

HYUNDAI AUTOEVER

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# AUTOSAR CanCM User Manual

DOC. NO

SCOPE OF APPLICATION All Project/Engineering  
Responsibility : Classic AUTOSAR Team

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## 1. Overview

CanCM module is created as per HKMC communication design specification. For more detailed functional description, please refer to the reference document below.

The following terms on configuration category mean:

- Changeable (C) : Items that can be configured by users
- Fixed (F) : Items that cannot be changed by users
- NotSupported (N) : Items that are not used

## 2. Reference

| Sl. No. | Title  | Version |
|---------|--|---------|
| 1       | ES95480-00 (High-speed CAN design specification) | -       |
| 2       | ES95400-00 (CAN DESIGN SPECIFICATION)            | -       |
| 3       |  |         |

## 3. AUTOSAR System

### 3.1 CAN Communication Stack

On Hyundai AutoEver AUTOSAR platform, CAN Communication Stack consists of modules shown below.

- CanIf : Sends and receives CAN messages
- PduR : Delivers PDUs between communication modules
- IpduM : Sends and receives multiplexed PDUs
- CanTp : Sends and receives transport protocol-based mass data
- CanSM : Controls the status of CAN communication channels and handles Bus-Off operations
- CanTrcv : Controls CAN transceiver hardware
- OsekNm : Handles the Sleep entry synchronization of CAN communication channel
- CanCM : Controls the activation and deactivation of CAN communication depending on the battery voltage and HKMC specifications

### 3.2 CanCM Module

CanCM module performs the following in order to control CAN communication under given conditions.

- Activates and deactivates the CAN communication based on the timing configurations
- Activates and deactivates the CAN communication based on the battery voltage conditions
- Activates and deactivates the Com communication based on the ComM communication mode switches

## 4. Product Release Notes

### 4.1 Overview

This chapter provides the release information of Hyundai AutoEver CanCM module, describing the features and restrictions of different release versions of the CanCM software product.

### 4.2 Scope of the Release

All content in this document is limited to the following Hyundai AutoEver CanCM modules.

| Module name | AUTOSAR version | SWS version | Module version |
|-------------|-----------------|-------------|----------------|
| CanCM       | -               | -           | 1.5.21         |

※ Module version refers to the SW version defined in the BswModule Description file (Bswmd) of each module.

### 4.3 Module Release Notes

#### 4.3.1 Limitations

## 4.3.1.1 Precautions when Asw is directly using the ADC Read function of IoHwAb module

All Asw tasks that call out ADC-reading functions (IoHwAb\_AnalInReadDirect, IoHwAb\_AnalInDirReadDirect) shall be bound to internal resources such as CanCM tasks or enclosed by ExclusiveArea (SuspendAllInterrupt/ResumeAllInterrupt or SuspendOsInterrupt/ResumeOsInterrupt methods) so as to prevent mutual preemption from occurring.

## 4.3.1.2 Limitations related to missing sections of Chorus Application

In the process of Can Controller STOP, when a message is received before the interrupt (MCAL internal logic) is disabled and the controller is stopped, the wakeup is not executed due to MCAL restrictions.

## 4.3.2 Deviations

## 4.4 Change Log

### 4.4.1 Version 1.5.21.0

#### Improvement

- Code improvement to comply with the UNECE Cyber Security regulations that detected in Integration\_Pm

|                      |   |
|----------------------|---|
| Rationale            | Needed to improve the codes to comply with the UNECE Cyber Security regulations from Integration_Pm |
| Impact on behavior   | None  |
| Impact on settings   | None  |
| Required ASW actions | None  |

### 4.4.2 Version 1.5.20.0

#### Improvement

- Code improvement to comply with the UNECE Cyber Security regulations

|                      |  |
|----------------------|--|
| Rationale            | Code improvement to comply with the UNECE Cyber Security regulations |
| Impact on behavior   | None   |
| Impact on settings   | None   |
| Required ASW actions | None   |

### 4.4.3 Version 1.5.19.0

## Improvement

### ■ Eliminated impact on Library

| Rationale            | Eliminated impact on Library |
|----------------------|------------------------------|
| Impact on behavior   | None                         |
| Impact on settings   | None                         |
| Required ASW actions | None                         |

## 4.4.4 Version 1.5.18.0

## Improvement

### ■ Code improvement to comply with the UNECE Cyber Security regulations

| Rationale            | Needed to improve the codes to comply with the UNECE Cyber Security regulations |
|----------------------|---|
| Impact on behavior   | None  |
| Impact on settings   | None  |
| Required ASW actions | None  |

## 4.4.5 Version 1.5.17.1

## Improvement

### ■ Format changes of the user manual document

| Rationale            | Needed to update user manual document. |
|----------------------|--|
| Impact on behavior   | None                                   |
| Impact on settings   | None                                   |
| Required ASW actions | None                                   |

## 4.4.6 Version 1.5.17.0

## Improvement

### ■ Actions taken based on the review results of race conditions

| Rationale            | Needed to review race conditions                  |
|----------------------|---|
| Impact on behavior   | None  |
| Impact on settings   | Need to set BswM (refer to 10.3 of this document) |
| Required ASW actions | None  |

## 4.4.7 Version 1.5.16.0

## Improvement

### ■ Documented the limitation concerning Chorus Application Messages missings



|                      |  |
|----------------------|--|
| Rationale            | Found the limitation that the wakeup is not executed when a message is received while processing MCAL internal logics for Chorus Can Controller STOP operation |
| Impact on behavior   | None   |
| Impact on settings   | None   |
| Required ASW actions | None   |

## 4.4.8 Version 1.5.15.1

### Improvement

- Updated the guide for checking the Network Activation Timer expiration

|                      |   |
|----------------------|---|
| Rationale            | Received the request to allow the user to check the Network Activation Timer expiration |
| Impact on behavior   | None  |
| Impact on settings   | None  |
| Required ASW actions | None  |

## 4.4.9 Version 1.5.15.0

### Improvement

- Added MISRA-C exception handling to the modules

|                      |                           |
|----------------------|---------------------------|
| Rationale            | Violation against MISRA-C |
| Impact on behavior   | None                      |
| Impact on settings   | None                      |
| Required ASW actions | None                      |

## 4.4.10 Version 1.5.14.0

### Improvement

- Network Activation Time can be set to 0

|                      |  |
|----------------------|--|
| Rationale            | The specifications were revised.   |
| Impact on behavior   | When setting Network Activation Time at 0, FullCom immediately enables Tx. |
| Impact on settings   | None   |
| Required ASW actions | None   |

## 4.4.11 Version 1.5.13

### Improvement

- Fixed Misra C violations

|                      |                          |
|----------------------|--------------------------|
| Rationale            | Fixed Misra C violations |
| Impact on behavior   | None                     |
| Impact on settings   | None                     |
| Required ASW actions | None                     |

## 4.4.12 version 1.5.12.1

### Improvement

- Added fail safety logics to prepare for voltage measurement failures

|                      |   |
|----------------------|---|
| Rationale            | To prevent TX disabling caused by voltage measurement failure when the IoHwAb ADC Read function of ASW and the CanCM modules can preempt each other |
| Impact on behavior   | Maintains the previous values and reports DET errors in case of voltage measurement failure   |
| Impact on settings   | None  |
| Required ASW actions | None  |

## 4.4.13 version 1.5.12

### Improvement

- Voltage-related communication controls are now optional

|                      |  |
|----------------------|--|
| Rationale            | Needed to selectively use voltage-related communication controls for individual channels |
| Impact on behavior   | Able to selectively use communication control functions based on voltage values entered  |
| Impact on settings   | None   |
| Required ASW actions | None   |

## 4.4.14 version 1.5.11

### Improvement

- Parameter type changed for remote wakeup notification

|                      |  |
|----------------------|--|
| Rationale            | Error occurred in wakeup behaviors when the number of wakeup sources exceeds 16. |
| Impact on behavior   | Changed the type of the parameter that conveys wakeup sources to fit the number. |
| Impact on settings   | None   |
| Required ASW actions | None   |

## ■ Changed the set range for ADC Default values

|                      |   |
|----------------------|---|
| Rationale            | It was not possible to set ADC Default values higher than 1023. |
| Impact on behavior   | Changed the set range to 0-65535                                |
| Impact on settings   | None  |
| Required ASW actions | None  |

## 4.4.15 version 1.5.10

### Improvement

- Fixed the logics that detect remote wakeups between the beginning of CAN sleep and the entering into low power mode

|                      |   |
|----------------------|---|
| Rationale            | There was a possibility of failing to read the wakeup signal due to logic errors. |
| Impact on behavior   | Fixed logic errors that caused the failure to read the wakeup signal              |
| Impact on settings   | None  |
| Required ASW actions | None  |

## 5. Configuration Guide

### 5.1 CanCMGlobalConfig

| Parameter Name                                | Value    | Categor |
|---|----------|---------|
| <sup>1)</sup> CanCMDemStatusReport            | True     | F       |
| <sup>2)</sup> CanCMDisableDMOnAbnormalVoltage | From SRS | F       |
| <sup>3)</sup> CanCMWakeupSupport              | From SRS | F       |
| <sup>4)</sup> CanCMHysteresisSupport          | True     | F       |
| CanCMDevErrorDetect                           | True     | F       |
| CanCMMainFunctionPeriod                       | 0.005    | F       |
| <sup>5)</sup> CanCMFilteringConstant          | 128      | C       |

- 1) Whether to use the functionality that notifies DEM modules when the battery voltage is in critical range
- 2) Whether to use DM (Deadline Monitoring) deactivation functionality of Com modules when the battery voltage is in abnormal range
- 3) Whether to use the functionality that regularly checks remote wake-up in NO COMM status
- 4) In deciding if the voltage is normal when it returns from critical to non-critical level or from abnormal to normal.
- 5) Coefficient used for filtering Adc values entered in monitoring the battery voltage (Refer to 8.1.3 in IoHwAb Manual)

## 5.2 CanCMBatMonConfig

| Parameter Name                       | Value | Categor |
|--------------------------------------|-------|---------|
| <sup>1)</sup> CanCMBatAnalogInputRef | -     | C       |
| <sup>2)</sup> CanCMAdcDefault        | 500   | C       |

- 1) Setting the ADC port for monitoring the battery voltage: CanCM module periodically reads ADC values in designated ports, checks voltage status and controls communication functions.  
**In case that 2 or more ports are designated, CanCM module reads the ADC values from all ports designated and uses the highest value.**
- 2) Set the initial value for battery voltage (refer to 8.1.3 in IoHwAb user manual).

## 5.3 CanCMChannelConfig

| Parameter Name                                | Value     | Categor |
|---|-----------|---------|
| CanCMChannelId                                | Automated | F       |
| <sup>1)</sup> CanCMNetworkActivationTime      | 0.1       | C       |
| <sup>2)</sup> CanCMVoltageErrorDelayTime      | 0.12      | C       |
| <sup>3)</sup> CanCMTimeoutMonitoringStartTime | 1         | C       |
| <sup>4)</sup> CanCMVoltageAbnormalUpper       | -         | C       |
| <sup>4)</sup> CanCMVoltageAbnormalLower       | -         | C       |
| <sup>5)</sup> CanCMVoltageCriticalUpper       | -         | C       |
| <sup>5)</sup> CanCMVoltageCriticalLower       | -         | C       |
| <sup>6)</sup> CanCMVoltageHysteresis          | -         | C       |
| CanCMComMChannelId                            | Automated | F       |

- 1) Time taken for the functionality that sends CAN messages (except NM messages) to be activated after the communication mode of the given channel is switched to FULL COMMUNICATION
- 2) Time taken for the voltage error status to be cleared after the battery voltage returns from the critical to the non-critical range (the CAN message sending functionality is activated immediately after the error status is cleared )
- 3) Standby time until the Rx Deadline monitoring functionality of the Com module is activated, after the communication mode of the given channel is switched to FULL COMMUNICATION
- 4) Setting the range for abnormal voltage  
When the battery voltage is in the specified abnormal range, Rx Deadline monitoring functionality of the Com module is deactivated to prevent DTC from recording the received signal timeout. When the battery voltage returns to the normal range, the functionality is reactivated.  
**When the values of both CanCMVoltageAbnormalUpper and CanCMVoltageAbnormalLower are 0, the foregoing functionality that monitors Rx Deadline is not executed.**
- 5) Setting the range for critical voltage  
When the battery voltage is in the critical range, CAN messages are prohibited from being sent. When the current status returns to the normal voltage, CAN messages are allowed to be sent again.  
**When the values of both CanCMVoltageCriticalUpper and CanCMVoltageCriticalLower are 0, the foregoing functionality that controls the transmission of messages is not executed.**

## 6) Setting hysteresis values

Hysteresis values are applied when deciding whether the voltage has returned to non-critical from critical.

- Criteria for critical voltage range  
 $\text{BatVol} \leq \text{CanCMVoltageCriticalLower}$  or  $\text{BatVol} \geq \text{CanCMVoltageCriticalUpper}$
- Criteria for non-critical voltage range (hysteresis values are applied when returning to non-critical from critical).  
 $\text{CanCMVoltageCriticalLower} + \text{CanCMVoltageHysteresis} < \text{BatVol} < \text{CanCMVoltageCriticalUpper} - \text{CanCMVoltageHysteresis}$
- Criteria for abnormal voltage  
 $\text{BatVol} \leq \text{CanCMVoltageAbnormalLower}$  or  $\text{BatVol} \geq \text{CanCMVoltageAbnormalUpper}$
- Criteria for normal voltage (Hysteresis values are applied when returning to normal from abnormal).  
 $\text{CanCMVoltageAbnormalLower} + \text{CanCMVoltageHysteresis} < \text{BatVol} < \text{CanCMVoltageAbnormalUpper} - \text{CanCMVoltageHysteresis}$   
 (BatVol : voltage ADC value)

The entire communication control time is calculated by the cycle task of the CanCM module, errors may occur depending on the cycle of the task.

The values from 4) to 6) above are based on the voltage ADC values from the port designated as the monitoring input.

The unit of time for 1) to 3) above is second.

Refer to the corresponding parameters in the HKMC CAN ES design specification when configuring all values.

## 5.4 CanCMDemEventParameterRefs

| Parameter Name                 | Value | Categor |
|--------------------------------|-------|---------|
| <sup>1)</sup> CANCM_E_BAT_FAIL | -     | F       |

- 1) Designates an event ID to notify the Dem module when the battery voltage changes from normal to critical range.

## 5.5 CanCMWakeupParameterRefs

| Parameter Name                            | Value | Categor |
|---|-------|---------|
| <sup>1)</sup> CanCMEcuMWakeupSourceRef    | -     | F       |
| <sup>2)</sup> CanCMIoHwAbWakeupPinNameRef | -     | F       |

- 1) Designates the wake-up source as defined in EcuM.  
 When the CanCM module detects a remote wake-up at a corresponding CAN channel, it calls EcuM interface, using the designated wakeup source as the parameter.
- 2) Designates the IO pin where the wake-up signal comes in.  
 When ComM is switched to NO COMM status, the CanCM module periodically reads the designated pin and detects a remote wake-up. For this reason,when the wake-up frame is

detected on the bus in a Sleep or Stand-By status, the transceiver shall maintain the voltage level of the designated pin as LOW.

## 6. Application Programming Interface (API)

### 6.1 Type Definitions

None

### 6.2 Macro Constants

None

### 6.3 Functions

None

## 7. Generator

### 7.1 Generator Option

| Option | Description  |
|--------|--|
| -V     | Displays the version of module in use.                 |
| -O     | Designates the location where the output is generated. |

### 7.2 Generator Message

#### 7.2.1 Error Messages

None

#### 7.2.2 Warning Messages

None

#### 7.2.3 Information Messages

None

## 8. Det Error

Detected development errors shall be reported to the Det\_ReportError(uint16 ModuleId, uint8 InstanceId, uint8 ApId, uint8 ErrorId) service of the Development Error Tracer (DET) if the pre-processor switch CANCM\_DEV\_ERROR\_DETECT is set “on”.

### 8.1 Error Classification

| Type of error                  | Relevance   | Related error code      | Value |
|--------------------------------|-------------|-------------------------|-------|
| CanCM module is uninitialized  | Development | CANCM_E_UNINIT          | 0x1F  |
| Error code for reading battery | Development | CANCM_E_READBATTERYFAIL | 0x20  |
| Invalid request                | Development | CANCM_E_INVALID_REQUEST | 0x21  |

#### 8.1.1 Service ID

| CanCM function name          | Service ID[hex] |
|------------------------------|-----------------|
| CanCM_MainFunction           | 0x02            |
| CanCM_ComModelIndication     | 0x03            |
| CanCM_GetCurrentVoltageMode  | 0x04            |
| CanCM_GetCurrentNetworkState | 0x05            |

## 9. Dem Error

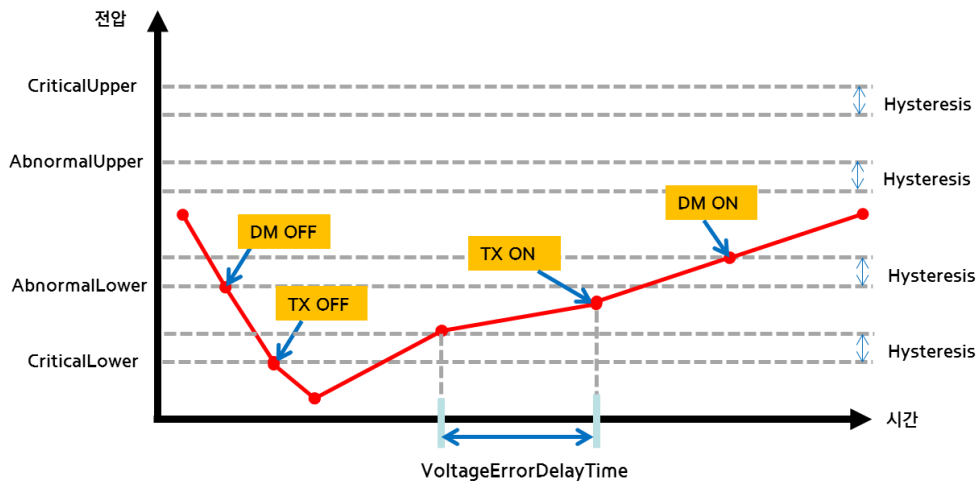
Bsw module errors shall be reported to the Dem\_ReportErrorStatus () when the errors occur.

### 9.1 CANCM\_E\_BAT\_FAIL

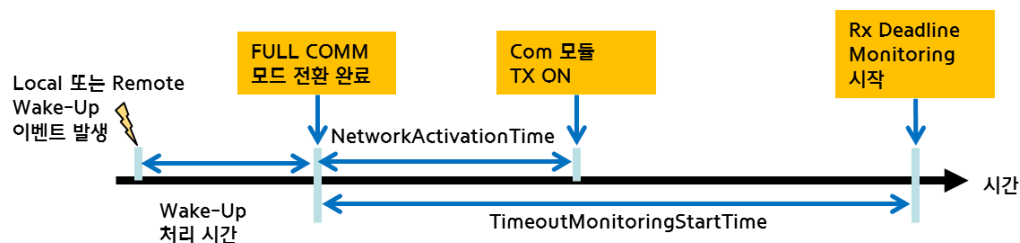
|                               |  |
|-------------------------------|--|
| ErrorId Symbol                | CANCM_E_BAT_FAIL   |
| Description                   | This occurs when there are voltage errors.   |
| Cause                         | H/W  |
| Platform default Action       | Wait (depending on H/W conditions)   |
| Functional impact             | When the current battery voltage is not suitable for communication, CanCM stops the transmission functionality of CAN and notifies DEM.            |
| Related module(s)             | IoHwAb   |
| MCU                           | Common   |
| Error type                    | Configuration, code  |
| Possible fixes in application | When the voltage returns to the normal level, the transmission functionality can be resumed. Application can recognize this via a setting of BswM. |

## 10. Appendix

### 10.1 Configuration guides per feature



[Figure 1] Example of communication control by voltages measured



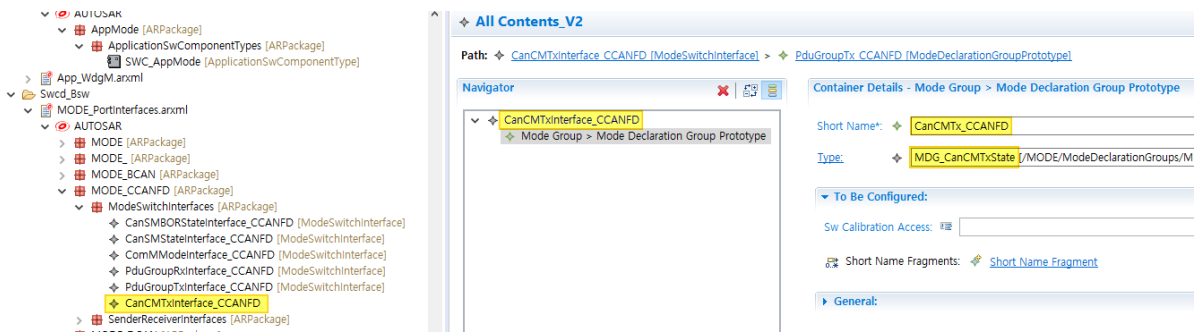
[Figure 2] CAN communication control timing

### 10.2 Guide for checking when Network Activation Timer expires

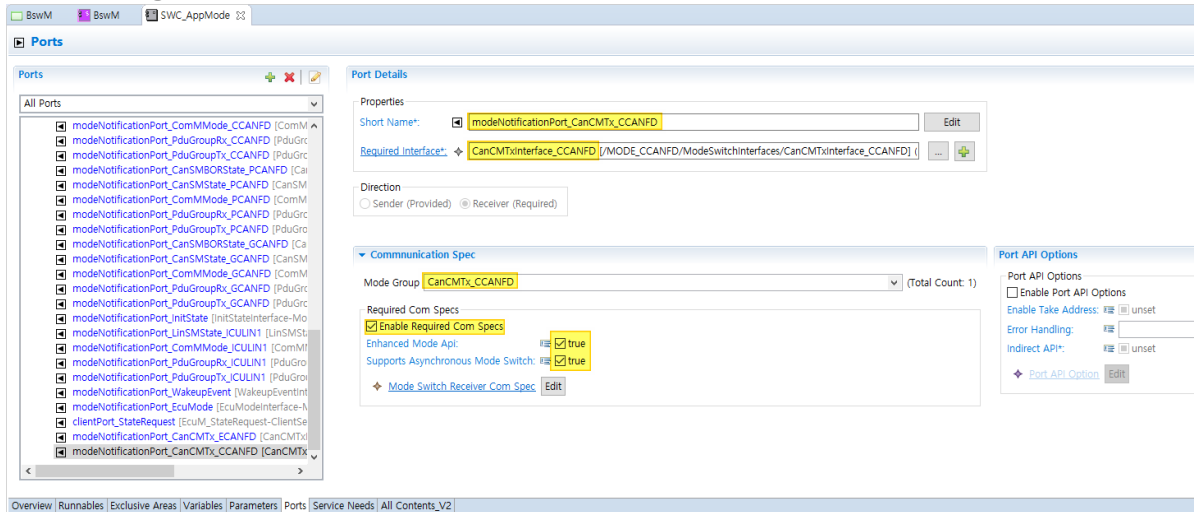
Expiration of Network Activation Timer can be detected with the Rte\_Switch rule that is configured in BswM. Since the existing per-channel TX enabling rules include not only the TX enabling conditions of CanCM but ComM and Dcm, it's impossible to specifically check when the Network Activation Timer of CanCM has expired. Following the guide below, therefore, the user can check the expiration time of Network Activation Timer in the CanCM, for each channel. (This functions at the exact time of expiration only when the voltage is in normal range.)

- 1) In order to generate a switch port, create ModeSwitchInterfaces of the channel to register and connect it to the SwitchPort of BswM. (See Step 9 for setting the type.)

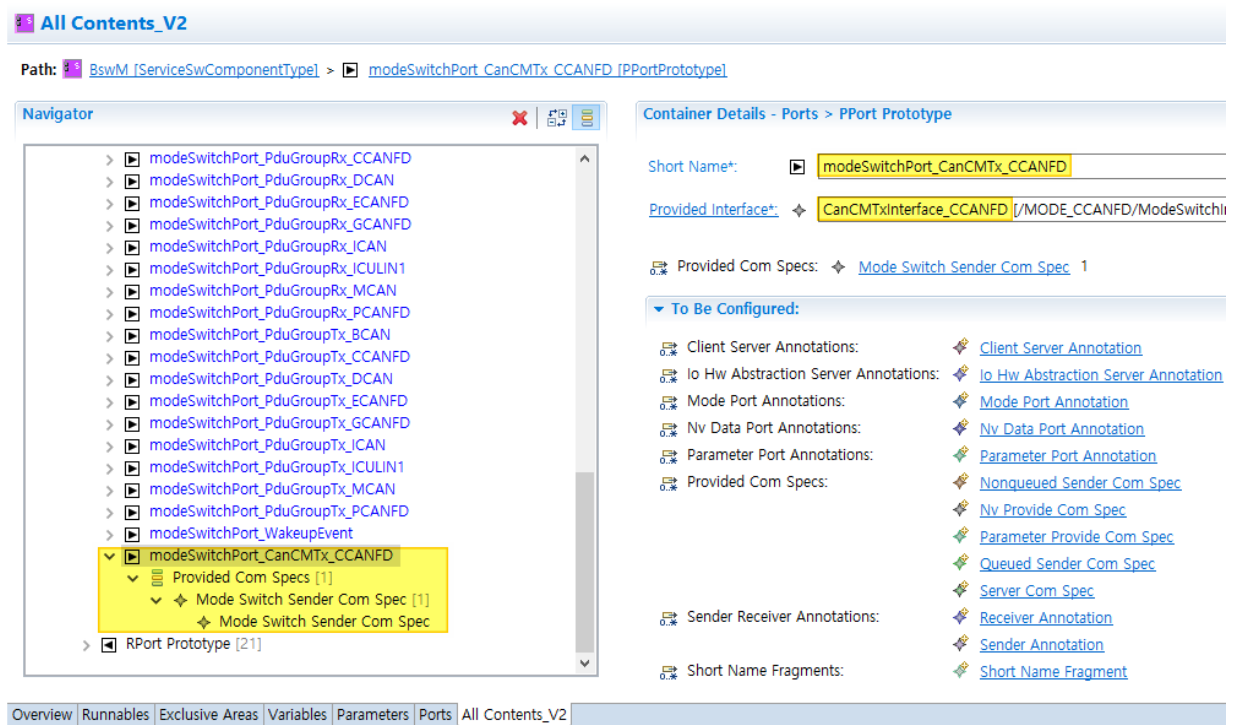




- 2) In SWC\_AppMode tab, go to Ports > RPort Prototype > Click “+” > Mode Switch Interface > Mode Receiver to generate RPort.



- 3) Generate PPort in Swcd\_Bsw\_BswM.arxml.



## All Contents\_V2

Path: BswM [ServiceSwComponentType] > modeSwitchPort CanCMTx\_CCANFD [PortPrototype] > ModeSwitchSenderComSpec

**Navigator**

- modeSwitchPort\_PduGroupRx\_CCANFD
- modeSwitchPort\_PduGroupRx\_DCAN
- modeSwitchPort\_PduGroupRx\_ECANFD
- modeSwitchPort\_PduGroupRx\_GCANFD
- modeSwitchPort\_PduGroupRx\_ICAN
- modeSwitchPort\_PduGroupRx\_ICULIN1
- modeSwitchPort\_PduGroupRx\_MCAN
- modeSwitchPort\_PduGroupRx\_PCANFD
- modeSwitchPort\_PduGroupTx\_BCAN
- modeSwitchPort\_PduGroupTx\_CCANFD
- modeSwitchPort\_PduGroupTx\_DCAN
- modeSwitchPort\_PduGroupTx\_ECANFD
- modeSwitchPort\_PduGroupTx\_GCANFD
- modeSwitchPort\_PduGroupTx\_ICAN
- modeSwitchPort\_PduGroupTx\_ICULIN1
- modeSwitchPort\_PduGroupTx\_MCAN
- modeSwitchPort\_PduGroupTx\_PCANFD
- modeSwitchPort\_WakeupEvent
- modeSwitchPort\_CanCMTx\_CCANFD
  - Provided Com Specs [1]
    - Mode Switch Sender Com Spec [1]
      - Mode Switch Sender Com Spec
- RPort Prototype [21]

**Container Details - Provided Com Specs > Mode Switch Sender Com Spec**

Enhanced Mode Api: ☐ false

Mode Group: CanCMTx\_CCANFD [/MODE\_CCANFD/ModeSwitchInte

Queue Length: 1

**To Be Configured:**

Mode Switched Ack: Mode Switched Ack Request

**General:**

## 4) Connect the port in Service Needs of SWC\_AppMode.

**Service Needs**

- Nv Block Needs [0]
- Com Mgr User Needs [0]
- Ecu State Mgr User Needs [0]
- Bsw Mgr Needs [0]
  - Service Needs > Bsw M
- Crypto Service Needs (No

**Service Needs Details**

Bsw Mgr Needs

Short Name: BswMgrNeeds

Represented Port Group: Represented Port Group: Browse...

**Assigned Ports**

| Role   | Port Prototype                          | Port Interface                   |
|--------|---|----------------------------------|
| Custom | modeNotificationPort_InitState          | InitStateInterface               |
| Custom | modeNotificationPort_LinSMState_ICULIN1 | LinSMStateInterface_ICULIN1      |
| Custom | modeRequestPort_ComMMode_ICULIN1        | ComMModeRequestInterface_ICULIN1 |
| Custom | modeNotificationPort_ComMMode_ICULIN1   | ComMModeInterface_ICULIN1        |
| Custom | modeNotificationPort_PduGroupRx_ICULIN1 | PduGroupRxInterface_ICULIN1      |
| Custom | modeNotificationPort_PduGroupTx_ICULIN1 | PduGroupTxInterface_ICULIN1      |
| Custom | modeNotificationPort_WakeupEvent        | WakeupEventInterface             |
| Custom | modeNotificationPort_EcuMode            | EcuModeInterface                 |
| Custom | modeNotificationPort_CanCMTx_ECANFD     | CanCMTxInterface_ECANFD          |

## Ports assigned to Service Needs

| Assigned Ports |   |                                |
|----------------|---|--------------------------------|
| Role           | Port Prototype                            | Port Interface                 |
| Custom         | modeNotificationPort_CanSMBORState_GCA... | CanSMBORStateInterface_GCA...  |
| Custom         | modeNotificationPort_CanSMState_GCANFD    | CanSMStateInterface_GCANFD     |
| Custom         | modeNotificationPort_ComMMMode_GCANFD     | ComMMModeInterface_GCANFD      |
| Custom         | modeNotificationPort_PduGroupRx_GCANFD    | PduGroupRxInterface_GCANFD     |
| Custom         | modeNotificationPort_PduGroupTx_GCANFD    | PduGroupTxInterface_GCANFD     |
| Custom         | modeNotificationPort_InitState            | InitStateInterface             |
| Custom         | modeNotificationPort_LinSMState_ICULIN1   | LinSMStateInterface_ICULIN1    |
| Custom         | modeRequestPort_ComMMMode_ICULIN1         | ComMMModeRequestInterface_I... |
| Custom         | modeNotificationPort_ComMMMode_ICULIN1    | ComMMModeInterface_ICULIN1     |
| Custom         | modeNotificationPort_PduGroupRx_ICULIN1   | PduGroupRxInterface_ICULIN1    |
| Custom         | modeNotificationPort_PduGroupTx_ICULIN1   | PduGroupTxInterface_ICULIN1    |
| Custom         | modeNotificationPort_WakeupEvent          | WakeupEventInterface           |
| Custom         | modeNotificationPort_EcuMode              | EcuModeInterface               |
| Custom         | modeNotificationPort_CanCMTx_ECANFD       | CanCMTxInterface_ECANFD        |
| Custom         | modeNotificationPort_CanCMTx_CCANFD       | CanCMTxInterface_CCANFD        |

- 5) Go to Service and I/O of EcucValueCollection and add connections.

**Service and I/O**

Service, Ecu Abstraction, CDD Components

Automatic Connection

| Contents                              | Context Component | Port Interface                  | Component Type                     | Connector   |
|---------------------------------------|-------------------|---------------------------------|------------------------------------|-------------|
| modeRequestPort_PduRouterRequest_EOL8 | BswM              | PduRouterRequest_EOL8 [/MO...   | BswM [/BswM/ServiceSwComponent...  | -           |
| modeRequestPort_PduRouterRequest_EOL9 | BswM              | PduRouterRequest_EOL9 [/MO...   | BswM [/BswM/ServiceSwComponent...  | -           |
| modeRequestPort_PduRouter_DCAN        | BswM              | PduRouterRequestInterface_DC... | BswM [/BswM/ServiceSwComponent...  | -           |
| modeRequestPort_PduRouter_ICAN        | BswM              | PduRouterRequestInterface_IC... | BswM [/BswM/ServiceSwComponent...  | -           |
| modeSwitchPort_CanCMTx_CCANFD         | BswM              | CanCMTxInterface_CCANFD [/...   | BswM [/BswM/ServiceSwComponent...  | -           |
| modeSwitchPort_CanCMTx_ECANFD         | BswM              | CanCMTxInterface_ECANFD [/...   | BswM [/BswM/ServiceSwComponent...  | -           |
| modeNotificationPort_CanCMTx_ECANFD   | SWC_AppMode       | CanCMTxInterface_ECANFD [/...   | SWC_AppMode [/AppMode/Applicati... | modeSwitchF |
| modeSwitchPort_CanSMBORState_BCAN     | BswM              | CanSMBORStateInterface_BCA...   | BswM [/BswM/ServiceSwComponent...  | -           |

New Connectors

Ports To Be Connected:

| Provider/Outer Port           | Provider Component / Composition | Requester/Inner Port                | Requester/Inner Component |
|-------------------------------|----------------------------------|-------------------------------------|---------------------------|
| modeSwitchPort_CanCMTx_CCANFD | BswM                             | modeNotificationPort_CanCMTx_CCA... | SWC_AppMode               |

Select All Deselect All

Option:

☐ Respect Naming Rule ☒ Identical Port Interface

PPort Prefix: P\_ Apply

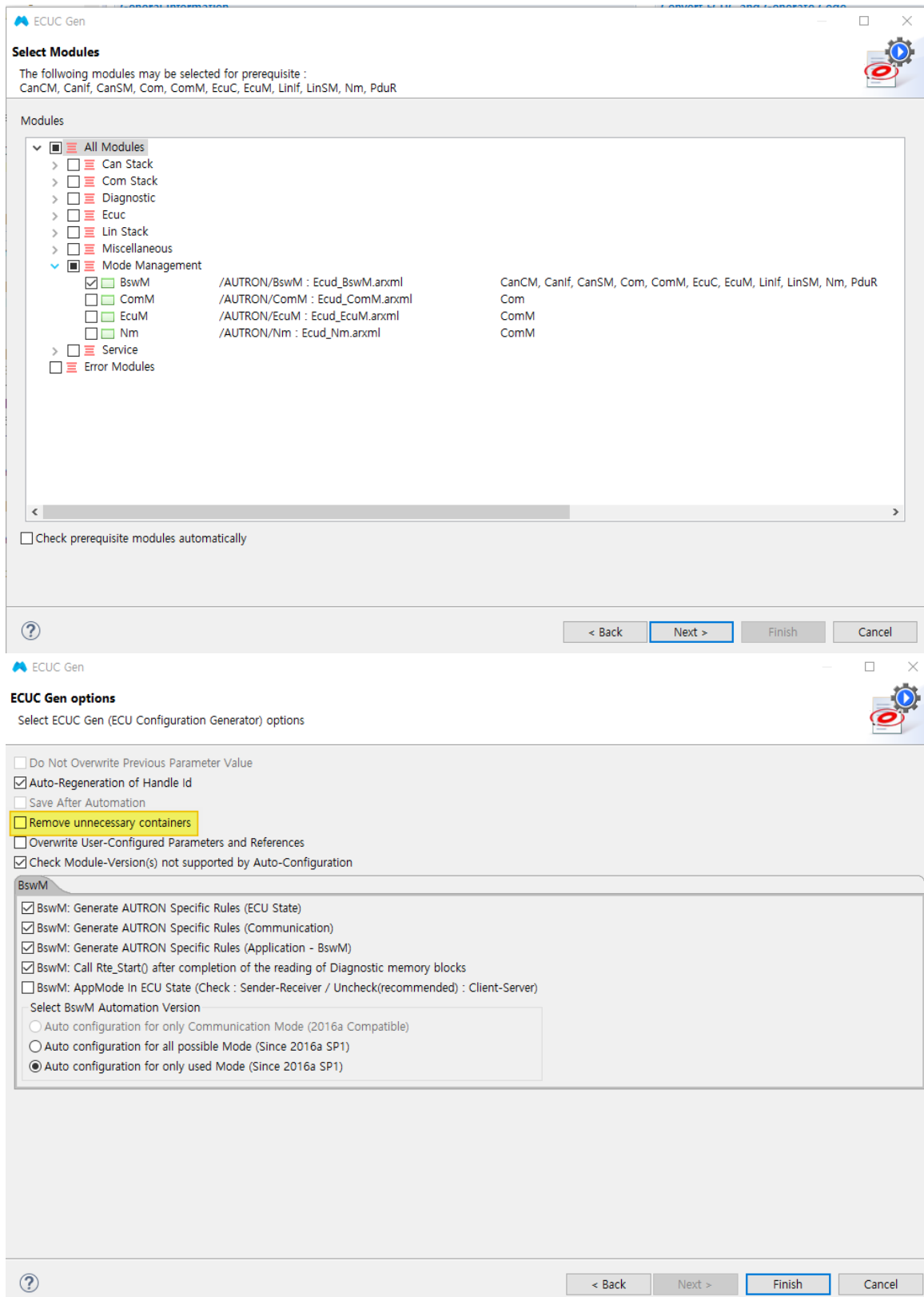
RPort Prefix: R\_ Apply

PPort Postfix: \_P Apply

RPort Postfix: \_R Apply


OK Cancel


- 6) Harmonize BswM in ECUC Gen Configuration: harmonize after unchecking "Remove unnecessary containers" in order to harmonize without altering manually-set BswM items (when adding channels, etc.).




- 7) Now rules, actions, etc. need to be set up for BswM. For BswM's logical expressions, use LE\_{channel}\_CANCM\_ENABLE\_TX which is generated per channel. If you can't find the correct one, create one as shown below. For BswModeCondition, CanCM channel is connected as shown below.

## Container Details - BswMLogicalExpression


Short Name\*:  LE\_ECANFD\_CANCM\_ENABLE\_TX

Argument Ref\*:  MC\_IMM\_GenericRequest\_CanCMTx\_ECANFD\_EQ\_ENABLE [/AUTOSAR/BswM/BswMCor


### ▼ Expression:

[Configure..](#)  MRP\_IMM\_GenericRequest\_CanCMTx\_ECANFD == CANCM\_COMM\_STAT\_TX\_ENABLED

## Container Details - BswMModeCondition

Short Name\*:  MC\_IMM\_GenericRequest\_CanCMTx\_ECANFD\_EQ\_ENABLE


Condition Type\*:  BSWM\_EQUALS

Condition Mode\*:  MRP\_IMM\_GenericRequest\_CanCMTx\_ECANFD [/AUTOSAR/BswM

 [Condition Value](#) 1 [0...1]


## Container Details - BswMBswMode

Short Name\*:  BswMBswMode

Bsw Requested Mode\*:  CANCM\_COMM\_STAT\_TX\_ENABLED


## 8) Generate Action as Rte Switch. (BswMAAction, BswMAvailableActions, BswMRteSwitch)


## Container Details - BswMAAction

Short Name\*:  AC\_RteSwitch\_CanCMTx\_ECANFD\_START

 [Available Actions](#) 1 [1]

Container Details - BswMAvailableActions

Short Name\*:  BswMAvailableActions


 [Rte Switch](#) 1 [0...1]


▼ To Be Configured:


Choices:

|  |   |
|--|---|
| <input type="radio"/> ComM Allow Com         | <input type="radio"/> ComM Mode Limitation        |
| <input type="radio"/> ComM Mode Switch       | <input type="radio"/> Deadline Monitoring Control |
| <input type="radio"/> EcuM Go Down           | <input type="radio"/> EcuM Select Shutdown Target |
| <input type="radio"/> FrSMSetEcuPassive      | <input type="radio"/> Lin Schedule Switch         |
| <input type="radio"/> NM Control             | <input type="radio"/> Pdu Group Switch            |
| <input type="radio"/> Pdu Router Control     | <input type="radio"/> Switch IPdu Mode            |
| <input type="radio"/> Trigger IPdu Send      | <input checked="" type="radio"/> Rte Switch       |
| <input type="radio"/> SchM Switch            | <input type="radio"/> Trigger Start Up Phase2     |
| <input type="radio"/> Trigger Slave RTE Stop | <input type="radio"/> User Callout                |
| <input type="radio"/> J1939Dcm State Switch  | <input type="radio"/> J1939Rm State Switch        |

Container Details - BswMRteSwitch

Short Name\*:  BswMRteSwitch

Switched Mode\*:  ENABLE [/MODE/ModeDeclarationGroups/MDG\_CanCMTx

Port Ref\*:  CanCMTx\_ECANFD [/AUTOSAR/BswM/BswMConfig/BswM

## 9) Add the definitions for values configured in BswMSwitchedMode to MODE\_PortInterfaces.arxml

Swcd\_Bsw

MODE\_PortInterfaces.arxml

AUTOSAR

MODE [ARPackage]

ApplicationPrimitiveDataTypes [ARPackage]

CompuMethods [ARPackage]

DataTypeMappingSets [ARPackage]

MAP\_AppMode [DataTypeMappingSet]

MAP\_CanCMTx [DataTypeMappingSet]

MAP\_CanSMBORState [DataTypeMappingSet]

MAP\_CanSMState [DataTypeMappingSet]

MAP\_ComMMMode [DataTypeMappingSet]

MAP\_EthSMState [DataTypeMappingSet]

MAP\_InitState [DataTypeMappingSet]

MAP\_LinSMState [DataTypeMappingSet]

MAP\_PduGroup [DataTypeMappingSet]

MAP\_PduRouter [DataTypeMappingSet]

MAP\_WakeupEvent [DataTypeMappingSet]

ModeDeclarationGroups [ARPackage]

MDG\_CanCMTxState [ModeDeclarationGroup]

MDG\_CanSMBORState [ModeDeclarationGroup]

MDG\_CanSMState [ModeDeclarationGroup]

MDG\_ComMMMode [ModeDeclarationGroup]



MDG\_EthSMMode [ModeDeclarationGroup]

MDG\_InitState [ModeDeclarationGroup]


MDG\_LinSMState [ModeDeclarationGroup]


MDG\_PduGroup [ModeDeclarationGroup]



MDG\_WakeupEvent [ModeDeclarationGroup]

Path:  MDG\_CanCMTxState [ModeDeclarationGroup] >  ENABLE [ModeDeclaration]


Navigator


 MDG\_CanCMTxState
 

 Mode Declarations [2]



 DISABLE
  ENABLE

Container Details - Mode Declarations > Mode Declaration

Short Name\*:  ENABLE

Value:  1

▼ To Be Configured:

 Short Name Fragments:  Short Name Fragment

► General:

## 10) Create an Action List and connect the actions defined above. (BswMActionList, BswMActionListItem)

Container Details - BswMActionList

Short Name\*:

TrueAL\_CanCM\_ECANFD\_ENABLE\_TX

Execution\*:

BSWM\_TRIGGER

Item 1

[1...\*]

▼ Action Items:

Configure..

AC\_RteSwitch\_CanCMTx\_ECANFD\_START

Container Details - BswMActionListItem

Short Name\*:

AC\_RteSwitch\_CanCMTx\_ECANFD\_START

Abort On Fail\*:

☐ false

Index\*:

0

Ref\*:

AC\_RteSwitch\_CanCMTx\_ECANFD\_START [/AUTOSAR/BswM/BswM

▼ To Be Configured:

Report Fail To Dem Ref:

11) Generate the Rule. Ensure only CanCM conditions are checked as shown below.

Container Details - BswMRule

Short Name\*:

Rule\_CanCM\_ECANFD\_ENABLE\_TX

Nested Execution Only\*:

☐ false

Init State\*:

BSWM\_FALSE

▼ Expression:

False Action List:

Expression Ref\*:

LE\_ECANFD\_CANCM\_ENABLE\_TX [/AUTOSAR/BswM/BswMConfig/BswMArbitration/LE\_ECANFD\_CANCM

True Action List:

TrueAL\_CanCM\_ECANFD\_ENABLE\_TX [/AUTOSAR/BswM/BswMConfig/BswMModeControl/TrueAL\_CanC

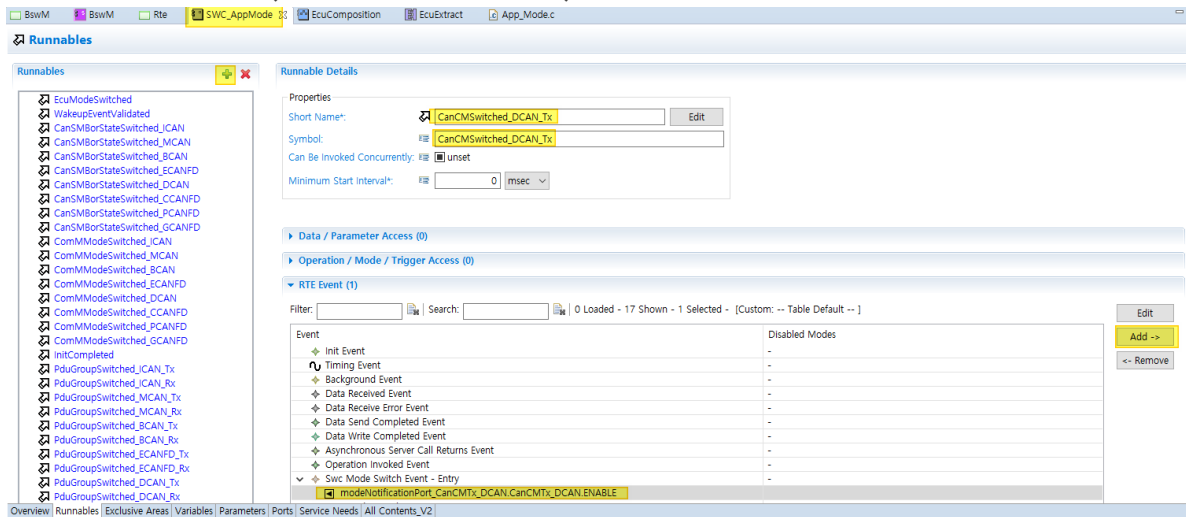
Configure..

```
void Rule_CanCM_ECANFD_ENABLE_TX() {
    if (MRP_IMM_GenericRequest_CanCMTx_ECANFD == CANCM_COMM_STAT_TX_ENABLED) {
        TrueAL_CanCM_ECANFD_ENABLE_TX();
    }
}

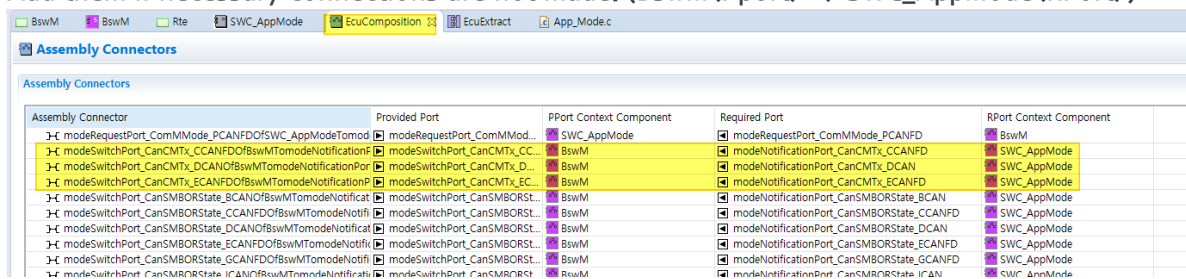
void TrueAL_CanCM_ECANFD_ENABLE_TX() {
    AC_RteSwitch_CanCMTx_ECANFD_START();
}
```



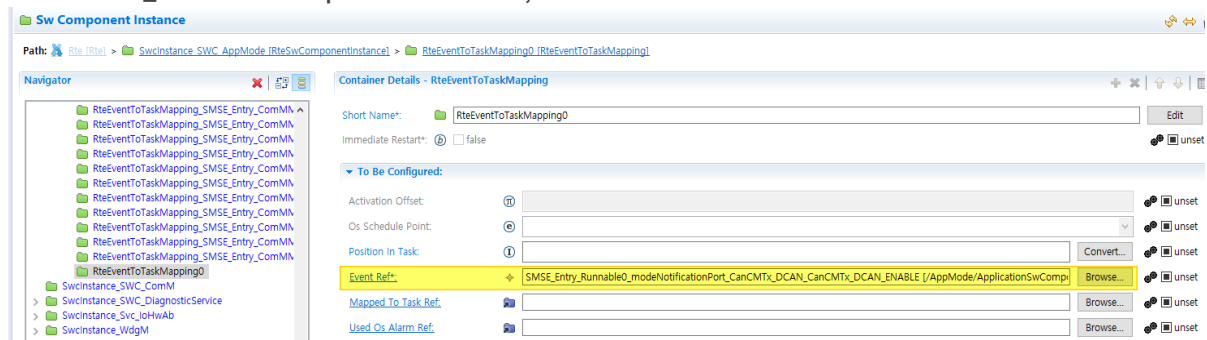
- 12) Create the runnables for the connection to AppMode. (SWC\_AppMode) Connect modeNotificationPort created in RTE Event (under enable condition) as shown below.



- 13) Assembly Connectors of EcuComposition should show that connectors have been generated as below. Add them if necessary connections are not made. (BswM<Pport> -> SWC\_AppMode<RPort>)



- 14) Go to Ecu\_Rte > Sw Component Instance, select RteEventRef to connect the correct channel.



- 15) The runnable of SWC\_AppMode created in Step 12 is called when the Network Activation Timer of the channel expires. Implement any behavior as required by declaring the prototype in Reference\_code/App\_Mode.c.

```
FUNC(void, AppMode_CODE) CanCMSwitched_DCAN_Tx(void)
{
}

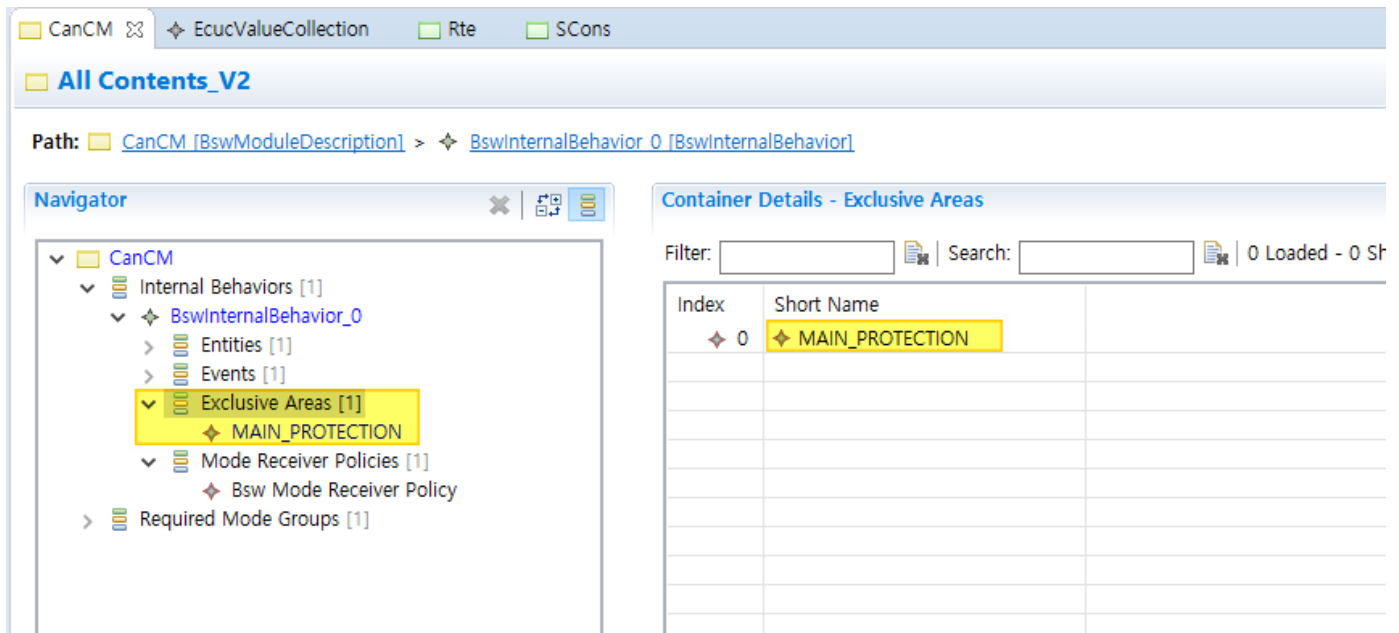
```



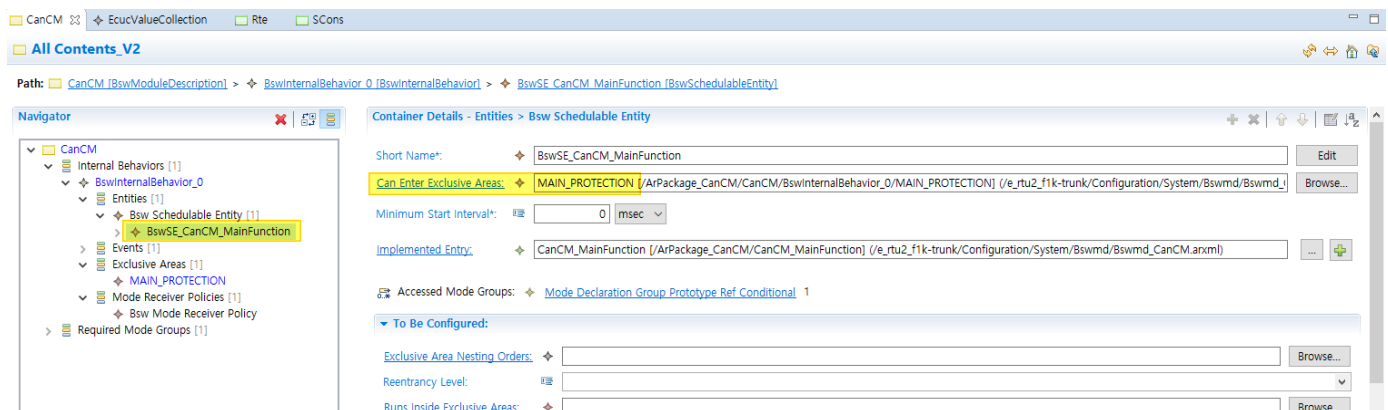
## 10.3 Exclusive areas added (for versions 1.5.17.0 and higher)

Version 1.5.17.0 and higher have newly-added Exclusive Areas. BswM\_CanCM.arxml and Ecud\_Rte.arxml shall be fixed according to the guide below.

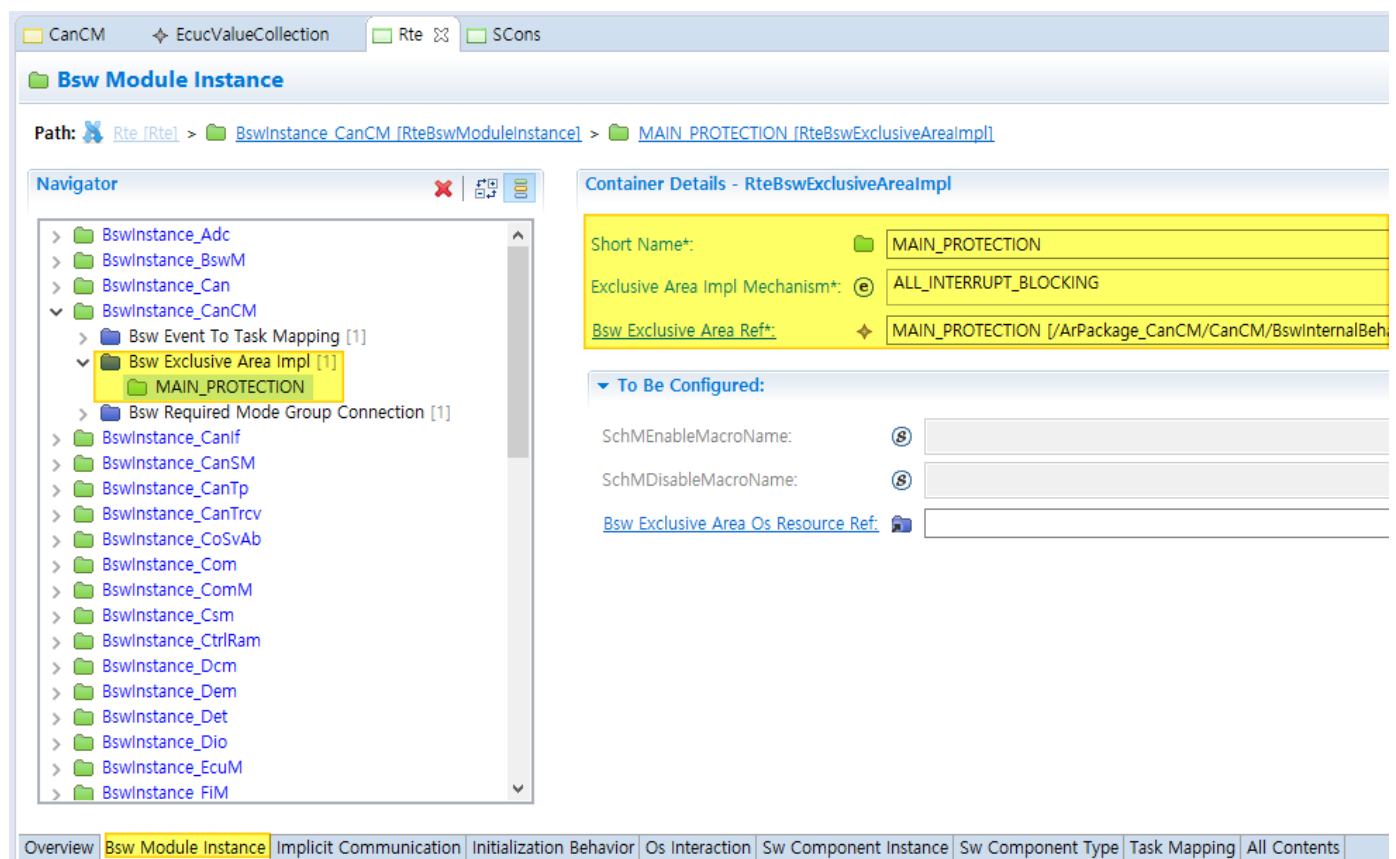
Go to Configuration/System/Bswmd/Bswmd\_CanCM.arxml and add Exclusive Areas/MAIN\_PROTECTION to CanCM/Internal Behaviors/BswInternalBehavior\_0.



Go to Entities > Bsw Schedulable Entity > BswSE\_CanCM\_MainFunction. Add the aforementioned MAIN\_PROTECTION to Can Enter Exclusive Areas.



Create BswInstance\_CanCM/Bsw Exclusive Area Impl in Ecud\_Rte.arxml and configure as shown below.



After building, SchM\_Enter\_CanCM\_MAIN\_PROTECTION and SchM\_Exit\_CanCM\_MAIN\_PROTECTION are generated in Rte.c.