post-condition

An “active” presentation state is sent back to MessageCenter Server.



## Sequence Diagram



**4.2.4.9 MCv3-SD-REQ-347946/A-Message Center Notification Presentation\_ StatusType is Update, Received Event is not Granted****Scenarios****Normal Usage**

In this example, MessageCenter Server compiles message content of MsgID 15 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID) and sees an update on a not granted notification.

MessageCenter Client is acting like it would receive „activate“ on this new message (-> see MCv3-SD-REQ-347045-Message Center Notification Presentation\_ StatusType is Activate, No Message Granted) and sends active granted status back to MessageCenter Server.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

Note: This is a robustness reaction and is not part of normal behavior.

**Constraints****Pre-condition**

System is on.

**Pre-condition**

Received event is not granted.

**Post-condition**

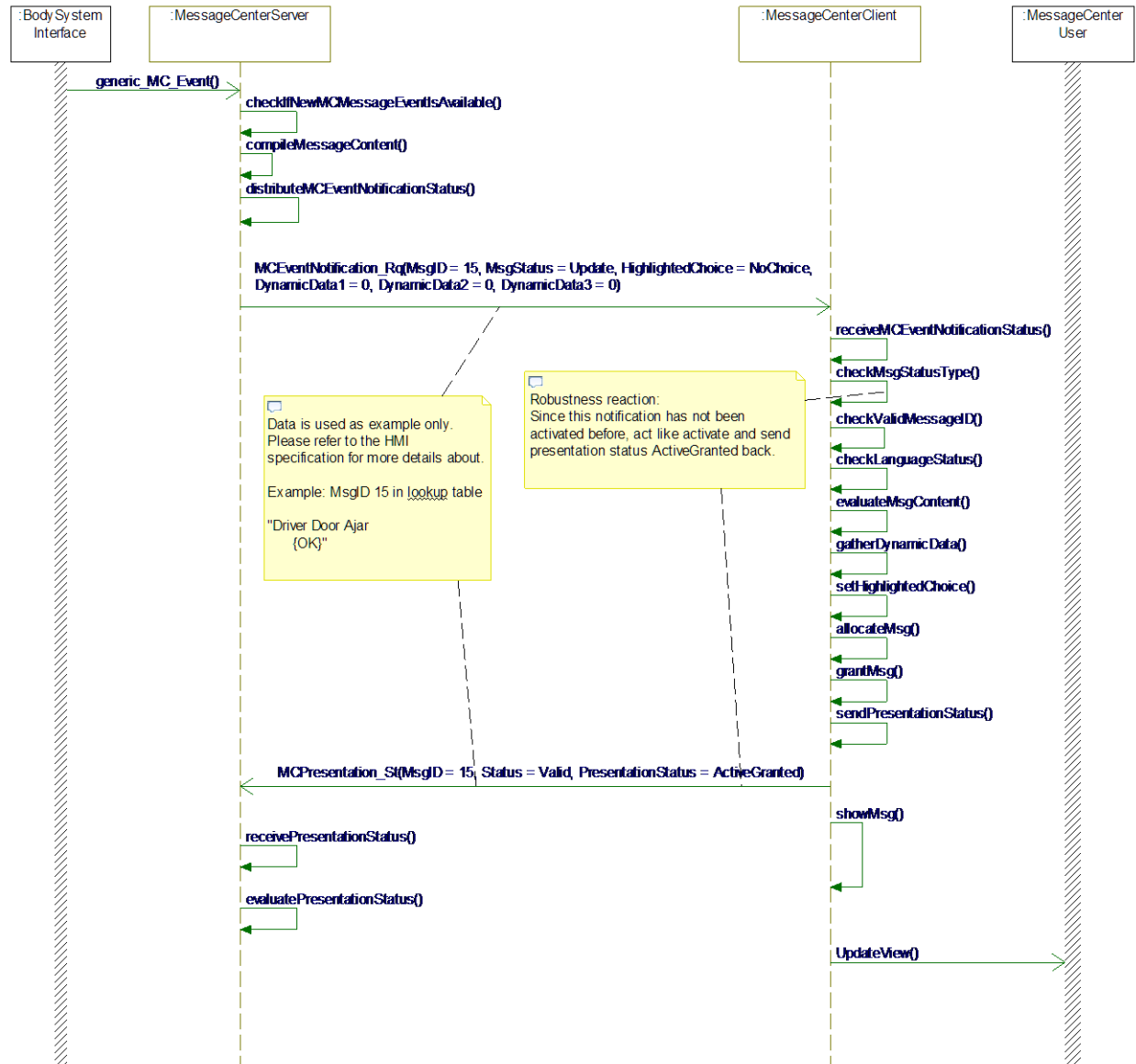
An “old” MC notification is presented to the user.

**Post-condition**

An “active” presentation state is sent back to MessageCenter Server.



## Sequence Diagram



**4.2.4.10 MCv3-SD-REQ-347947/A-Message Center Notification Presentation 4 messages in longer sequence showing different MsgStates****Scenarios****Normal Usage**

In this example, a sequence of several activations and updates of notifications is shown for better understanding of the message center notification system.

Following scenarios are illustrated:

SC1 activate

SC2 activate

SC3 activate

SC1 update

SC4 activate

SC2 update

SC3 update

SC1 update

SC4 update

SC2 update

SC3 update

**Constraints****Pre-condition**

System is on.

**Pre-condition**

No message granted

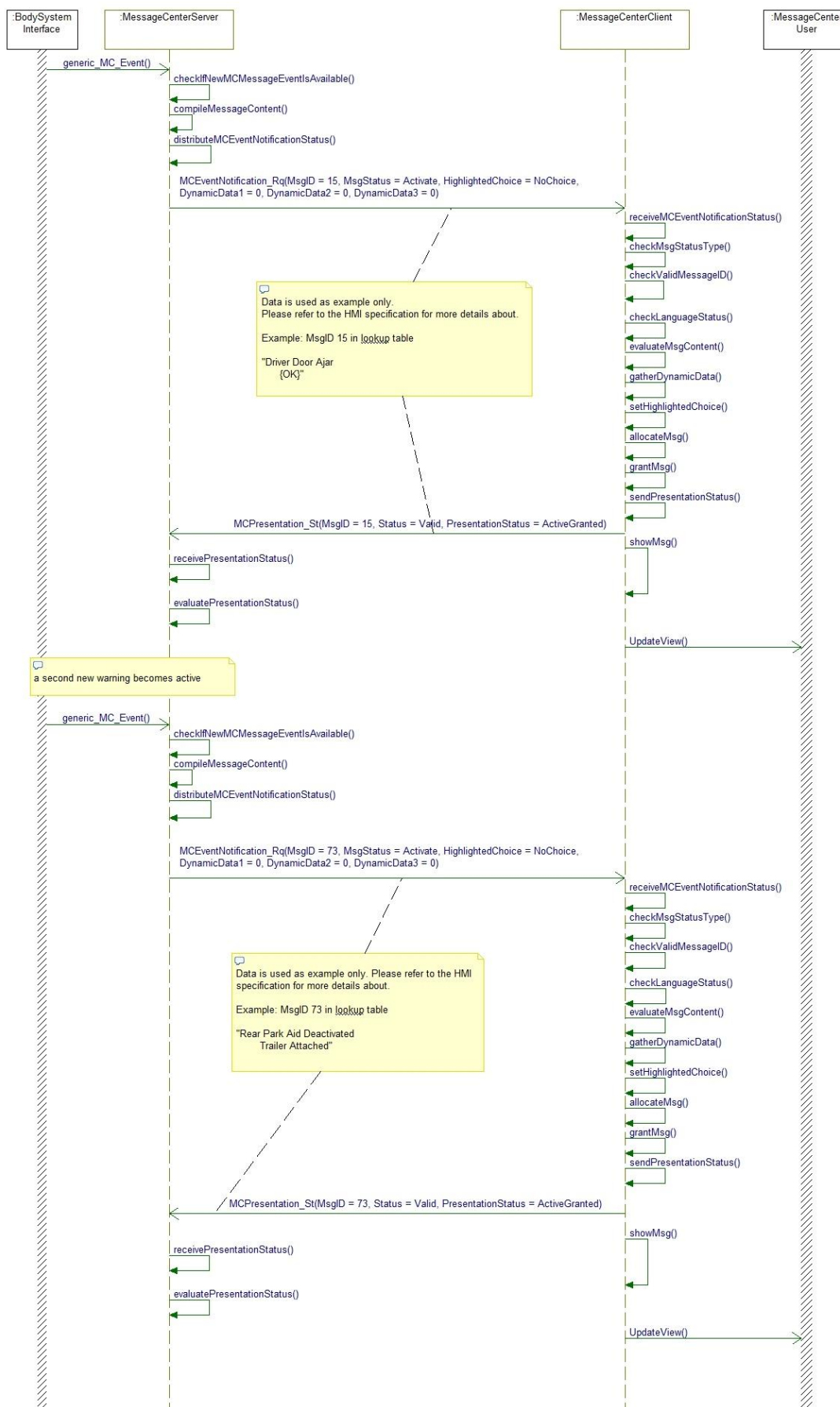
**Post-condition**

SC3 is presented to the user and SC1, SC4 and SC2 are in queue (stack)

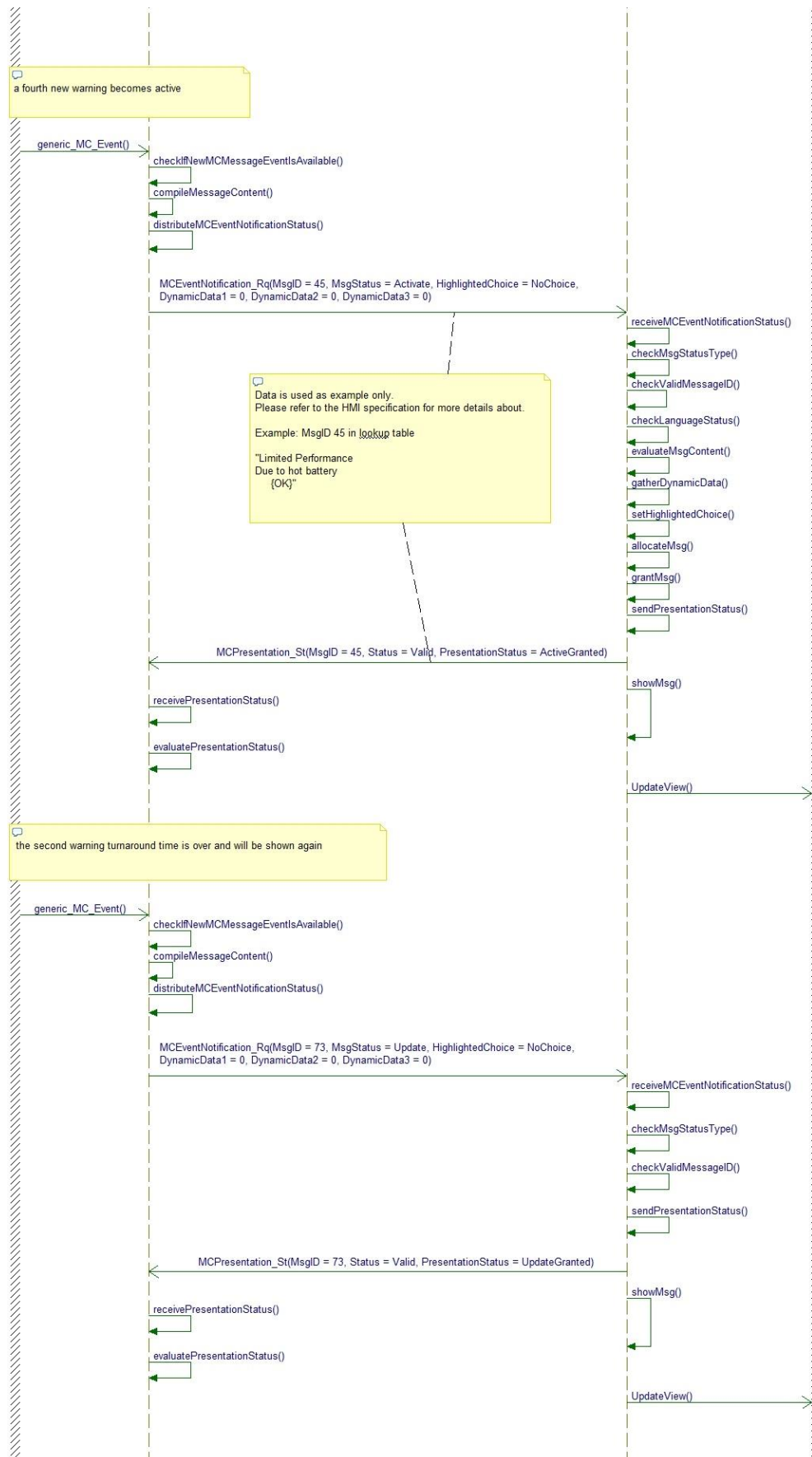


## Sequence Diagram



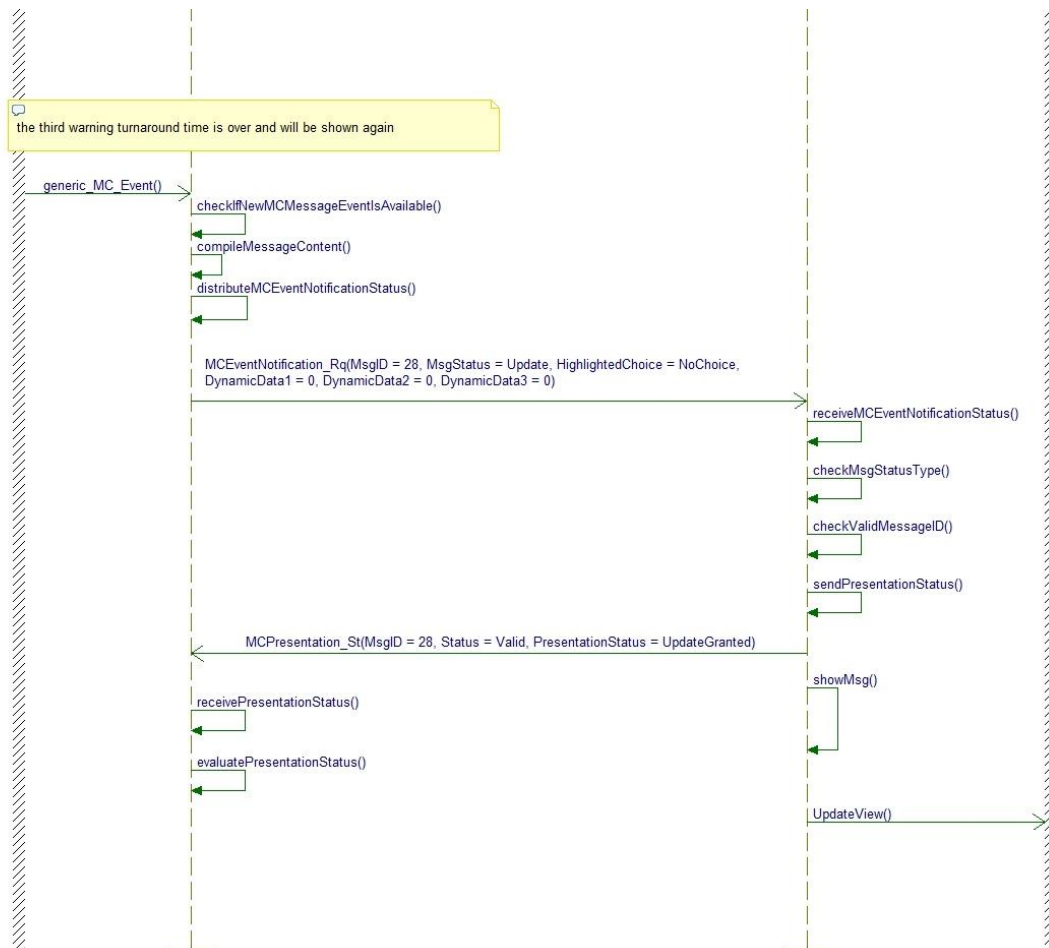
















#### 4.2.4.11 MCv3-SD-REQ-349024/A-Message Center Notification Presentation\_Error occurred while RAW Data Decoding

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 530 and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID), checks in lookup table that two choice fields are available, checks actual set language status, evaluates content of received bus message, reads and acquires type of all dynamic data raw fields.

In this case, due to entry in lookup table, both (MessageCenter Server and Client) do know to interpret DD1 (=Dynamic Data 1 – field) as an enumeration carrying drive mode. However, the value in transferred DD1 is outside of literal range of this enumeration and cannot be assigned.

Due to that, MessageCenter Client shall just send back inactive presentation state to MessageCenter Server to indicate an error occurred.

MessageCenter Server receives this notification status and evaluates it to proceed accordingly.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

MsgStatus can be Activate or Update

###### Post-condition

An “inactive” presentation state is sent back to MessageCenter Server.

##### Sequence Diagram





### 4.3 MCv3-FUN-REQ-347036/A-Message Center Notification Confirmation

#### 4.3.1 Requirements

#### 4.3.2 Use Cases

##### 4.3.2.1 MCv3-UC-REQ-347038/A-Message Center Notification Confirmation

<b>Actors</b>	Message Center User
<b>Pre-conditions</b>	A message center notification with a confirmation element (e.g. OK button) is presented to the user (granted).
<b>Scenario Description</b>	User presses confirmation element (e.g. OK button)
<b>Post-conditions</b>	MessageCenter Client sends a confirmation indication information to MessageCenter Server
<b>List of Exception Use Cases</b>	NA
<b>Interfaces</b>	G-HMI MCConfirmationSelection_Ind

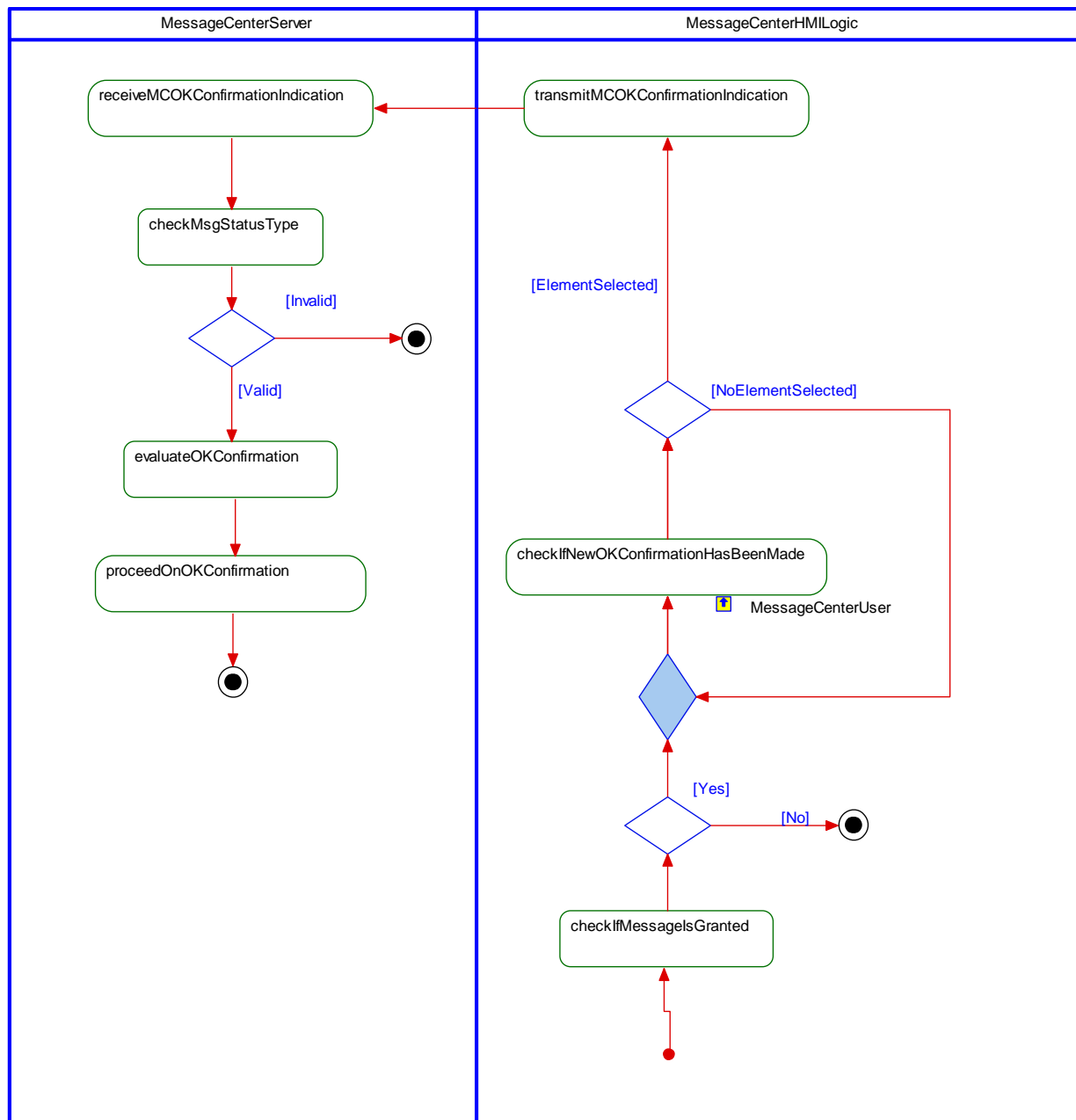




## 4.3.3 Activity Diagrams

## 4.3.3.1 MCv3-ACT-REQ-347039/A-Message Center Notification Confirmation

## Activity Diagram





#### 4.3.4 Sequence Diagrams

##### 4.3.4.1 MCv3-SD-REQ-347375/A-Message Center Notification Confirmation\_Messages available, User Choice OK Confirmation, Successor Msg not available

###### Scenarios

###### Normal Usage

User presses OK. HMI shows reaction on OK press (e.g. button is highlighted). This confirmation indication is sent to MessageCenter Server.

###### Constraints

###### Pre-condition

System is on.

###### Pre-condition

MC notification with OK button is presented to the user.

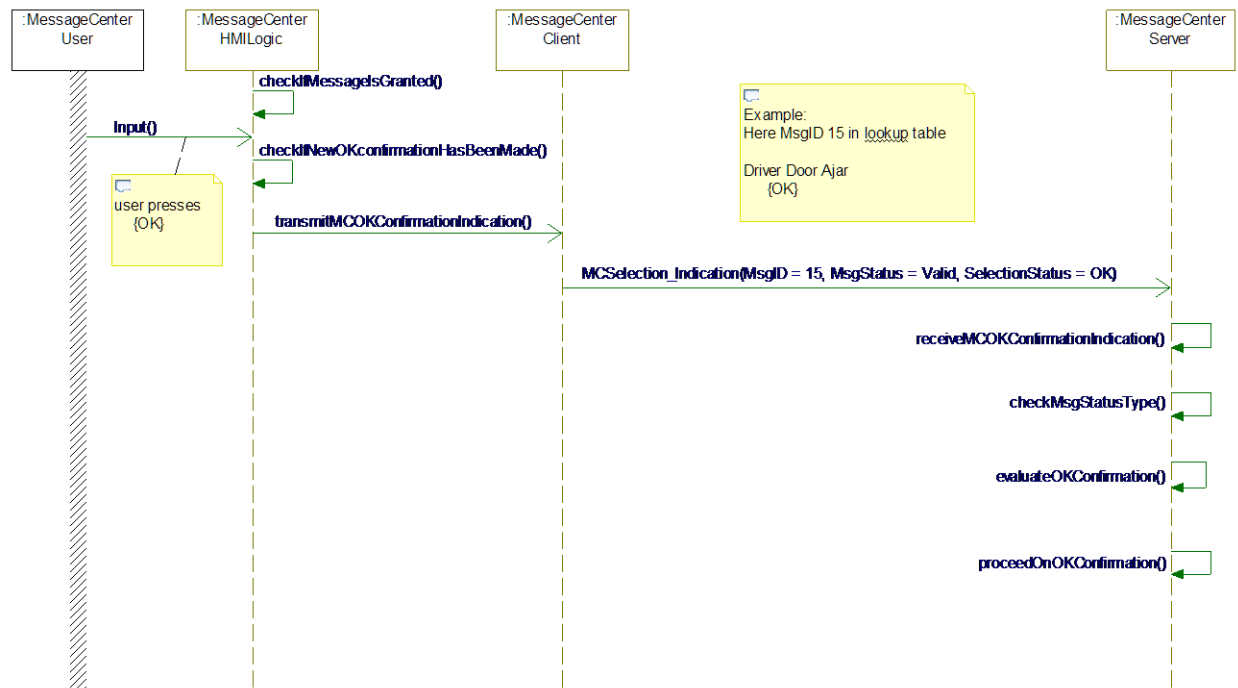
###### Pre-condition

MC notification is granted.

###### Post-condition

This message is still presented to the user.

###### Sequence Diagram



**4.3.4.2 MCv3-SD-REQ-347381/A-Message Center Notification Confirmation\_showing interaction behavior with another granted message****Scenarios****Normal Usage**

A message center notification is triggered (here: MsgID 73 - Rear Park Aid Deactivated). After a short time, another message center notification with an OK-Button is triggered (here: MsgID 15 - Driver Door Ajar).

User presses OK to confirm notification.

MessageCenter Server first brings the notification in the back into front (via "update") and then deactivates the confirmed one to avoid flickering.

**Constraints****Pre-condition**

System is on.

**Pre-condition**

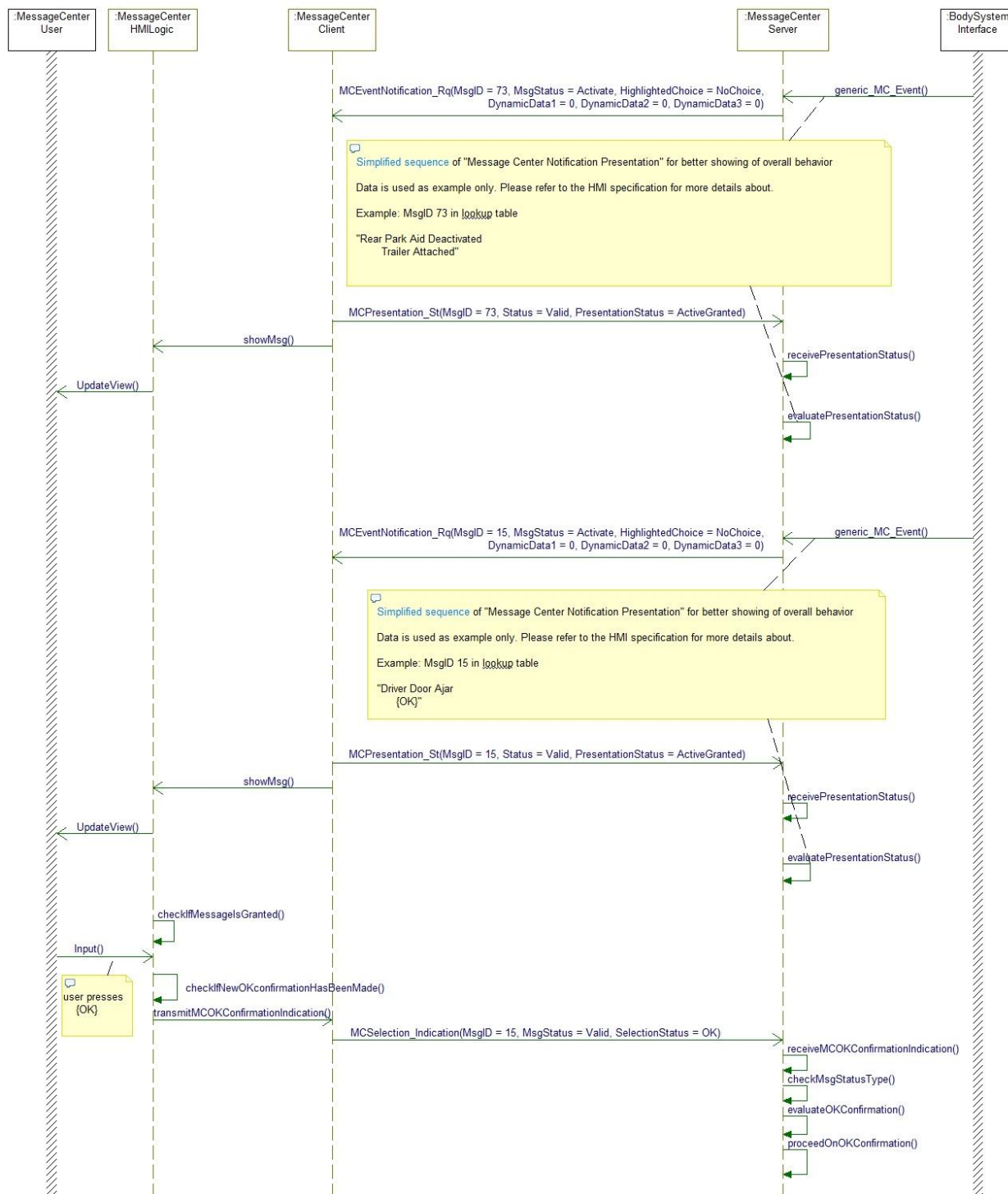
No MC notification is active.

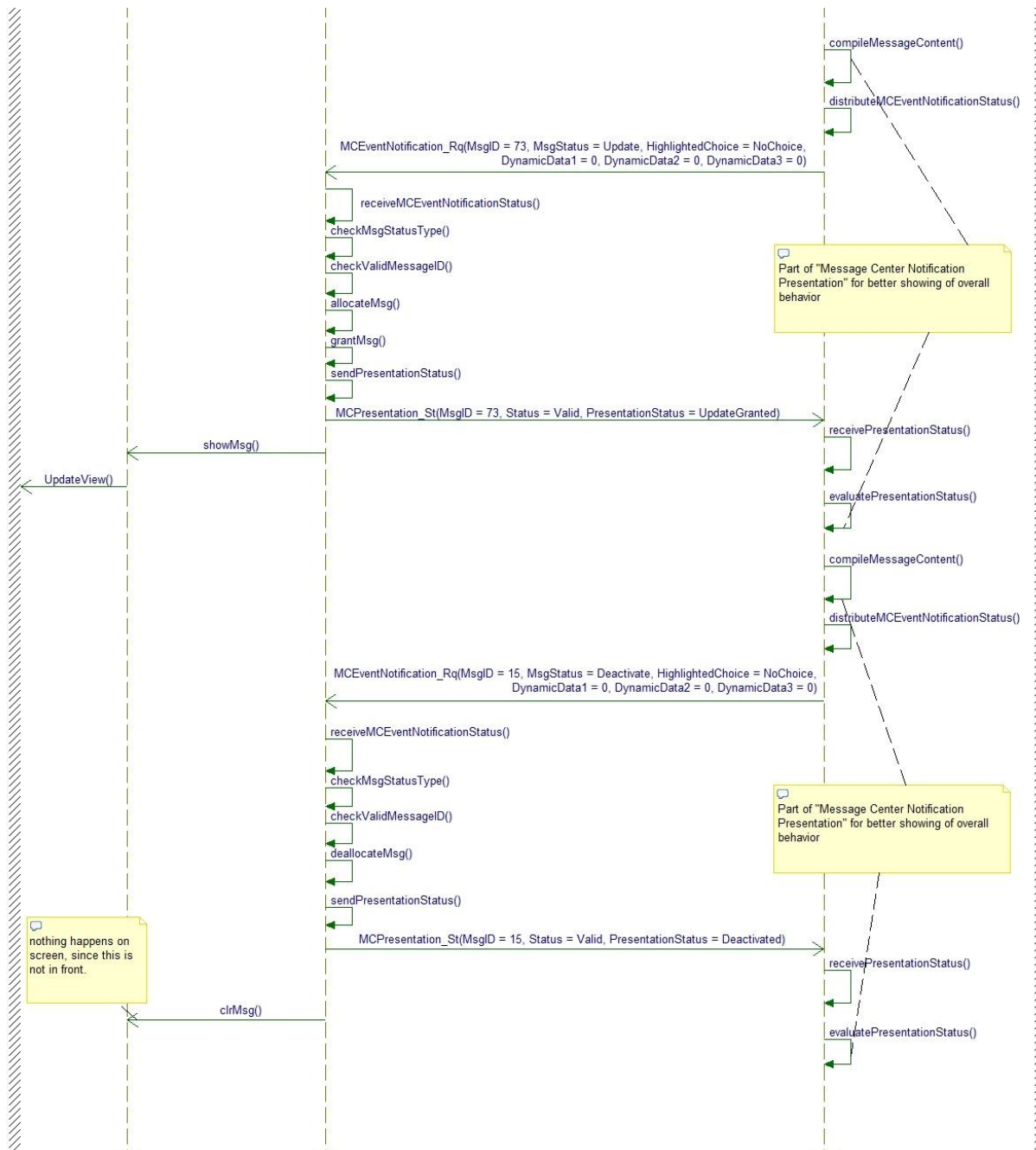
**Post-condition**

First MC notification is presented to the user.



## Sequence Diagram







#### 4.4 MCv3-FUN-REQ-347031/A-Message Center Notification Choice Selection

##### 4.4.1 Requirements

##### 4.4.2 Use Cases

##### 4.4.2.1 MCv3-UC-REQ-347033/A-Message Center Notification Choice Selection

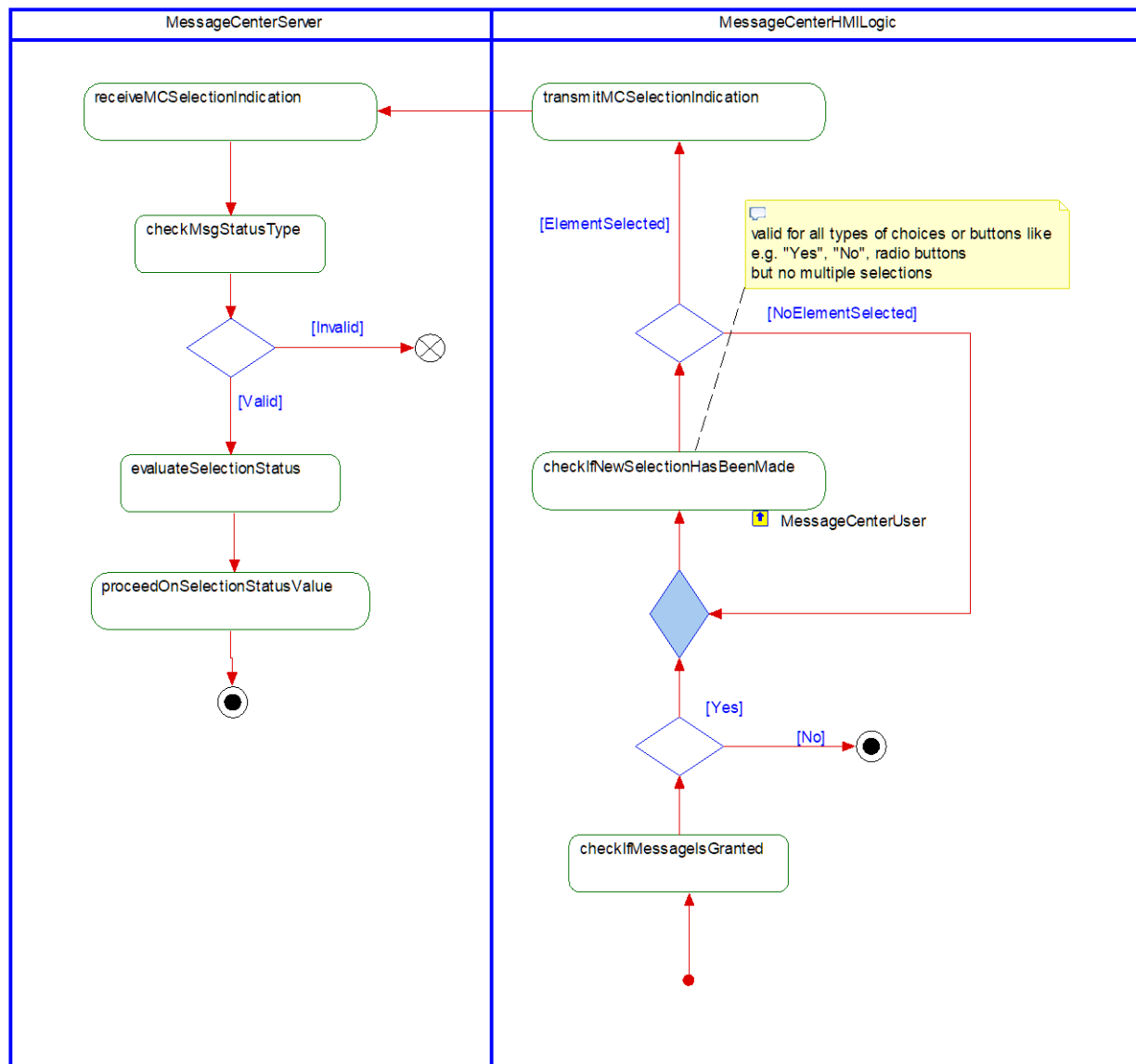
<b>Actors</b>	Message Center User
<b>Pre-conditions</b>	A message center notification with at least one choice element (e.g. "yes" button) is presented to the user (granted).
<b>Scenario Description</b>	User presses one choice element (e.g. "yes" button)
<b>Post-conditions</b>	MessageCenter Client sends an information to MessageCenter Server which number of choice element has been pressed by the user.
<b>List of Exception Use Cases</b>	NA
<b>Interfaces</b>	G-HMI MCConfirmationSelection_Ind



## 4.4.3 Activity Diagrams

## 4.4.3.1 MCv3-ACT-REQ-347034/A-Message Center Notification Choice Selection

## Activity Diagram





#### 4.4.4 Sequence Diagrams

##### 4.4.4.1 MCv3-SD-REQ-347040/A-Message Center Notification Choice Selection\_Messages available, User Choice 1 Selection, Successor Msg not available

###### Scenarios

###### Normal Usage

In this example, User selects choice 1 (here: Yes). MessageCenter Client compiles selection indication message with choice 1 selected and sends to MessageCenter Server.

This checks validity (correct message type and ID) evaluates that choice 1 has been selected and means "Yes" in this case and proceeds accordingly.

###### Constraints

###### Pre-condition

System is on.

###### Pre-condition

Notification with at least one choice element is presented to the user.

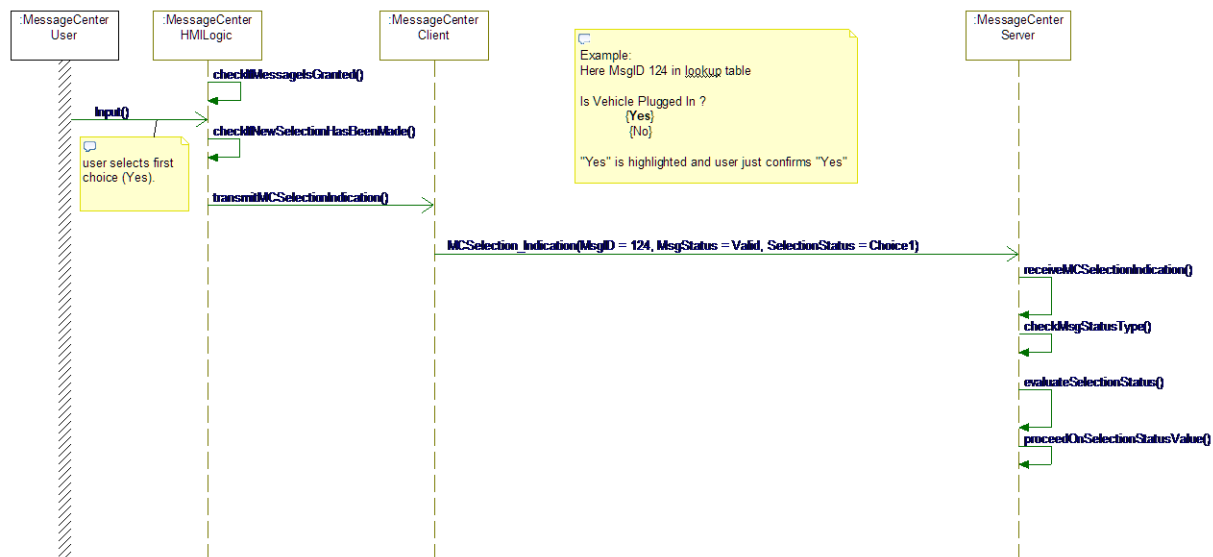
###### Post-condition

This MC notification is still presented to the user.

###### Post-condition

MessageCenter Client sends a confirmation indication information is sent to MessageCenter Server to transfer choice 1 has been selected by user.

###### Sequence Diagram







## 4.5 MCv3-FUN-REQ-347869/A-Message Center Deallocate All Messages At Once

### 4.5.1 Requirements

### 4.5.2 Use Cases

#### 4.5.2.1 UC-REQ-347871/A-Message Center Deallocate All Messages At Once

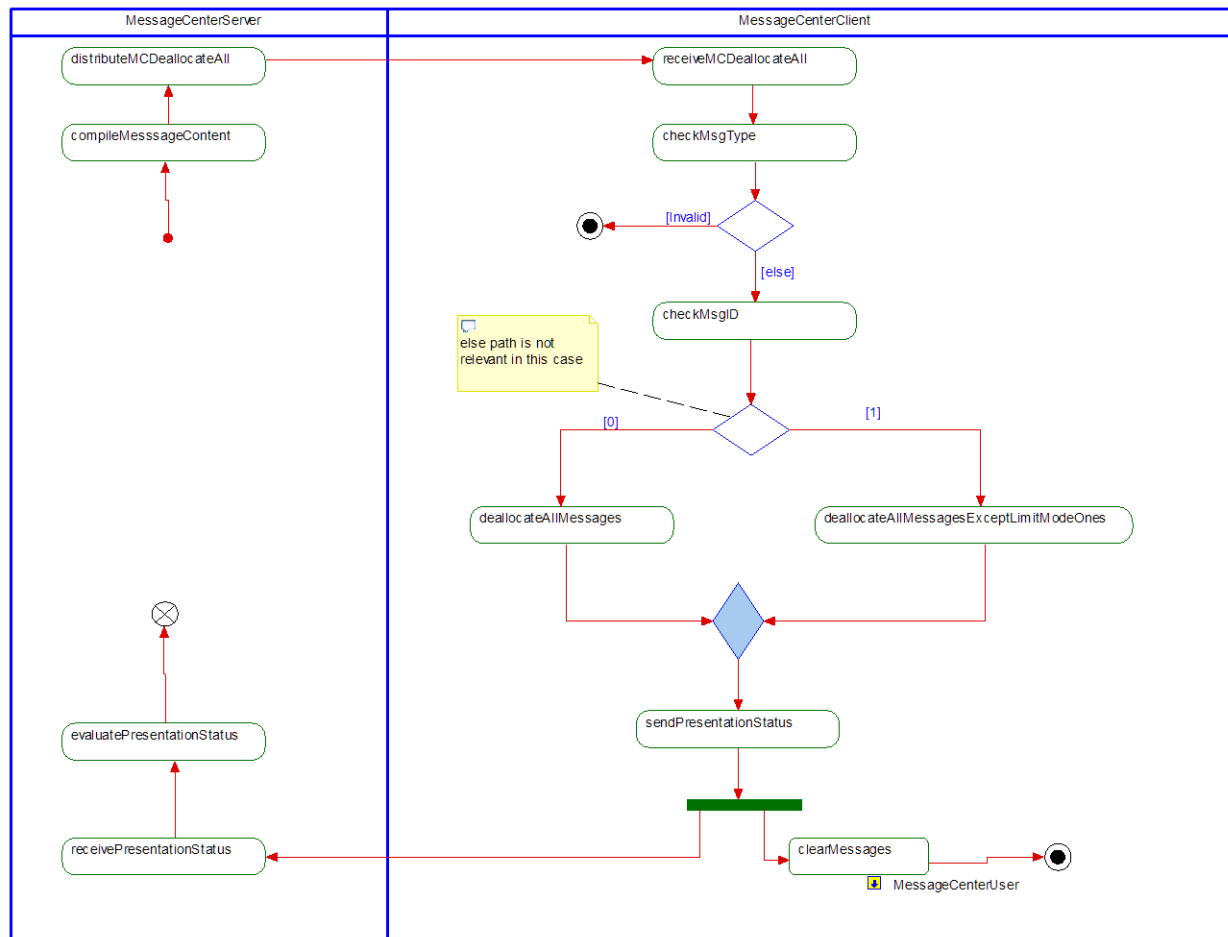
<b>Actors</b>	Message Center System
<b>Pre-conditions</b>	MessageCenter Server needs to deallocate/deactivate all messages at once
<b>Scenario Description</b>	MessageCenter Server compiles related message content and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID) and deallocates/deactivates all message or all messages except limit mode ones and sends according status back to MessageCenter Server
<b>Post-conditions</b>	All message center notifications (maybe except limit mode ones) are deallocated/deactivated.
<b>List of Exception Use Cases</b>	NA
<b>Interfaces</b>	G-HMI MCConfirmationSelection_Ind



### 4.5.3 Activity Diagrams

#### 4.5.3.1 MCv3-ACT-REQ-347872/A-Message Center Deallocate All Messages At Once

##### Activity Diagram





#### 4.5.4 Sequence Diagrams

##### 4.5.4.1 MCv3-SD-REQ-347873/A-Deallocate All Messages At Once\_Deactivate All

###### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 0 and transmits this notification message to MessageCenter Client. It can be activate, update or deactivate.

MessageCenter Client checks validity (correct message type and ID) and deallocates all notifications at once.

Then it sends an inactive presentation status back to MessageCenter Server.

Note: all other data like HighlightedChoice or Dynamic Data fields do not care and shall be ignored.

###### Constraints

###### Pre-condition

System is on.

###### Pre-condition

It does not care whether any message is active.

###### Pre-condition

Message ID „0“ is sent.

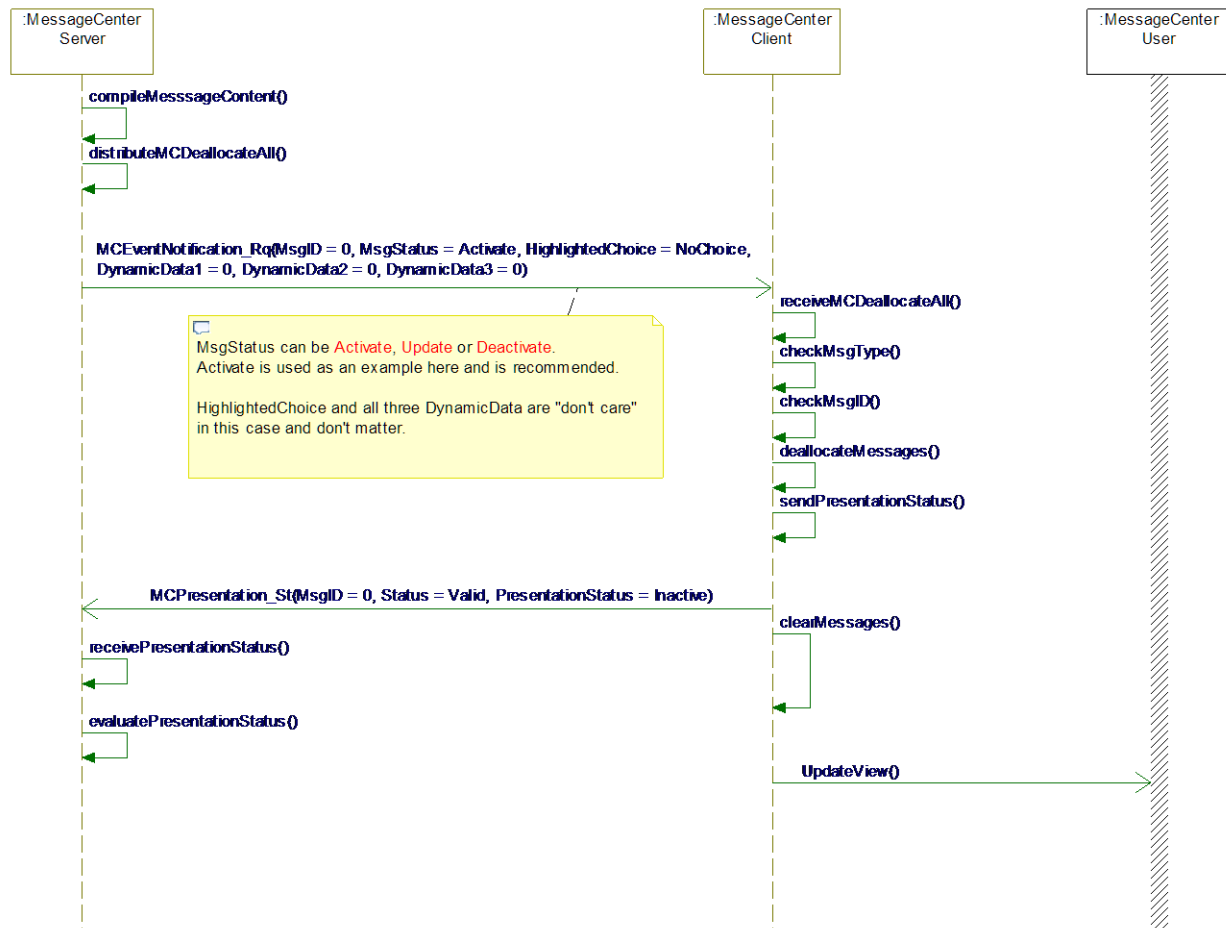
###### Post-condition

All messages are deallocated. Means stack is empty.

###### Post-condition

No message is presented to user

###### Sequence Diagram





#### 4.5.4.2 MCv3-SD-REQ-347874/A-Deallocate All Messages At Once\_Deallocate All except Limit Mode Ones

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of MsgID 1 and transmits this notification message to MessageCenter Client. It can be activate, update or deactivate.

MessageCenter Client checks validity (correct message type and ID) and deallocates all notifications at once except limit mode ones. This means, notifications defined to be available in limit mode, will not be deallocated in this case, however all other.

Then it sends an inactive presentation status back to MessageCenter Server.

Note: all other data like HighlightedChoice or Dynamic Data fields do not care and shall be ignored.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

It does not care whether any message is active.

###### Pre-condition

Message ID „1“ is sent.

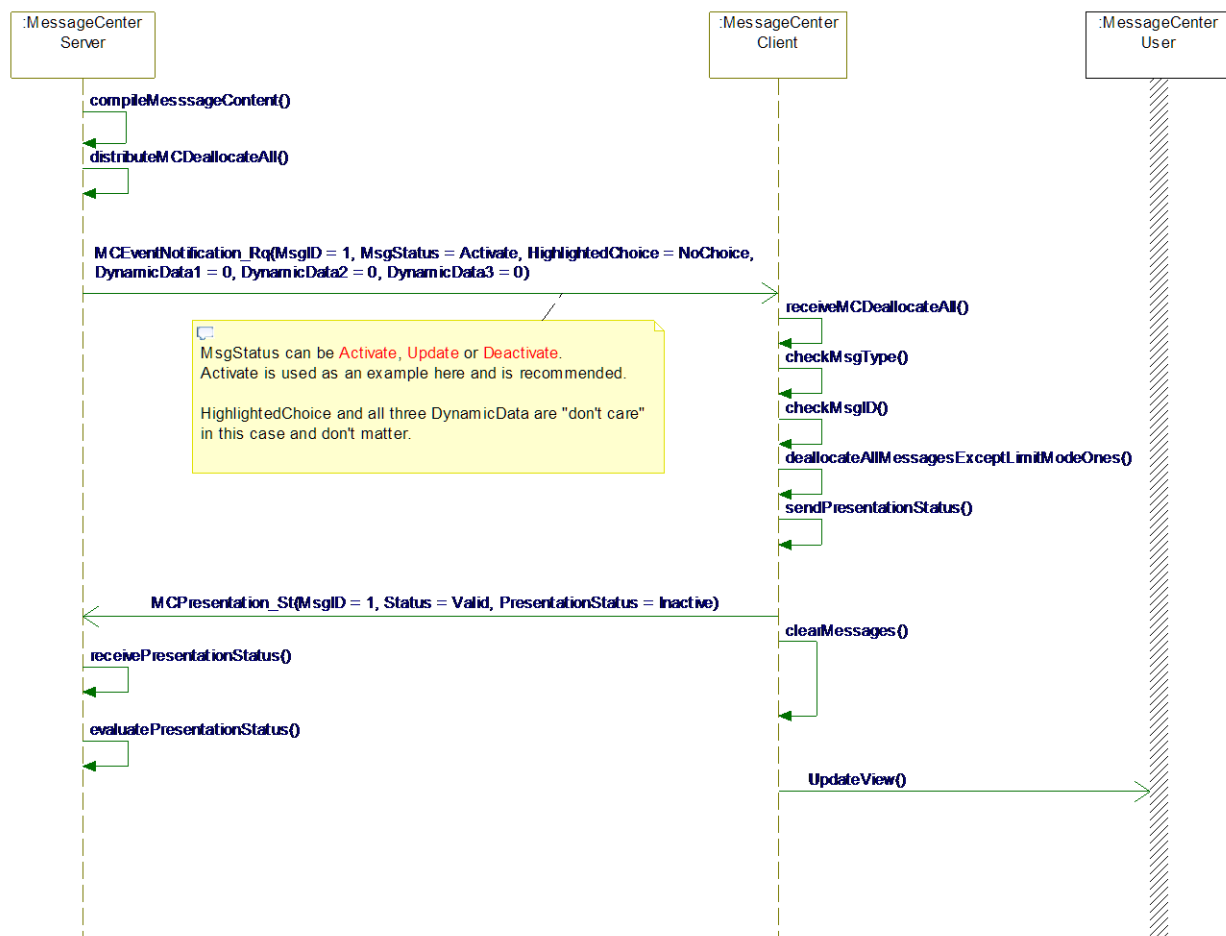
###### Post-condition

All messages are deallocated. Means stack is empty.

###### Post-condition

No message is presented to user

##### Sequence Diagram





#### 4.5.4.3 MCv3-SD-REQ-347875/A-Deallocate All Messages At Once\_MessageType Invalid

##### Scenarios

###### Normal Usage

In this example, MessageCenter Server compiles message content of any MsgID and transmits this notification message to MessageCenter Client. However, message type is Invalid.

MessageCenter Client checks validity (correct message type and ID) and ignores whole message.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

It does not care whether any message is active.

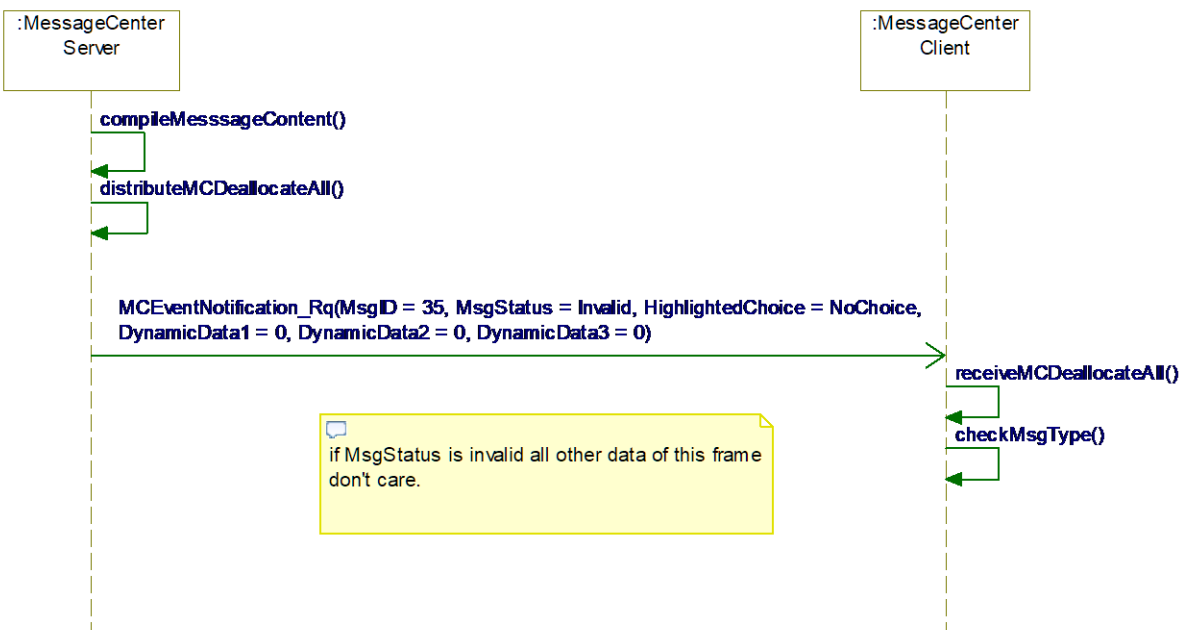
###### Pre-condition

Message type "Invalid" is sent for intention to empty messages stack.

###### Post-condition

No change.

##### Sequence Diagram





## 4.6 MCv3-FUN-REQ-348224/A-Message Center Global Alert Notification

### 4.6.1 Requirements

#### 4.6.1.1 MCv3-REQ-347032/A-Message Center Global Alert Notification *StatusType is Activate, no Message in Stack*

If MessageCenter Server receives a Global Alert trigger but there is no message granted (no message center notification in stack) it shall not send out a message center notification activation request for global alert to MessageCenter Client.

### 4.6.2 Use Cases

#### 4.6.2.1 **MCv3-UC-REQ-348226/A-Message Center Global Alert Notification**

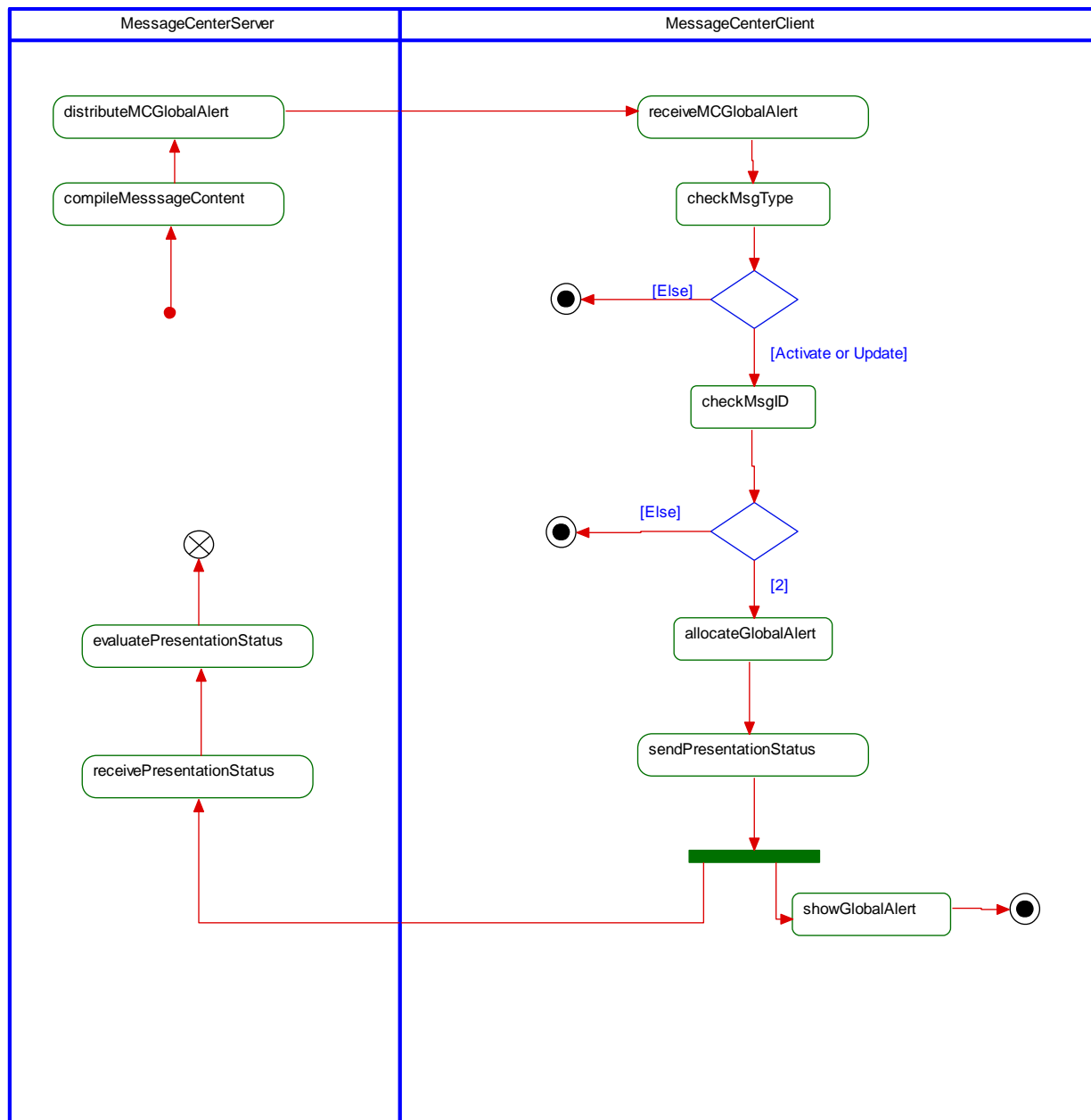
<b>Actors</b>	Vehicle System
<b>Pre-conditions</b>	A global alert event occurs or finishes.
<b>Scenario Description</b>	MessageCenter Server compiles related message content and transmits this notification message to MessageCenter Client. This checks validity (correct message type and ID) and activates/deactivates "global alert screen" (-> see HMI specification for further information) and sends according status back to MessageCenter Server.
<b>Post-conditions</b>	Global alert screen activated or deactivated.
<b>List of Exception Use Cases</b>	NA
<b>Interfaces</b>	G-HMI Vehicle System Interface



## 4.6.3 Activity Diagrams

## 4.6.3.1 MCv3-ACT-REQ-348227/A-Message Center Global Alert Notification

## Activity Diagram





## 4.6.4 Sequence Diagrams

### 4.6.4.1 MCv3-SD-REQ-348228/A-Message Center Global Alert Notification\_ *StatusType* is Activate

#### Scenarios

##### Normal Usage

MessageCenter Server sends a global alert notification to MessageCenter Client.

After MessageCenter Client is checking valid data it allocates this blank screen and sends back related presentation status.

#### Constraints

##### Pre-condition

System is on.

##### Pre-condition

It does not care if any message is active.

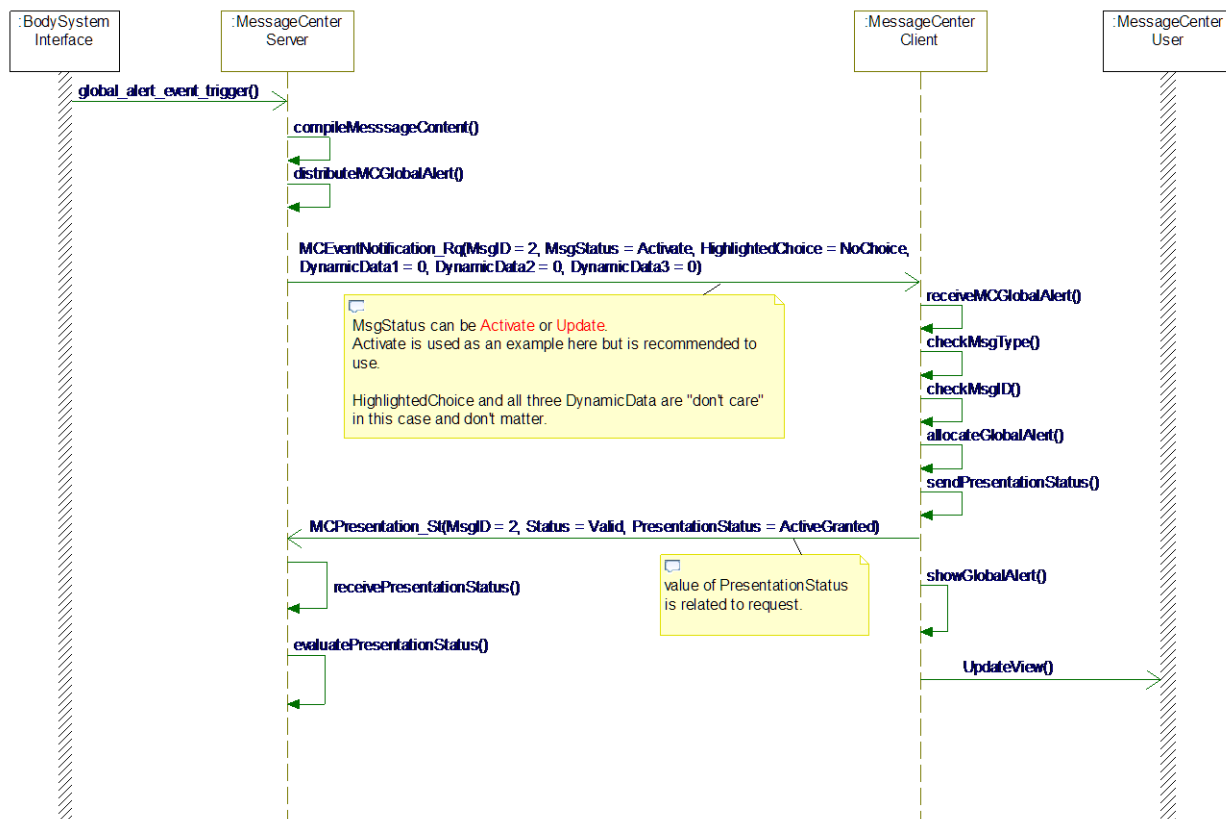
##### Pre-condition

Message ID „2“ is sent.

##### Post-condition

A message center notification blank screen is presented to the user.

#### Sequence Diagram







#### 4.6.4.2 MCv3-SD-REQ-348233/A-Message Center Global Alert Notification\_Global Alert event finished,message in stack,common sequence

##### Scenarios

###### Normal Usage

MessageCenter Server receives finish of global alert and sends update to old message notification in stack to MessageCenter Client.

After MessageCenter Client is checking validity of the data it reallocates this old message and presents it to the user and sends back related presentation status and removes global alert notification.

##### Constraints

###### Pre-condition

System is on.

###### Pre-condition

It does not care if any message is active.

###### Pre-condition

Message ID „2“ is sent.

###### Post-condition

The updated message center notification is presented to the user.

###### Post-condition

The global alert notification has been removed.

##### Sequence Diagram





#### 4.6.4.3 MCv3-SD-REQ-348252/A-Message Center Global Alert Notification\_ *StatusType is Invalid or Deactivate*

##### Scenarios

###### Normal Usage

MessageCenter Server sends a notification request with invalid message type to MessageCenter Client.

MessageCenter Client is checking if message type and message ID are valid. In this case, message type is invalid and MessageCenter Client only ignores whole request.

##### Constraints

###### Pre-condition

System is on.

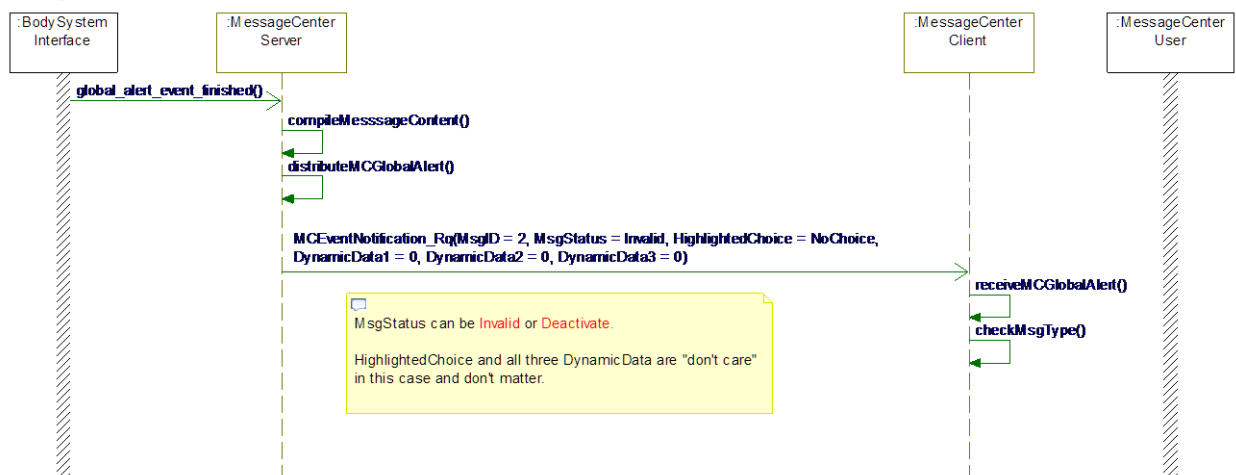
###### Pre-condition

MessageCenter Server sends message type "Invalid" to MessageCenter Client.

###### Post-condition

Message notification request is ignored by MessageCenter Client.

##### Sequence Diagram





## 4.7 MCv3-FUN-REQ-362264/A-Message Center Broadcast Notification Capability Status

### 4.7.1 Requirements

### 4.7.2 Use Cases

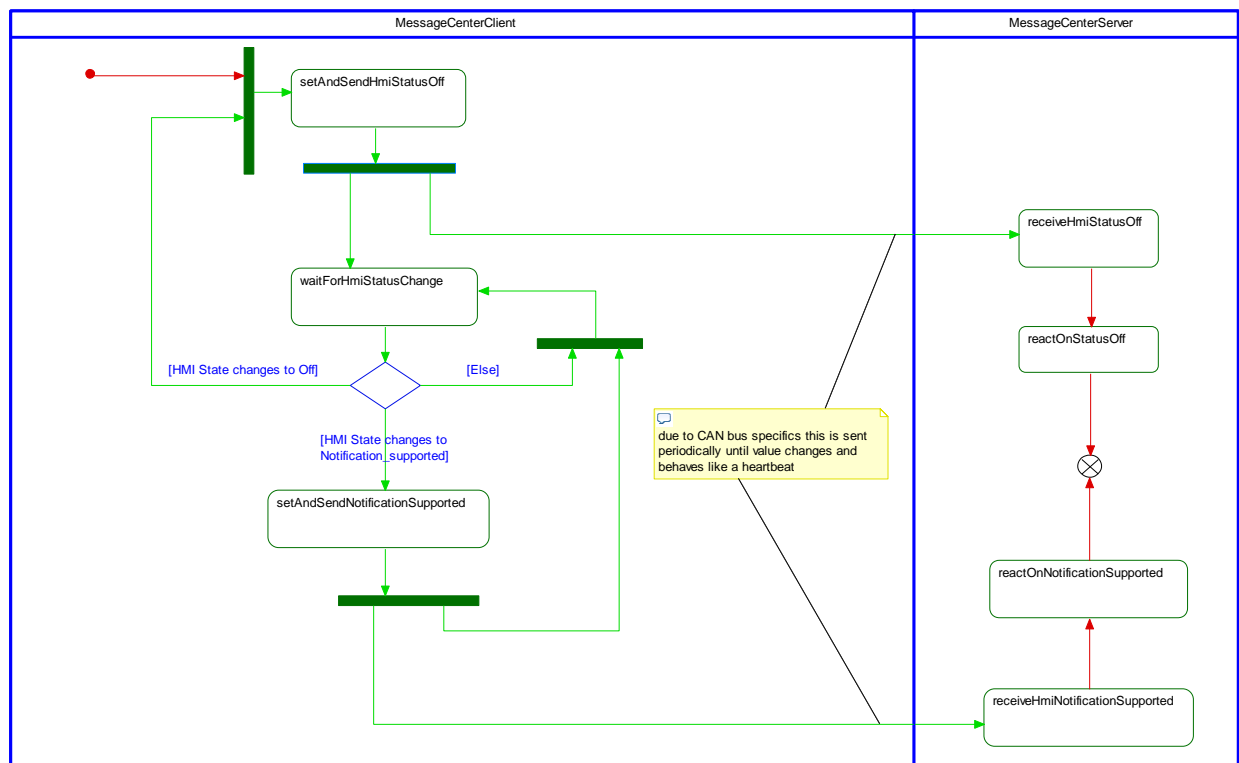
#### 4.7.2.1 MCv3-UC-REQ-362265/A-Broadcast Center Stack HMI Notification Capability

<b>Actors</b>	Center Stack HMI
<b>Pre-conditions</b>	System is capable to transmit messages on bus system
<b>Scenario Description</b>	CenterStackHmiNotification status signal reflects actual HMI status regarding presenting notification status to the user all the time in manner of a heartbeat.
<b>Post-conditions</b>	CenterStackHmiNotification status signal reflects actual HMI notification status and is transmitted periodically
<b>List of Exception Use Cases</b>	None
<b>Interfaces</b>	CenterStackHmiNotification_St

### 4.7.3 Activity Diagrams

#### 4.7.3.1 MCv3-ACT-REQ-362266/A-Broadcast Center Stack HMI Notification Capability

##### Activity Diagram



### 4.7.4 Sequence Diagrams

#### 4.7.4.1 MCv3-SD-REQ-362267/A-Broadcast Center Stack HMI Notification Capability at Startup

##### Scenarios

##### Normal Usage

CenterStackHmiNotification status signal is updated with "Notification not capable" and transmitted periodically.

**Constraints****Pre-condition**

System is booting up or restarting.

**Pre-condition**

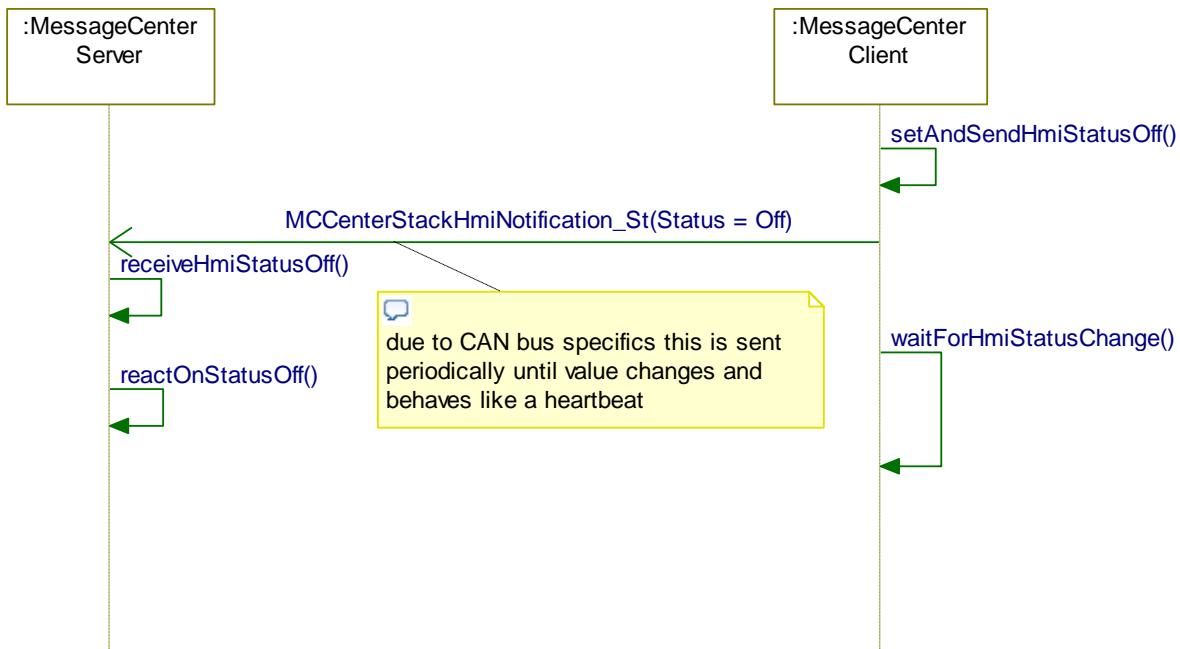
System is capable to transmit messages on bus system.

**Post-condition**

Client is waiting for change of HMI notification status.

**Post-condition**

CenterStackHmiNotification status signal is transmitted periodically using this value.

**Sequence Diagram****4.7.4.2 MCv3-SD-REQ-362268/A-Broadcast Center Stack HMI Notification Capability changes to On****Scenarios****Normal Usage**

HMI notification status changes, since HMI is now capable to present notifications to the user. CenterStackHmiNotification status signal is updated with "Notification capable" and transmitted periodically.

**Constraints****Pre-condition**

System is up and running.

**Post-condition**

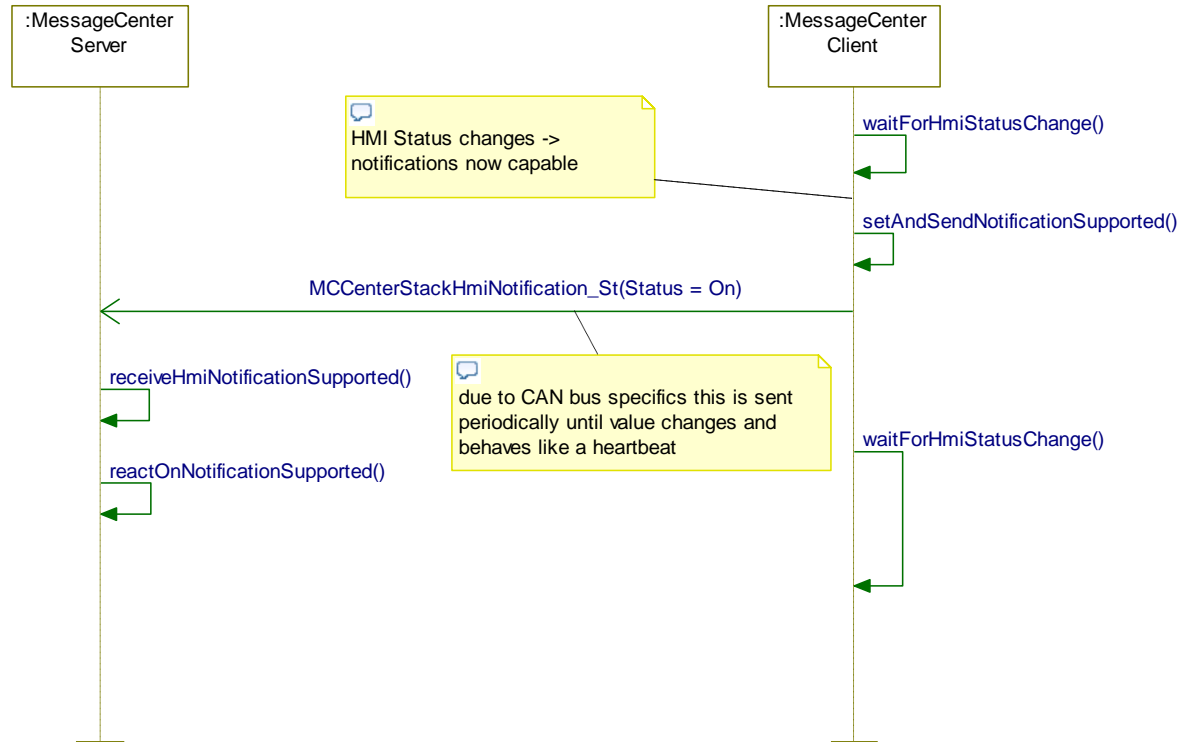
Client is waiting for change of HMI notification status.

**Post-condition**

CenterStackHmiNotification status signal is transmitted periodically using this value.



## Sequence Diagram

**4.7.4.3 MCv3-SD-REQ-362271/A-Broadcast Center Stack HMI Notification Capability changes to Off****Scenarios****Normal Usage**

HMI notification status changes, since HMI is now not capable anymore to present notifications to the user. CenterStackHmiNotification status signal is updated with "Notification not capable" and transmitted periodically.

**Constraints****Pre-condition**

System is up and running.

**Post-condition**

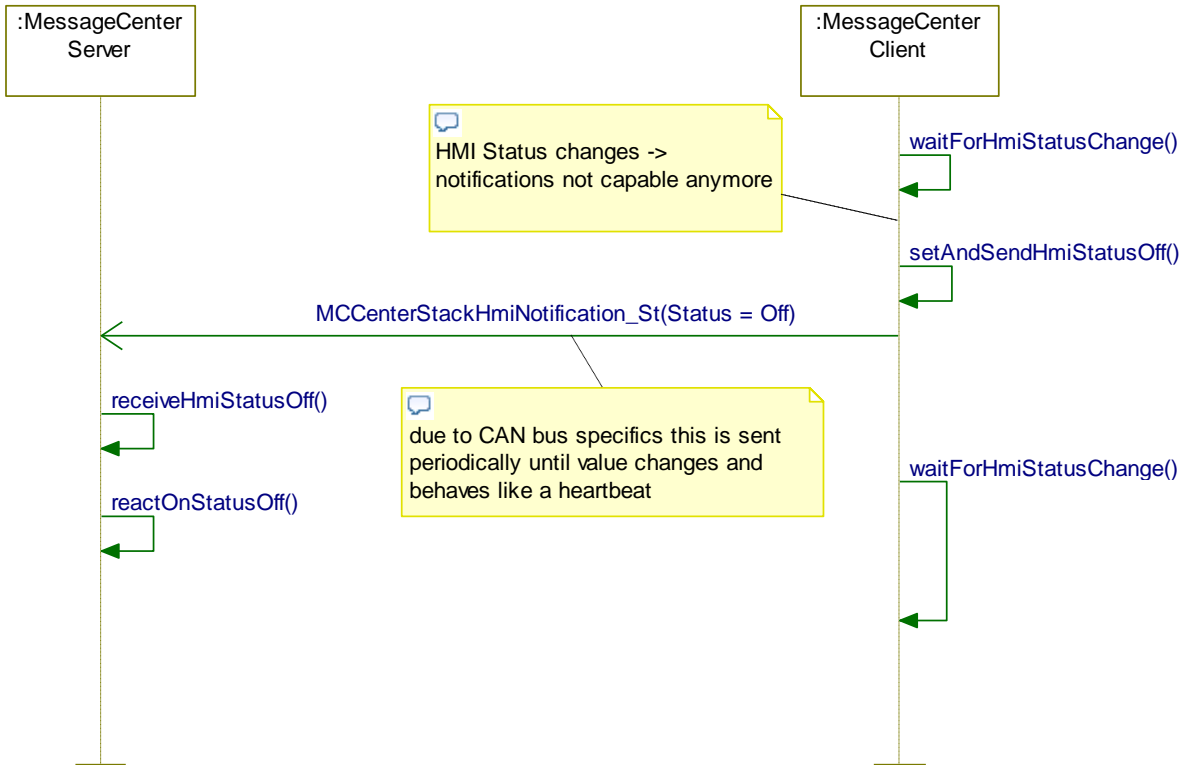
Client is waiting for change of HMI notification status.

**Post-condition**

CenterStackHmiNotification status signal is transmitted periodically using this value.



## Sequence Diagram





## 5 APPENDIX A: Example of lookup table used in this spec

Please keep in mind following table is an example used in this spec to have it more demonstrative. For real table please refer to HMI documentation.

Lookup table examples (valid for MC Client and MC Server):

Msg ID (fictive)	HMI ID	HMI content	DD local	DD1-Type	DD2-Type	DD3-Type	Ok button	Choices	Comment
0	n/a	n/a	no	0 Unused	0 Unused	0 Unused	no	no	Deallocate all messages
1	n/a	n/a	no	0 Unused	0 Unused	0 Unused	no	no	Deallocate all messages except limited mode messages
2	n/a	n/a	no	0 Unused	0 Unused	0 Unused	no	no	Global Alert active (-> blank screen) - not removing from stack or deallocating
12	none	Travelling {xx.x} {unit} to POI	no	3 Float	4 Unit	0 Unused	no	no	MC Client must divide by 100 and remove least digit since only one after point will be shown DD3 and DD4 are not defined in layout -> don't care
158	W1087	Factory Keypad Code { X X X X X X }	no	2 Integer2	2 Integer2	6 Digits	no	no	MC Client must interpret DD2 and DD1 as one integer DD3 carries 7 or 5 digits to show
211	W4110	Road Construction Ahead {XXXX} {unit}	yes	0 Unused	0 Unused	0 Unused	no	no	Since this is LHI dynamic data is already locally available, it will not be received via message center CAN signal
15	W100	Driver Door Ajar {OK}	no	0 Unused	0 Unused	0 Unused	yes	no	MC Server and MC Client know that an OK button for confirmation exists
124	W1800	Is Vehicle Plugged In ? {Yes} {No}	no	0 Unused	0 Unused	0 Unused	no	Choice1 = "Yes" Choice2 = "No"	MC Server and MC Client know that 2 Choices exist: Choice 1 = Yes, Choice 2 = No
73	W1653	Rear Park Aid Deactivated Trailer Attached	no	0 Unused	0 Unused	0 Unused	no	no	
45	W1805	Limited Performance Due to hot battery {OK}	no	0 Unused	0 Unused	0 Unused	yes	no	MC Server and MC Client know that an OK button for confirmation exists
28	W3486	Blind Spot Alert Deactivated Trailer Attached	no	0 Unused	0 Unused	0 Unused	yes	no	MC Server and MC Client know that an OK button for confirmation exists



		{OK}							
375	W3353a	Ready to Drive {XXX}% Charged	no	1 Integer	0 Unused	0 Unused	no	no	MC Server and MC Client know DD1 is an integer number
530	W4146	Return to {Drive Mode} ? Yes No	no	5 DriveMode	0 Unused	0 Unused	no	no	MC Server and MC Client know DD1 is an enumeration of drive modes

**Msg ID:** unique ID of table index

**HMI ID:** reference ID used in global message list

**HMI content:** schematic appearance how HMI might look

**DD local:** is dynamic data taken from local data, like e.g. in IODs.

**DDx-Type:** type of this dynamic data field; see APX-642758 as reference

**OK button:** does this message have an "OK" field?

**Choices:** does this message have any choices and which one is assigned to which content?

**Comment:** additional information on whole data set on this line and how to interpret to give additional understanding





## 6 APPENDIX B: Example table of dynamic data types used in this spec

Please keep in mind following table is an example used in this spec to have it more demonstrative. For real table please refer to HMI documentation.

Example Dynamic Data type list (valid for MC Client and MC Server):

Type	Name	Values	Comment
0	UnUsed	n/a	not applicable
1	Integer	0-65535	
2	Integer2	0-4294967295	Use 2 DDs as one Integer (=32Bit)
3	Float	0.00-655.35	multiply with 0.01
4	Unit	0x0 Km/h 0x1 mph 0x2 miles 0x3 feet	Enumeration for unit
5	DriveMode	0x00 SelDrvMde01 0x01 SelDrvMde02 0x02 SelDrvMde03 0x03 SelDrvMde04 0x04 SelDrvMde05 0x05 SelDrvMde06 0x06 SelDrvMde07 0x07 SelDrvMde08 0x08 SelDrvMde09 0x09 SelDrvMde10 0x0A SelDrvMde11 0x0B SelDrvMde12 0x0C SelDrvMde13 0x0D SelDrvMde14 0x0E SelDrvMde15 0x0F SelDrvMde16 0x10 SelDrvMde17 0x11 SelDrvMde18 0x12 SelDrvMde19 0x13 SelDrvMde20 0x14 SelDrvMde21 0x15 SelDrvMde22 0x16 SelDrvMde23 0x17 SelDrvMde24 0x18 SelDrvMde25 0x19 SelDrvMde26 0x1A SelDrvMde27 0x1B SelDrvMde28 0x1C SelDrvMde29 0x1D SelDrvMde30 0x1E SelDrvMde31 0x1F Faulty_default	Enumeration for drive mode  Naming is different per carline, so only generic names are used here
6	Digits	0x0 7 digits 0x1 5 digits	Enumeration for keypad variant



--	--	--	--

**Type:** unique ID of table index

**Name:** term naming this type

**Values:** value range/enumeration values

**Comment:** additional information on whole data set on this line and how to interpret to give additional understanding