HYUNDAI AUTOEVER

AUTOSAR CanSM User Manual

DOC. NO

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Table of Contents

1 Overview

This document is created based on the AUTOSAR standard SRS/SWS. For more detailed functional description, please refer to the below reference documents.

Each configuration category is defined as follows.

- Changeable (C): Items that can be configured by users
- Fixed (F): Items that cannot be changed by users
- NotSupported (N): Unavailable items

2 Reference

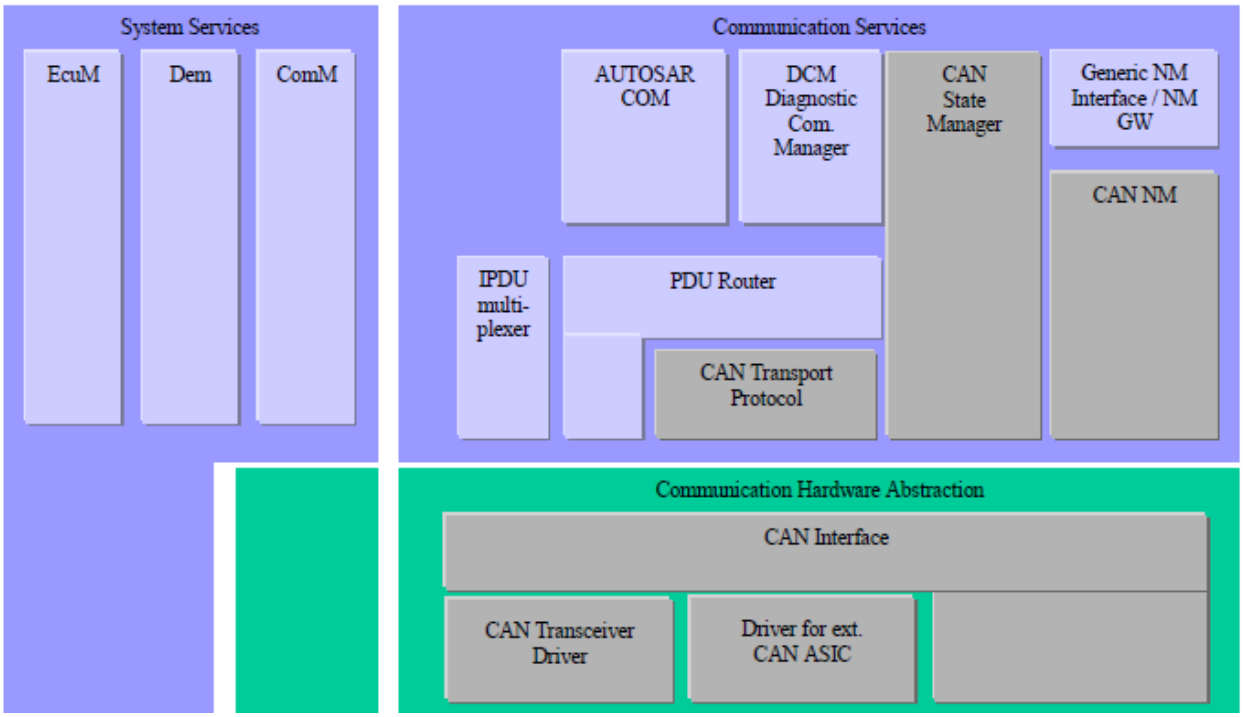
Sl. No.	Title	Version
1	AUTOSAR_SWS_CanStateManager.pdf	2.2.0

3 AUTOSAR System

3.1 CanSM Module

CanSM is a module that controls CAN communication status in the ECU and performs Bus-Off Recovery.

- **Controlling CAN communication status**
- **Bus-Off Recovery**



4 Product Release Notes

4.1 Overview

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

4.2 Scope of the Release

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

Module name	AUTOSAR version	SWS version	Module version
CanSM	4.0.3	2.2.0	1.12.11

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

4.3 Change Log

4.3.1 Version 1.12.11.0

➢ **Defects**

- ModeStatus mismatch when occur CanSM_TxTimeoutException after Bus Off

Cause	When using Selective WakeUp, Reset Controller even if ModeStatus is not CANSM_FULLCOMUNICATION
Operation effect	None
Settings effect	None
ASW action	None

4.3.2 Version 1.12.10.0

➢ **Defects**

- Modestatus transition modification in TimeoutException

Cause	Modestatus is not transferred to CANSM_FULLCOMMUNICATION
Operation effect	None
Settings effect	None
ASW action	None

4.3.3 Version 1.12.9.0

➢ **Defects**

- Repeat TimeoutException and Message Transmit when Timeout Exception occur

Cause	Perform Timeout Exception routine after Com task
Operation effect	None
Settings effect	None
ASW action	None

4.3.4 Version 1.12.8.1

➢ **Tasks**

- Add English UM

Cause	Add English UM
Operation effect	None
Settings effect	None
ASW action	None

4.3.5 Version 1.12.8.0

➢ **Features**

- Applying the new MCU S32K31x

Cause	Development to support the new MCU S32K31x
Operation effect	None
Settings effect	None
ASW action	None

4.3.6 Version 1.12.7.0

➢ **Improvements**

- Code improvement to comply with the UNECE Cyber Security regulations

Cause	Code improvement to comply with the UNECE Cyber Security regulations
Operation effect	None
Settings effect	None
ASW action	None

➢ **Improvements**

- Insert code to sort for input file list into generator

Cause	Insert code to sort for input file list into generator
Operation effect	None
Settings effect	None
ASW action	None

4.3.7 Version 1.12.6.0

➢ **Improvements**

- Security coding improved to comply with the UNECE Cyber Security regulations

Cause	Security coding improved to comply with the UNECE Cyber Security regulations
Operation effect	None
Setting effect	None
ASW action	None

4.3.8 Version 1.12.5.0

➢ **Improvements**

- Fixed the issue in which Bus-Off Recovery couldn't be completed if a message is transmitted during the recovery when the Bus-Off has yet to be resolved.

Cause	During a Bus-Off Recovery, the controller is initially switched to the START state and the communication status is set to OFFLINE. After a certain amount

	of time, the communication status is then changed to ONLINE, and the status variable is set to Monitor for Bus-Off. It is possible that a Bus-Off event occurs during the transition from switching the communication status to ONLINE and setting the status variable to Monitor for Bus-Off. In that case, the status variable is changed to Bus-Off Recovery Start and then back to Monitor for Bus-Off. This results in a situation where recovery cannot be restarted and messages cannot be transmitted even when the communication status is Full Comm .
Operation effect	None
Setting effect	None
ASW action	None

➢ **Improvements**

- Adjusted the default values of parameters and specified things to be checked with regard to Bus-Off Recovery

Cause	It was necessary to re-adjust the default parameter values depending on the type of CAN protocol (high-speed CAN or FD CAN) and domain (C-CAN, B-CAN, P-CAN, etc.) and to specify things to be checked when configuring those parameters.
Operation effect	None
Setting effect	None
ASW action	None

➢ **Improvements**

- Changed the name in development output to match the new company name

Cause	Reflected the company's new name, "Hyundai AutoEver," to development output
Operation effect	None
Setting effect	None
ASW action	None

➢ **Improvements**

- Security coding improved to comply with the UNECE Cyber Security regulations

Cause	Security coding improved to comply with the UNECE Cyber Security regulations
Operation effect	None
Setting effect	None
ASW action	None

4.3.9 Version 1.12.4.0

➢ **Improvements**

- Justified MISRA-C 2012 RTE items

Cause	Needed to justify MISRA-C 2012 RTE items
Operation effect	None
Setting effect	None
ASW action	None

➢ **Improvements**

- Revised the application-level solution of CANSM_E_MODE_CHANGE_X issue among the Dem errors

Cause	Since the Reset Channel functionality is no longer supported by ComM, it is removed from the application-level solution of the CANSM_E_MODE_CHANGE_X issue.
Operation effect	None
Setting effect	None
ASW action	None

4.3.10 Version 1.12.3.0

➢ **Improvements**

- Applied MISRA-C 2012

Cause	Improved code by applying MISRA-C 2012.
Operation effect	None
Setting effect	None
ASW action	None

➢ **Improvements**

- Added a chapter describing Det errors in the User Manual

Cause	Added descriptions about Det errors that occur in CanSM and information on Det error codes and API numbers so that it is possible to identify which Det error occurred in which API.
Operation effect	None
Setting effect	None
ASW action	None

➢ **Improvements**

- Made code improvements to allow compiling in a Cmake environment

Cause	Cmake can't compile the code when there is a whitespace after the extension of the header file to be included; whitespaces removed.
Operation effect	None
Setting effect	None
ASW action	None

4.3.11 Version 1.12.2.0

➢ **Improvements**

- Modified the module so that whether to support partial network is decided by CanSMPncSupport setting

Cause	The purpose is to allow CanSM to support functionalities related to partial network even when using a transceiver that does not support Selective Wakeup.
Operation effect	None
Setting effect	Set CanSMPncSupport to true when using partial network functionalities

ASW action	None

➢ **Improvements**

- Fixed an issue in which a wrong patch version was returned in CanSM module version information

Cause	The Get Version Information API returned an invalid patch version, which has been fixed.
Operation effect	None
Setting effect	None
ASW action	None

4.3.12 Version 1.12.1.0

➢ **Improvements**

- Changed configuration item properties to open the code

Cause	Needed to change configuration item properties to open the code
Operation effect	None
Setting effect	None
ASW action	None

4.3.13 Version 1.12.1

➢ **Improvements**

- Eliminated the possibility of issues when manually adding or modifying CanSM manager network configurations after harmonizing.

Cause	It was possible for an operational issue to occur when the user manually adds or modifies CanSM manager network configurations after harmonizing. A fix was applied so that manual configuration after harmonization doesn't affect operation.
Operation effect	None
Setting effect	None
ASW action	None

4.3.14 Version 1.12.0

➢ **Features**

- Developed CanSM Postbuild Selectable

Cause	Postbuild Selectable feature was developed to allow selecting a specific CanSMConfiguration from multiple instances of CanSMConfiguration through module initialization.
Operation effect	None
Setting effect	1) To use the PostBuild feature, related settings must be configured in CanSM_Init under EcuMDriverInitListOne 〉DriverInitItem. 2) To use the PostBuild feature, multiple CanSMConfiguration must be created and Implementation Config Variant must be configured in CanSM General Information.

ASW action	None

➢ **Improvements**

- Fixed an issue in which SILENT_COMM mode persisted even when a Bus-Off event no longer occurred if CanNm module is used

Cause	The handling of a Tx Timeout Exception in CanNm during Bus-Off Recovery caused an anomaly in the Recovery process. Fixed the issue by avoiding handling said exception during a Bus-Off event.
Operation effect	None
Setting effect	None
ASW action	None

4.3.15 Version 1.11.0

➢ **Improvements**

- Added CanSM_TxTimeoutException PDU Start feature to enable support for partial networks

Cause	Added CanSM_TxTimeoutException PDU Start feature to enable support for partial networks
Operation effect	None
Setting effect	None
ASW action	None

- Modified the directory location and structure of CanSM_TxTimeOutException.h to enable support for partial networks

Cause	To enable partial network functionality in CanNm, the CanSM_TxTimeOutException.h file has been moved from the Lib folder to the Delivery folder.
Operation effect	None
Setting effect	None
ASW action	None

- Implemented Bus-Off Notification logic for partial networks

Cause	Implemented code to use the Bus-Off Notification logic with partial networks, previously only available for cases without partial networks.
Operation effect	None
Setting effect	None
ASW action	None

4.3.16 Version 1.10.5

➢ **Improvements**

- Added a logic to keep switching to a desired mode after an error occurred during transition of communication modes

Cause	If there is an error during switching of communication modes, the existing logic provides a notification for the error before retrying for a preset number of times and then entered No Comm mode. The new logic keeps attempting to transition to the desired mode until it succeeds.
Operation effect	Previously, when a mode switching fails, reattempts were made only a certain number of times; now the software continues retrying until mode is successfully transitioned.
Setting effect	None
ASW action	It is necessary to change the code that makes requests for mode transition (see CanSM User Manual).

4.3.17 Version 1.10.4

➢ **Improvements**

- Modified the code that restores communication mode after a noise disruption in a CAN channel.

Cause	Modified the software to provide repeated notifications for mode transition failures caused by noise disruptions in a CAN channel, whereas previously, the logic only provided a single notification.
Operation effect	Repeated notifications will be provided for mode transition failures; previously, the notification was given only once.
Setting effect	None
ASW action	It is necessary to modify the ASW logic by referring to the CanSM User Manual.

4.3.18 Version 1.10.3

➢ **Improvements**

- Eliminated library influence with relation to RepetitionMax and RepetitionTime

Cause	Eliminated library influence with relation to RepetitionMax and RepetitionTime in the platform distributed as a library
Operation effect	After the distribution, there will be no library influence with relation to RepetitionMax and RepetitionTime.
Setting effect	None
ASW action	None

Synchronized the timing of No Communication mode notification and BOR Complete notification, the latter of which is triggered by a request to switch to No Communication during a Bus-Off event.

Cause	Adjusted the timings of the BOR Complete notification, which is triggered by a request to switch to No Communication during a Bus-Off event, and of the No Communication mode notification, to occur simultaneously.
Operation effect	The BOR Complete notification, which is triggered by a request to switch to No Communication during a Bus-Off event, and the No Communication mode notification will occur simultaneously.
Setting effect	None
ASW action	None

4.3.19 Version 1.10.2

➢ **Improvements**

- Eliminated library influence with relation to CanSM_TimerType

Cause	Eliminated library influence with relation to CanSM TxEnsured Time in the platform distributed as a library
Operation effect	After the distribution, there will be no library influence with relation to TxEnsured Time.
Setting effect	None
ASW action	None

- Added User Manual content on CanSM Bus-Off notification configurations

Cause	Added descriptions about “Supports Asynchronous Mode Switch” setting
Operation effect	A build error will occur without “Supports Asynchronous Mode Switch” setting
Setting effect	It is necessary to set “Supports Asynchronous Mode Switch” to true.
ASW action	None

- Added content related to CANSM_E_MODE_CHANGE

Cause	Added descriptions and how-to-use instructions concerning CANSM_E_MODE_CHANGE
Operation effect	None
Setting effect	None
ASW action	None

- Added content related to CanSMModeRequestRepetitionMax and CanSMModeRequestRepetitionTime

Cause	Added descriptions about RepetitionMax and RepetitionTime
Operation effect	None
Setting effect	None
ASW action	None

4.3.20 Version 1.10.1

➢ **Improvements**

- Analyzed and corrected compile warnings

Cause	Analyzed and corrected compile warnings
Operation effect	None
Setting effect	None
ASW action	None

4.3.21 Version 1.10.0

➢ **Features**

- Modified the module to allow using a CanTrcv module developed by a partner

Cause	To support development of a CanTrv module newly developed by a

	partner
Operation effect	None
Setting effect	The new CanTrcv module should be added and configured
ASW action	None

4.3.22 Version 1.9.13

➢ **Improvements**

Fixed the logic for Bus-Off notification

Cause: the Bus-Off notification malfunctioned when Sleep mode was entered during a Bus-Off event, preventing the delivery of the notification.

Operation effect: fixed the malfunction in the Bus-Off notification
Setting effect: available in mobilgene 2016b or later (fixed InitState in Bus-Off notification Rule).
ASW Action: None

4.3.23 Version 1.9.12

➢ **Improvements**

Fixed errors in the logic that controls interrupts during a Bus-Off event

Cause: after interrupts were temporarily disabled to handle a Bus-Off event, they were not re-enabled and remained of during the mode transition under certain conditions.
Operation effect: removed the possibility of malfunction in handling interrupts
Setting effect: None
ASW Action: None

4.4 Module Release Notes

4.4.1 Limitations

➢ Change Baudrate API functionality unsupported
The API, which allows changing the baudrate during CAN communication, is not supported. During CAN communication, it is possible to change the baudrate of a specific CAN Controller after switching from Full Communication mode to a mode that supports baudrate changes. Communication is temporarily halted during the change as it entails a transition of modes; it can resume after the baudrate is adjusted and the Full Communication mode is entered again.

➢ Multiple controllers per channel unsupported
In some cases, CanSM manages two or more CAN controllers for a single channel. In this SW product, multiple CAN controllers are not supported. (Here, a channel refers to one managed by CanSM and means the same as a physical layer.)

➢ CanSMBorTxConfirmationPolling feature unsupported
The feature that uses the polling method to check whether a CAN transmission was

successfully completed is not supported.
(It is not supported by CanIf.)

- The library should be redeployed by principle when a CanSM channel is added or removed. The platform library should be redeployed when changing CanSM configurations (adding or removing a physical CAN).

- Post Build Loadable unsupported
  This refers to a feature that enables changing CanSM configurations after the platform has been built by downloading configuration files, without re-compiling or re-building. It is not supported.

4.4.2 Deviations

- Bus-Off notification is available for a SW-C.
  For a SW-C to receive Bus-Off notification, it needs to connect to a BswM port (see 8.1. CanSM Bus-Off Notification).

- Request can be made to transition to No Communication during Bus-Off Recovery.
  When the user makes a request for transition to No Communication mode during Bus-Off Recovery, the communication channel will switch to No Communication (requests to switch to other modes will be rejected; Det error will not occur).

- After mode transition fails after repeating requests the number of times indicated by CanSMModeRequestRepetitionMax, an error-related event is sent to the Dem module. As the user deems necessary, it is possible to have the Dem module notify a SW-C of the error after receiving the error event notification.

- A Det error does not occur when a mode transition request is received during Bus-Off Recovery.
  (Previously, Det error occurred when ComM made a Full Comm request during Bus-Off Recovery; the behavior is removed since AUTOSAR 4.2.1 specifications no longer require triggering a Det error for a mode transition request during Bus-Off Recovery.)

- Switching to No Comm when a mode transition fails is not supported; the system will retry transitioning to the requested mode.

- If set CanSMUserTimeoutFunction and CanSMUserTimeoutHeader both, then the callout function where function set in CanSMUserTimeoutFunction is called when mode transition fails after repeating requests the number of times indicated by CanSMModeRequestRepetitionMax.

5 Configuration Guide

The CanSM configuration for the AUTOSAR platform distributed by Hyundai AutoEver reflects the policy of Hyundai AutoEver and therefore any changes require consultation with Hyundai AutoEver.

5.1 CanSMGeneral Configuration

Parameter Name	Value	Category
CanSMDevErrorDetect	True	C
CanSMMainFunctionTimePeriod	0.005	C
CanSMPncSupport	False	C
CanSMVersionInfoApi	False	F
CanSMChangeBaudrateApi	False	N
CanSMUserTimeoutFunction	-	C
CanSMUserTimeoutHeader	-	C

1) CanSMDevErrorDetect
   - determines whether to use error notification functionality
2) CanSMMainFunctionTimePeriod
   - sets the cycle time (in seconds) of the periodic function. It is set to 5 ms by default; when optimization is required due to the use of gateway functionality by the platform, it may be set to 10 ms. When making such changes, the settings related to running the given MainFunction should be changed too.
3) CanSMPncSupport
   - determines whether to use partial networks
4) CanSMVersionInfoApi
   - determines whether to enable the version information API
5) CanSMChangeBaudrateApi
   - determines whether to enable the API that allow changing CAN communication speed
6) CanSMUserTimeoutFunction
   - Set User Callout Function name called when CanSM_TimeoutProcessing occurs repeatedly. (Call on iteration as much as the value set in CanSMModeRequestRepetitionMax)
7) CanSMUserTimeoutHeader
   - Set Header File name including User Callout Function called when CanSM_TimeoutProcessing occur repeatedly.

5.2 CanSMConfiguration Configuration

Parameter Name	Value	Category
CanSMModeRequestRepetitionMax	3	C
CanSMModeRequestRepetitionTime	0.03	C

1) CanSMModeRequestRepetitionMax
   - When E_NOT_OK is received after making a mode request (the conditions under which E_NOT_OK is returned will vary depending on MCU), or
   - when E_OK is received after making a mode request but there is no ModeIndication, or
   - when E_OK is received after making a mode request but ModeIndication is invalid,

   the RepetitionMax count will decrease.
2) CanSMModeRequestRepetitionTime
   - the time interval in seconds between re-attempts of a mode request if no valid mode indication is received after the initial request.

5.3 CanSMConfiguration-CanSMManagerNetwork Configuration

Parameter Name	Value	Category
CanSMBorCounterL1ToL2	3	C
CanSMBorTimeL1	B-CAN: 0.96 FD-CAN, P/C-CAN: 0.06	C
CanSMBorTimeL2	B-CAN: 0.96 FD-CAN, P/C-CAN: 0.06	C
CanSMBorTimeTxEnsured	0.02	C
CanSMBorTxConfirmationPolling	False	N
CanSMComMNetworkHandleRef	Automated	F
CanSMTransceiverId	-	C

1) CanSMBorCounterL1ToL2
   - the number (counts) of Bus-Off events for Short Bus Off Recovery mode to be changed to Long Bus Off Recovery mode
   - should be set to appropriate value according to the specifications for the ECU and the ES.
2) CanSMBorTimeL1
   - the duration of Short Bus Off Recovery in seconds
   - must be set to appropriate value according to the specifications for the ECU and the ES;

the initial configuration value is compliant with ES95480-00 and ES95480-02 specifications.

3) CanSMBorTimeL2
   - the duration of Long Bus Off Recovery in seconds
   - must be set to appropriate value according to the specifications for the ECU and the ES; the initial configuration value is compliant with ES95480-00 and ES95480-02 specifications.
4) CanSMBorTimeTxEnsured
   - the interval for determining the completion of Bus off Recovery after Full Communication in seconds
   - Bus-Off Recovery TxEnsured Time should be bigger than the time for the first PDU transmission after the transition of PDU to Full Communication.
     (PDU transmission is required for CanSM module to confirm Bus-Off Recovery.)
   - should be set to appropriate value according to the specifications for the ECU and the ES.
5) CanSMBorTxConfirmationPolling
   - determines whether to use the polling method to check whether a CAN transmission was successfully completed.
6) CanSMComMNetworkHandleRef
   - the ComM Channel Id connected with CanSM Network
7) CanSMTransceiverId
   - the Transceiver Id connected with CanSM Network

5.4 CanSMConfiguration-CanSMManagerNetwork-CanSMController Configuration

Parameter Name	Value	Category
CanSMControllerId	Automated	F

1) CanSMControllerId
   - the Can Controller Id connected with CanSM Network

5.5 CanSMConfiguration-CanSMManagerNetwork-CanSMDemEventParameterRefs Configuration

Parameter Name	Value	Category
CANSM_E_BUS_OFF	-	C
CANSM_E_MODE_CHANGE	-	C

1) CANSM_E_BUS_OFF
   - the Dem event connected with CanSM Network.
   - notifies the Dem module of the event when a Bus-Off event occurs in the channel.
   - it is not possible to switch to communication mode other than No Communication when a Bus-Off event has occurred.

2) CANSM_E_MODE_CHANGE
   - after attempting mode transition the number of times indicated by CanSMModeRequestRepetitionMax (as explained in 5.2), the aforementioned event is sent to the Dem module.
   - if there is a Fail notification caused by an event, the current attempt (by the application or the platform) to transition modes has failed; the BSW keeps retrying to switch to the requested mode.
     The Application may choose to perform a hardware reset, to wait, or to use the ASW's own logic as necessary.

➢ When the platform has been deployed, one or more CanSMDemEventParameterRefs must be configured.

➢ Event notification will be possible after the operation cycle of Dem has begun (see Dem User Manual).

6 Application Programming Interface (API)

6.1 Type Definitions

None

6.2 Macro Constants

None

6.3 Functions

6.3.1 Mode Transition

Function Name	CanSM_GetCurrentComMode	
Syntax	FUNC (Std_ReturnType, CANSM_CODE) CanSM_GetCurrentComMode (NetworkHandleType NetworkHandle, P2VAR(ComM_ModeType, AUTOMATIC, CANSM_APPL_DATA) ComM_ModePtr)	
Service ID	0x03	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (In)	NetworkHandle	Network handle, whose current communication mode shall be put out
Parameters (Inout)	None	
Parameters (Out)	ComM_ModePtr	Pointer, where to put out the current communication mode
Return Value	Std_ReturnType: E_OK: Service accepted E_NOT_OK: Service denied	
Description	This service shall put out the current communication mode of a CAN network	
Preconditions	CanSM Module should be initialized	
Configuration Dependency	None	

6.3.2 Call-back Notification

Function Name	CanSM_ControllerBusOff	
Syntax	FUNC(void, CANSM_CODE) CanSM_ControllerBusOff(uint8 ControllerId)	
Service ID	0x04	
Sync/Async	Synchronous	
Reentrancy	Reentrant (only for different CanControllers)	
Parameters (In)	ControllerId	CAN controller, which detected a bus-off event
Parameters (Inout)	None	
Parameters (Out)	None	
Return Value	None	
Description	This callback function notifies the CanSM about a bus-off event on a certain CAN controller, which needs to be considered with the specified bus-off recovery handling for the impacted CAN network.	
Preconditions	CanSM Module should be initialized	
Configuration Dependency	None	

7 Generator

7.1 Generator Option

Options	Description
-H/-Help	To display help regarding usage of the tool.
-O/-Output	To generate the output files in the specified directory location.
-V/-Version	To display the copyright information and the tool version.
-L/-Log	To generate "$BswConfig::Lis_File_Name" file.
-D/-DryRun	To execute in validation mode.
-I/-Info	To disable an Information Message(s).
-W/-Warn	To disable Warning Message(s).
-DDT	Not to generate the time stamp in the generated files.

7.2 Generator Error Message

This section helps to analyze the errors or warnings displayed during the execution of the tool. It ensures conformance of input file(s) with syntax and semantics.
The Generation Tool displays errors or warnings or information when the user has configured incorrect inputs. The format of Error/Warning/Information message is as shown below:

- ERR/WRN/INF<mid><xxx>: < Error/Warning/Information Message>Where,
  <mid>: 140 – CanSM Module Id (140) for user configuration checks.
  000 – for command line checks.
  <xxx>: 001 – 999 – Message ID.
- File Name : Name of the file in which the error has occurred
- Path : Absolute path of the container in which the parameter is present

'File Name' and 'Path' are optional.
Below section provides the list of error, warning and information messages
.

7.2.1 Error Messages

ERR140001: Unexpected Error Found. Numbers of fields are not same for the entity 'structure name'.

This is an Unexpected Error. On the occurrence of this error contact AUTOEVER AUTOSAR Support System.

ERR140002: Unexpected Error Found. This error may be due to the incorrect configuration of the element(s) <Parameter Name/ Container Name>. If the error is not resolved, then

please contact AUTOEVER AUTOSAR Support System.

This error may occur due to incorrect configuration of the Parameter Name/ Container Name provided in the error message. If the error is not resolved, then contact AUTOEVER AUTOSAR Support System.

ERR140003: 'Component name' Component is not present in the input file(s).

This error occurs, if any of the component ComM or CanSM or CanIf is(are) not present in any of the input ECU Configuration Description File(s).

ERR140004: The reference path is empty for the parameter 'parameter name' in the container 'container name', having short name 'short name'.

This error occurs, if reference path is not configured for the below mentioned parameters.

Container Name	Parameter Name
CanSMManagerNetwork	CanSMComMNetworkHandleRef
CanSMController	CanSMControllerId

ERR140005: The parameter 'Parameter Name' in the container 'Container Name' should be configured.

This error occurs, if value of any of the mandatory parameters mentioned in the below table are not configured.

Container Name	Parameter Name
CanSMManagerNetwork	CanSMBorTimeL2
	CanSMBorCounterL2Err
	CanSMBorTimeTxEnsured
	CanSMBorTimeL1
	CanSMBorCounterL1ToL2
CanSMGeneral	CanSMVersionInfoApi
	CanSMDevErrorDetect
	CanSMMainFunctionTimePeriod
CanSMConfiguration	CanSMModeRequestRepetitionMax
	CanSMModeRequestRepetitionTime

ERR140013: The reference path <Reference Path> provided for the parameter 'Parameter Name' in the container 'Container Name', having short name <Container Short Name> is incorrect.

This error occurs, if reference path of any of the mandatory parameters mentioned in the below table is incorrect.

Container Name	Parameter Name
CanSMManagerNetwork	CanSMComMNetworkHandleRef
CanSMController	CanSMControllerId

Note: CanSMComMNetworkHandleRef are reference parameters of container CanSMManagerNetwork. The Container CanSMManagerNetwork is the Sub-container of CanSMConfiguration.

ERR140050: The container ''Container Name' should be configured in the input file.

This error occurs, if any of the mandatory containers are not configured.

Container Name
CanSMManagerNetwork
CanSMController
CanSMConfiguration

ERR140051: The configured value for the parameter 'Parameter Name' should be unique in the container 'Container Name'.

This error occurs, if any of the mandatory parameters are not having unique values.

Container Name	Parameter Name
CanSMManagerNetwork	CanSMComMNetworkHandleRef
CanSMController	CanSMControllerId
CanSMDemEventParameterRefs	CANSM_E_BUS_OFF

ERR140052: The configured value for the parameter 'Parameter Name' should not be configured as zero in the container 'Container Name'.
This error occurs, if the value of the below mentioned parameters is configured as zero.

Container Name	Parameter Name

Container Name	Parameter Name
CanSMGeneral	CanSMMainFunctionTimePeriod

ERR140006: To check whether tool errors out, if the elements AR-RELEASE-VERSION and SW-VERSION present in the Bsw Module Description template do not follow C syntax.
This error occurs, if the below mentioned parameters does not follow C syntax.
ERR140060: Parameter 'CanSMPncSupport' of CanSMGeneral can be set to 'true' only if 'ComMPncSupport' is set to true.
This error occurs, if 'CanSMPncSupport' is set to true although ComMPncSupport is 'false'.

ERR140061: Parameter both 'CanSMUserTimeoutFunction' and 'CanSMUserTimeoutHeader' of CanSMGeneral must be set or not set.
This error occurs, if only one of 'CanSMUserTimeoutFunction' or 'CanSMUserTimeoutHeader' is set.

7.2.2 Warning Messages

None

7.2.3 Information Messages

INF140015: AUTOSAR Release version 'AR-RELEASE-VERSION' configured for the parameter 'AR-RELEASE-VERSION' in provided MDT file is not correct. AUTOSAR Release version should be one of the following: 4.0.3.
This information occurs, if AR-RELEASE-VERSION in BSW-IMPLEMENTATION is not configured as 4.0.3

8 Dem Error

Bsw module errors shall be reported to the Dem_ReportErrorStatus() when the errors occur.

8.1 CANSM_E_MODE_CHANGE_X

ErrorId Symbol	CANSM_E_MODE_CHANGE_X
Description	This error occurs if the process of switching communication modes is unsuccessful.
Cause of error	H/W, MCAL
Platform Default Action	NO RESET
Functional impact	Can't perform CAN communication; can't enter low power mode; and can't enter Full Comm or No Comm mode.
Related module(s)	None
MCU	Common
Error type	Hardware issue
Application-level solution	1) Reset the ECU.

	2) Depending on hardware circumstance, choose No Action or apply the user's own logic. Application-level countermeasure is necessary to address communication failures due to errors related to changes in CAN MCAL Mode (Full Communication/No Communication). If the hardware issue is left unresolved, the same issue may occur even after the reset. Since the platform cannot determine a solution or countermeasure at the application level, the application should take necessary actions such as resetting or waiting.

8.2 CANSM_E_BUS_OFF_X

ErrorId Symbol	CANSM_E_BUS_OFF_X
Description	MCAL CAN Driver has recognized a Bus-Off event and is sending a notification about the situation.
Cause of error	MCAL
Platform Default Action	NO RESET
Functional impact	Bus-Off Recovery is underway; normal CAN communication is impossible until it is complete.
Related module(s)	None
MCU	Common
Error type	Hardware issue
Application-level solution	The CanSM module handles the Bus-Off Recovery process. It will wait until Bus-Off Recovery is finished. If the process repeats infinitely, an application-level solution is required. If the hardware issue is left unresolved, the same issue may occur even after the reset. The application should take appropriate action such as resetting or waiting.

9 Det Error

Detected development errors shall be reported to the Det_ReportError(uint8 InstanceId, uint8 ApiId, uint8 ErrorId) service of the Development Error Tracer (DET) if the pre-processor switch CanSMDevErrorDetect is set "on".

9.1 Error Classification

Type of error	Relevance	Related error code	Value
API service used without module initialization	Development	CANSM_E_UNINIT	0x1
API service called with wrong pointer	Development	CANSM_E_PARAM_POINTER	0x2
API service called with wrong parameter	Development	CANSM_E_INVALID_NETWORK_HANDLE	0x3
API service called with wrong parameter	Development	CANSM_E_PARAM_CONTROLLER	0x4
API service called with wrong parameter	Development	CANSM_E_PARAM_TRANSCEIVER	0x5
Network mode request during not finished bus-off recovery	Development	CANSM_E_BUSOFF_RECOVERY_ACTIVE	0x6
Network mode request during	Development	CANSM_E_WAIT_MODE_INDICATION	0x7

pending indication			
Invalid communication mode request	Development	CANSM_E_INVALID_COMM_REQUEST	0x8
Invalid BaudrateConfig for at least one of the CAN Controllers of the requested CAN Network	Development	CANSM_E_PARAM_INVALID_BAUDRATE	0x9
Mode request for a network failed more often as allowed by configuration	Development	CANSM_E_MODE_REQUEST_TIMEOUT	0xA

9.1.1 Service ID

CanSM function name	Service ID[hex]
CanSM_Init	0x00
CanSM_GetVersionInfo	0x01
CanSM_RequestComMode	0x02
CanSM_GetCurrentComMod e	0x03
CanSM_CheckBaudrate	0x0c
CanSM_ChangeBaudrate	0x0e
CanSM_ControllerBusOff	0x04
CanSM_ControllerModeIndication	0x07
CanSM_TransceiverModeIndication	0x09
CanSM_TxTimeoutException	0x0b
CanSM_ClearTrcvWufFlagIndication	0x08
CanSM_CheckTransceiverWakeFlagIndication	0x0a
CanSM_ConfirmPnAvailability	0x06
CanSM_MainFunction	0x05

10 Appendix

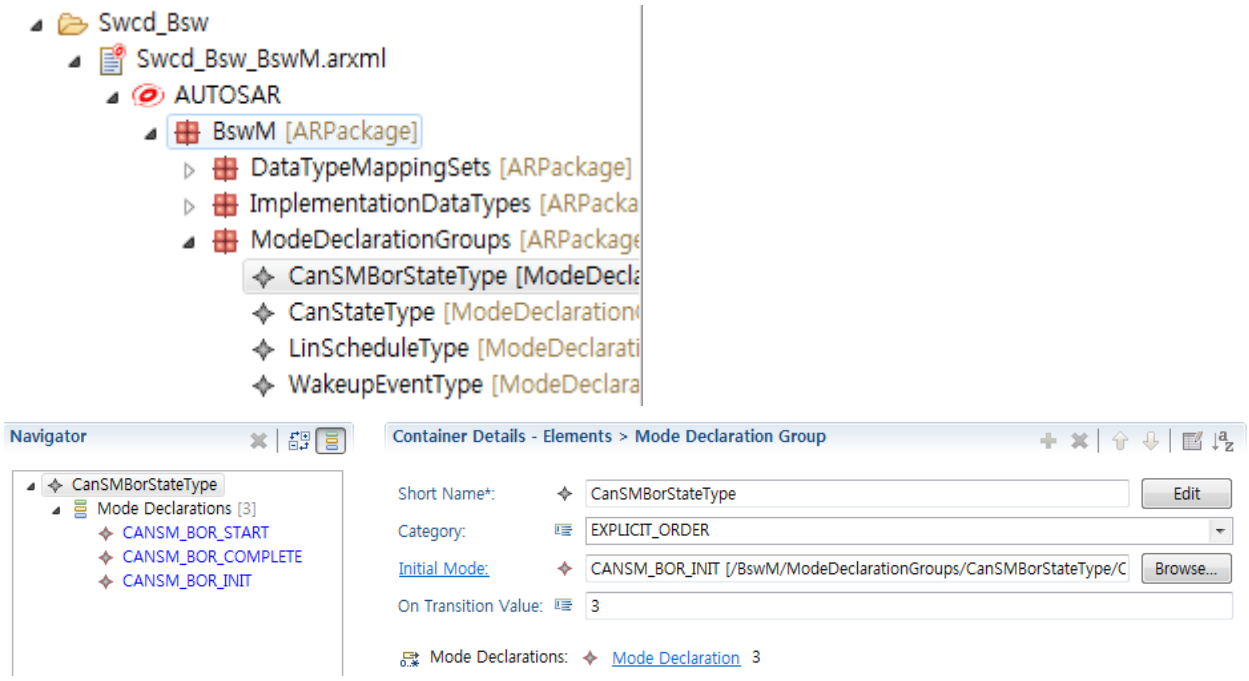
10.1 CanSM Bus-Off Notification Configuration

Refer to the Configuration Guide of BswM User Manual for relevant settings.

10.1.1 Manual Configuration

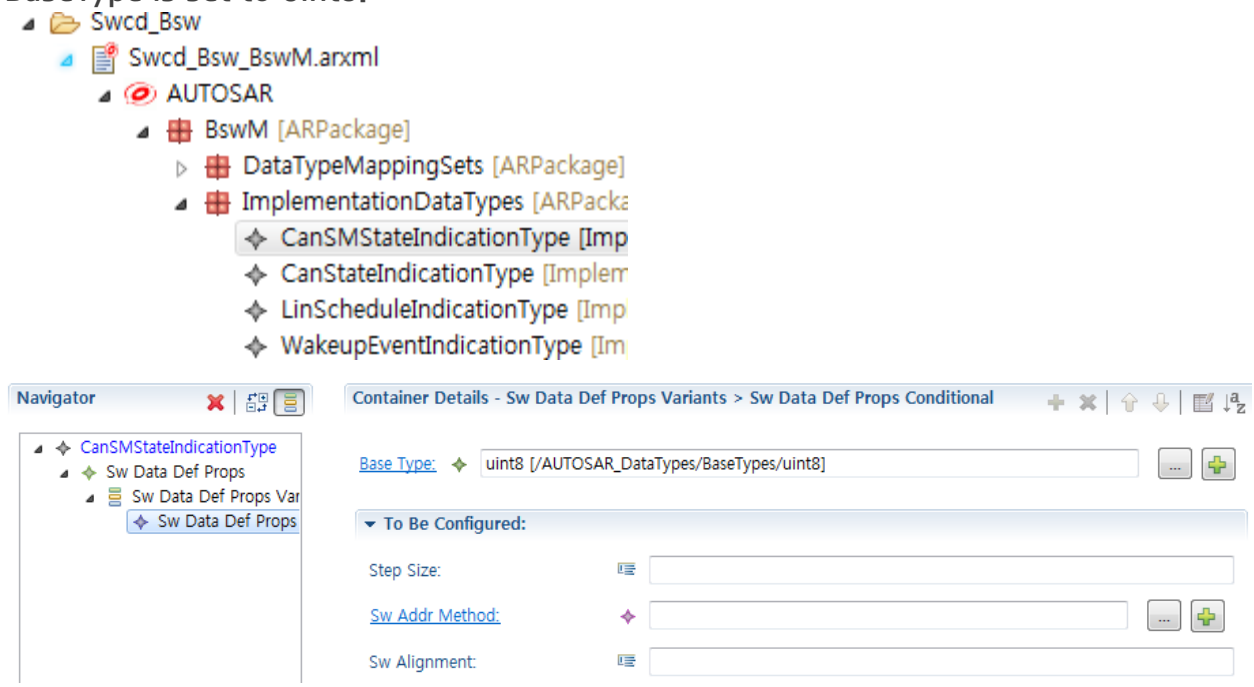
10.1.1.1 ModeDeclarationGroups Configuration

Create a ModeDeClarationGroup and set its name (CamSMBorStateType).
CANSM_NORMAL = 0,
CANSM_BUSOFF = 1
(Initial Mode is set to CANSM_NORMAL.)



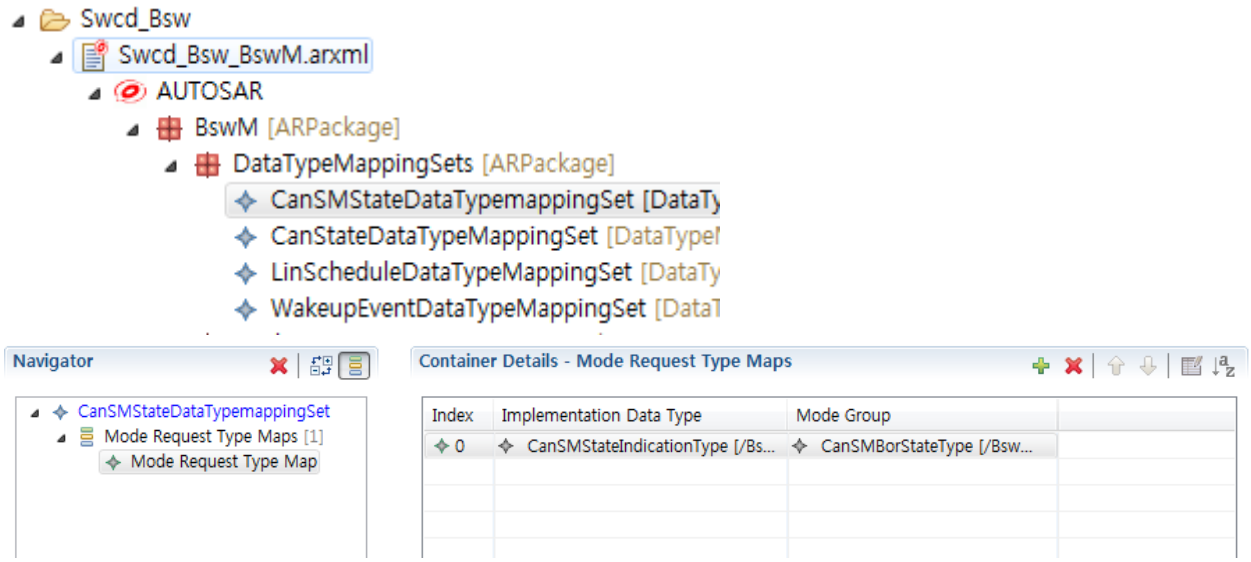
10.1.1.2 ImplementationDataTypes Configuration

Create a ImplementationDataType and change its name (CanSMStateIndicationType) BaseType is set to uint8.



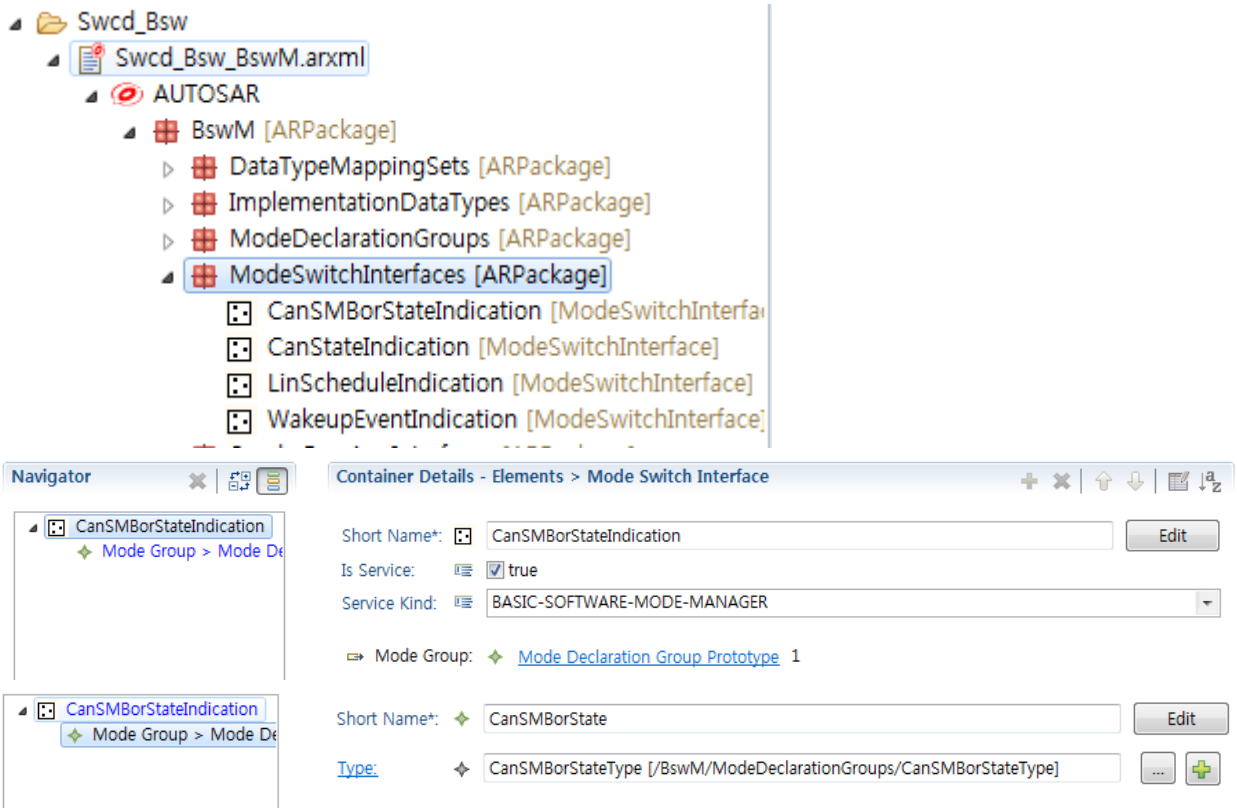
10.1.1.3 DataTypeMappingSets Configuration

After creating a CanSMStateDataTypemappingSet, set Implementation Data Type to CanSMStateIndicationType and Mode Group to CanSMBorStateType



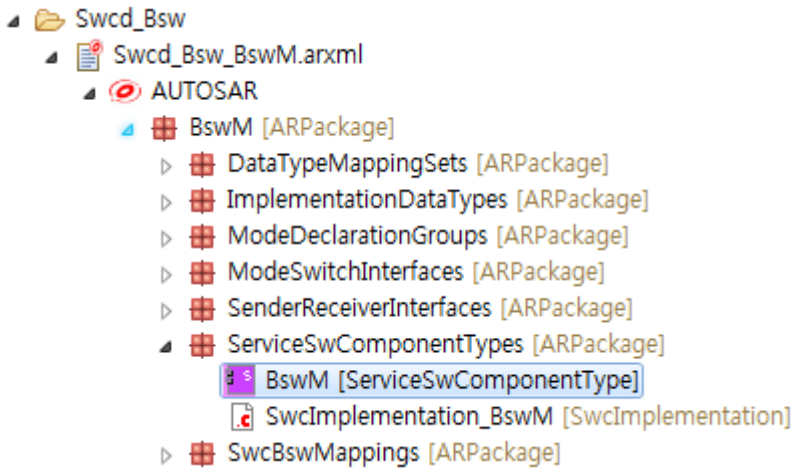
10.1.1.4 ModeSwitchInterfaces Configuration

Create a ModeSwitchInterface for each channel under ModeSwitchInterfaces (CanSMBorStateIndication_CAN1, CanSMBorStateIndication_CAN2)

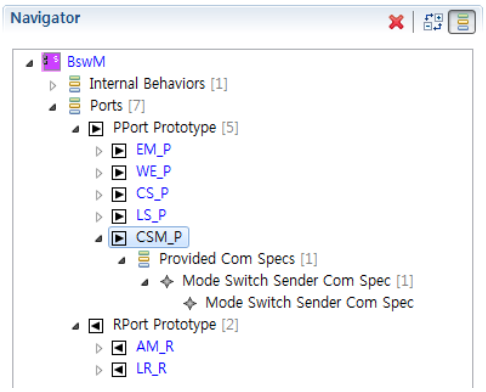


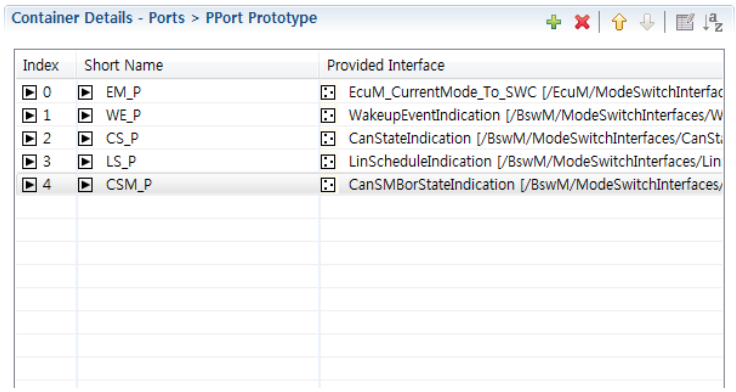
10.1.1.5 ServiceSwComponentTypes Configuration

Configure P-Port for each channel (CSM_P_CAN1, CSM_P_CAN2)

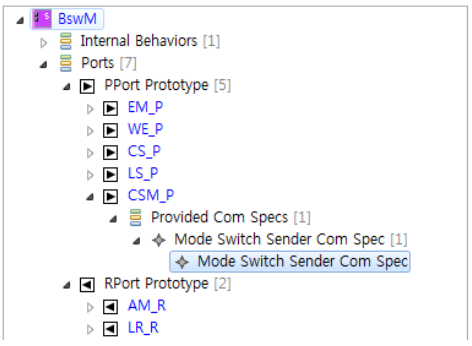


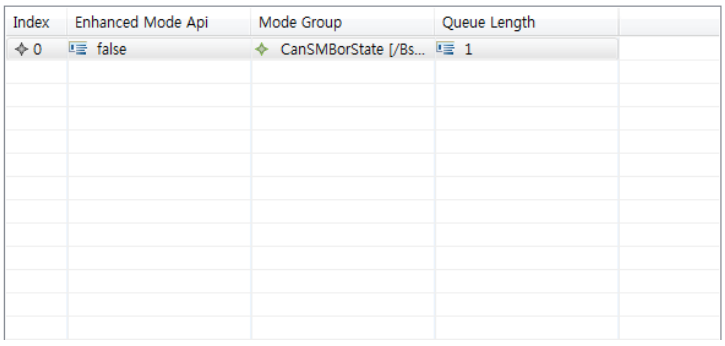
Add Mode Switch Interface > Mode Sender Provided Interface configuration





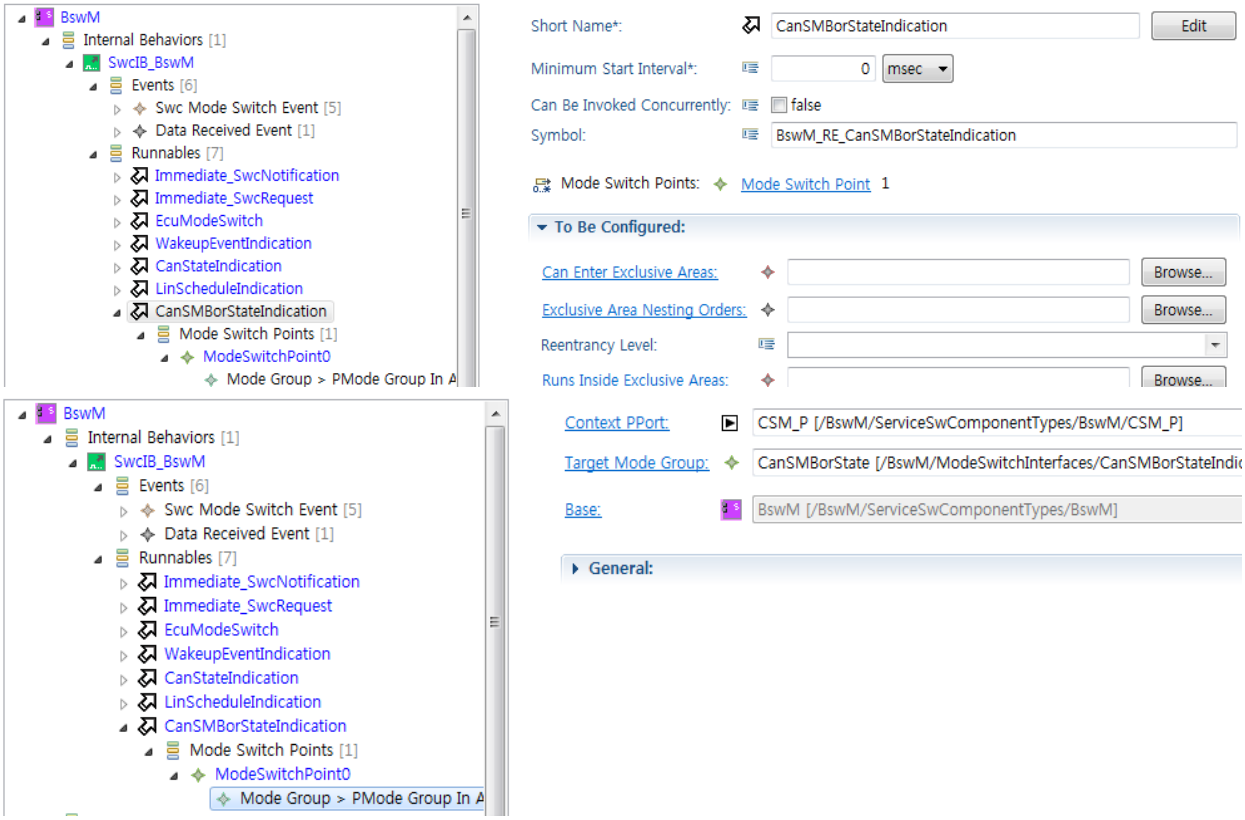
Mode Group configuration





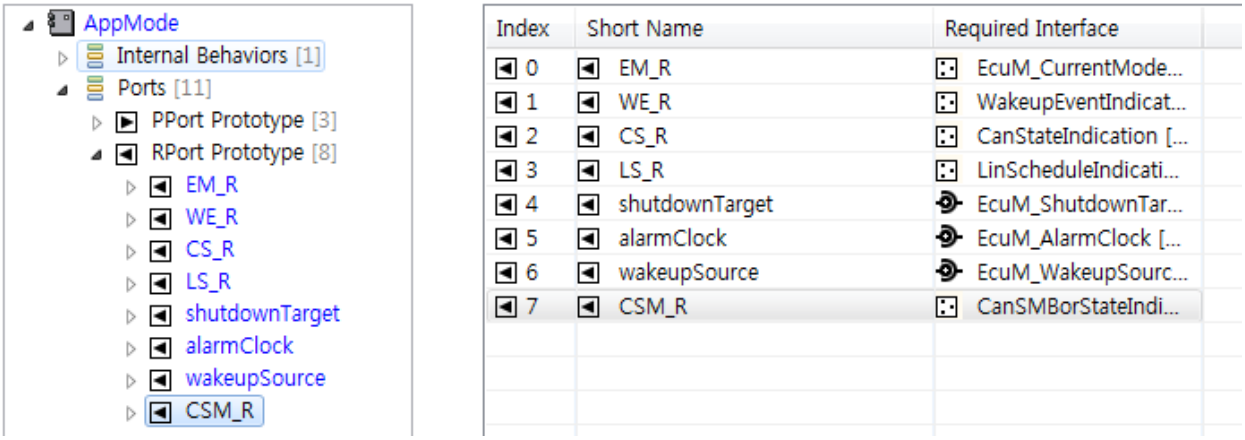
In case there is no ActionList Runnable, create Runnables (BswM_RE_CanSM_BorStateIndication).

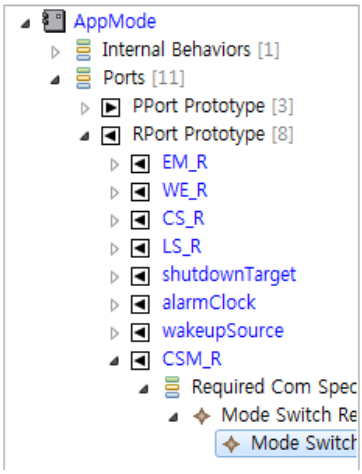
It is necessary to create Mode Switch Points separately for each channel.

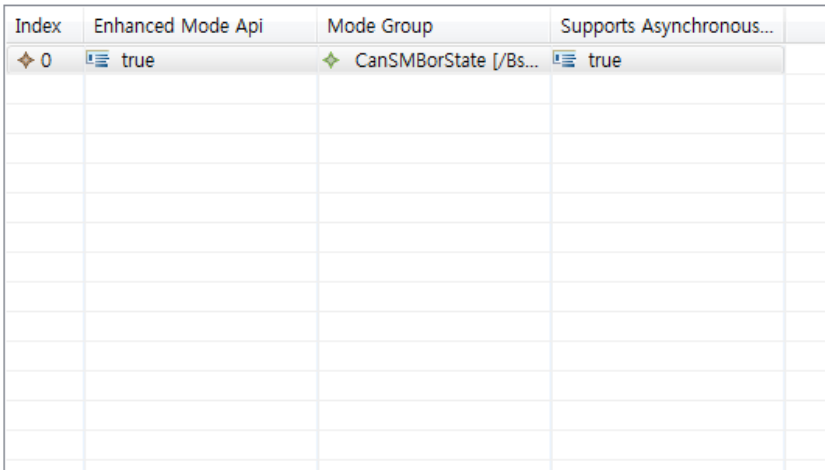


10.1.1.6 ApplicationSwComponentTypes Configuration

Create a Service R-Port for each channel (interface selection per channel).
Under R-Port, create Mode Switch Receiver Com Spec.

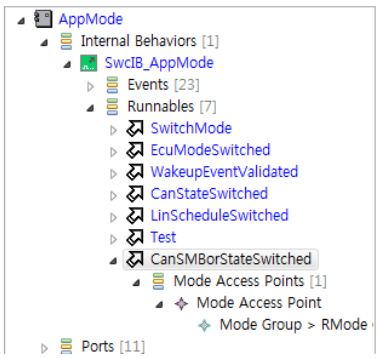


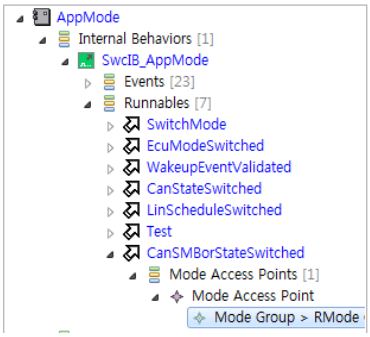


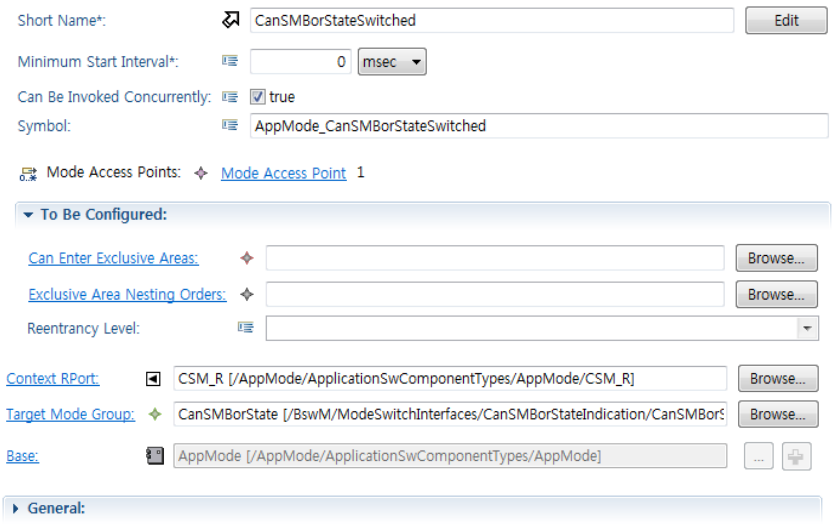


10.1.1.7 Creating Per-Channel Runnable

The symbol is generated as AppMode_CanSMBorStateSwitched.



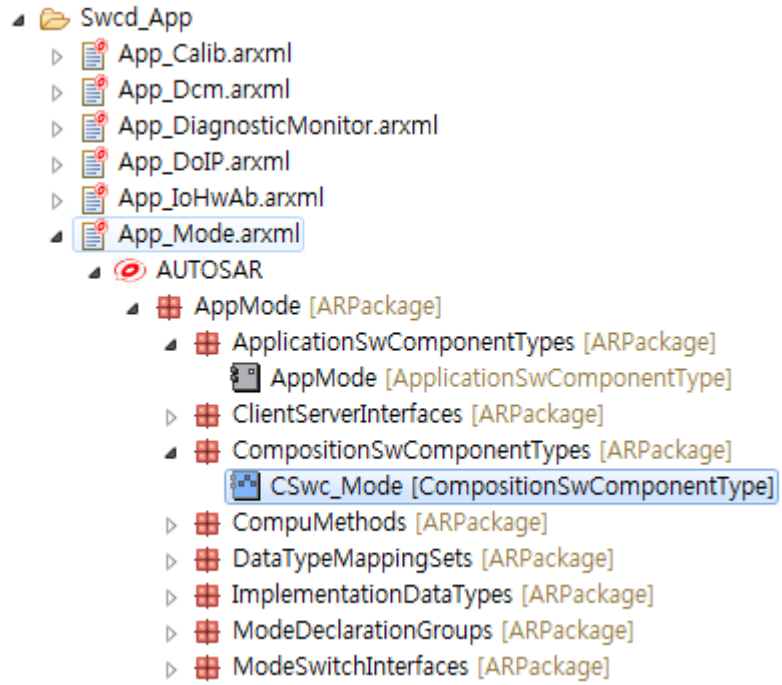




10.1.1.8 Creating Per-Channel, Per-Mode Mode Switch Event (N*2 items should be generated with N channels)

10.1.1.9 Event to Runnable Mapping

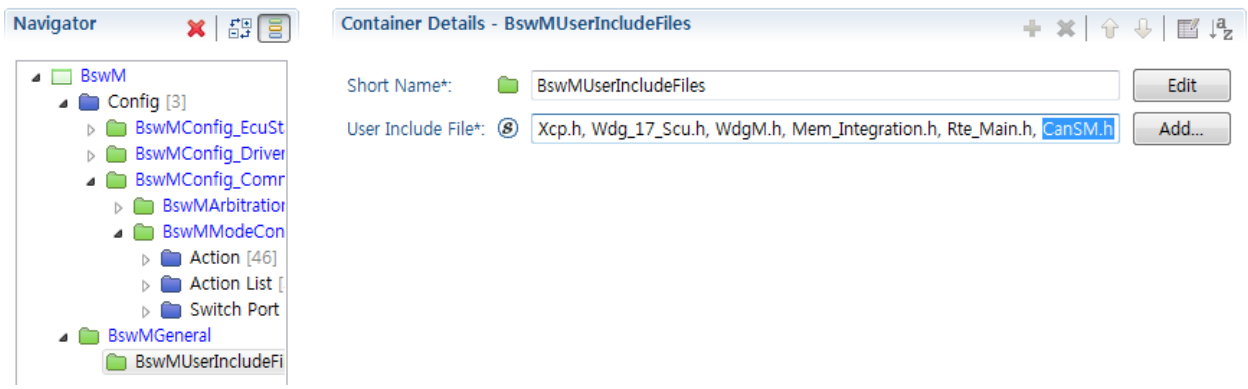
10.1.1.10 Connecting Assembly Connector



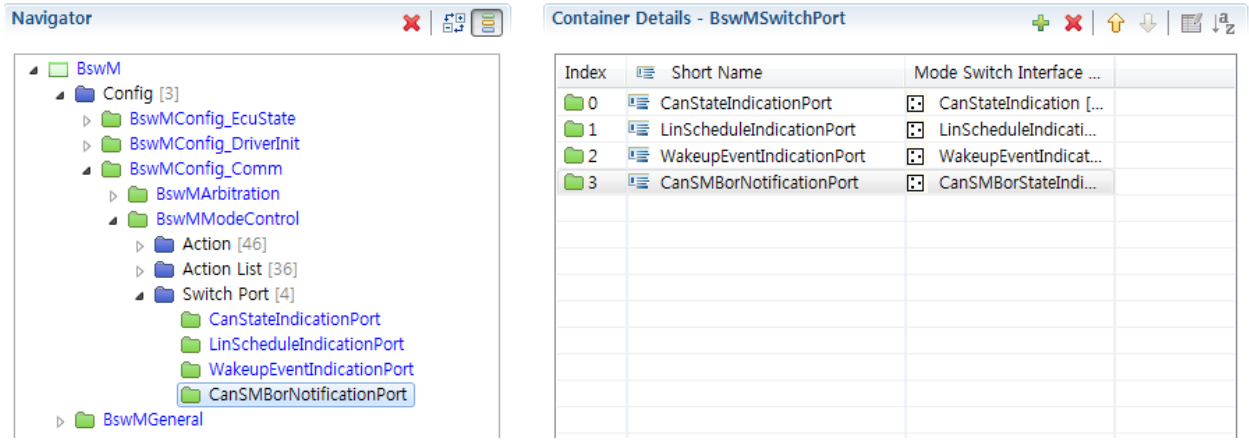
Assembly Connector	Provided Port	PPort Context Component	Required Port
AM_POfAppModeToAM_ROfBswM	AM_P	AppMode	AM_R
CSM_POfBswMToCSM_ROfAppMode	CSM_P	BswM	CSM_R
CS_POfBswMToCS_ROfAppMode	CS_P	BswM	CS_R
EM_POfBswMToEM_ROfAppMode	EM_P	BswM	EM_R
LR_POfAppModeToLR_ROfBswM	LR_P	AppMode	LR_R
LS_POfBswMToLS_ROfAppMode	LS_P	BswM	LS_R
WE_POfBswMToWE_ROfAppMode	WE_P	BswM	WE_R
alarmClockOfEcuMToalarmClockOfAppMode	alarmClock	EcuM	alarmClock
shutdownTargetOfEcuMToshutdownTargetOfAppMode	shutdownTarget	EcuM	shutdownTarget
wakeupSourceOfEcuMTowakeupSourceOfAppMode	wakeupSource	EcuM	wakeupSource

10.1.1.11 Adding BswMUserIncludeFiles

Add CanSM.h in BswMGeneral – User Include File.

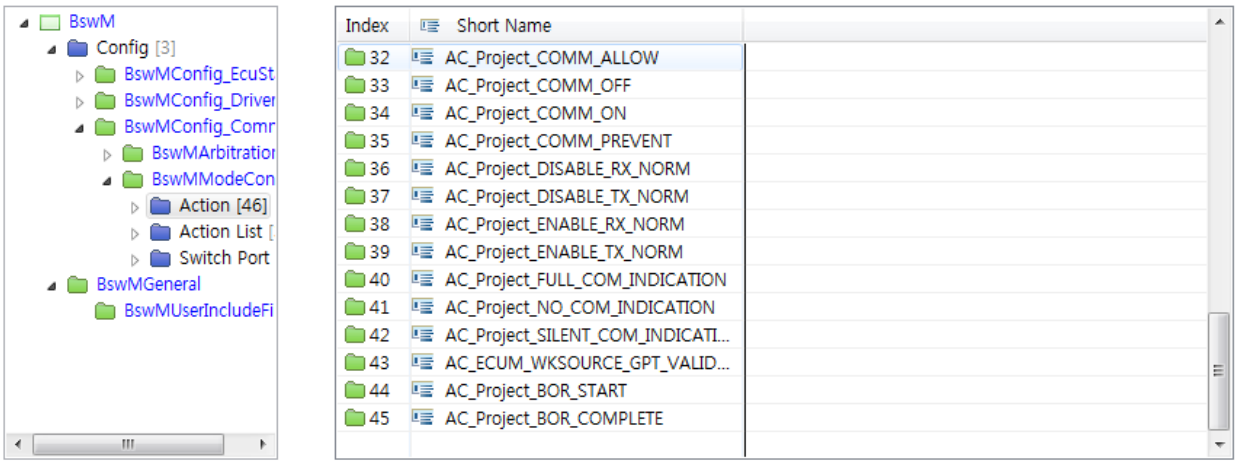


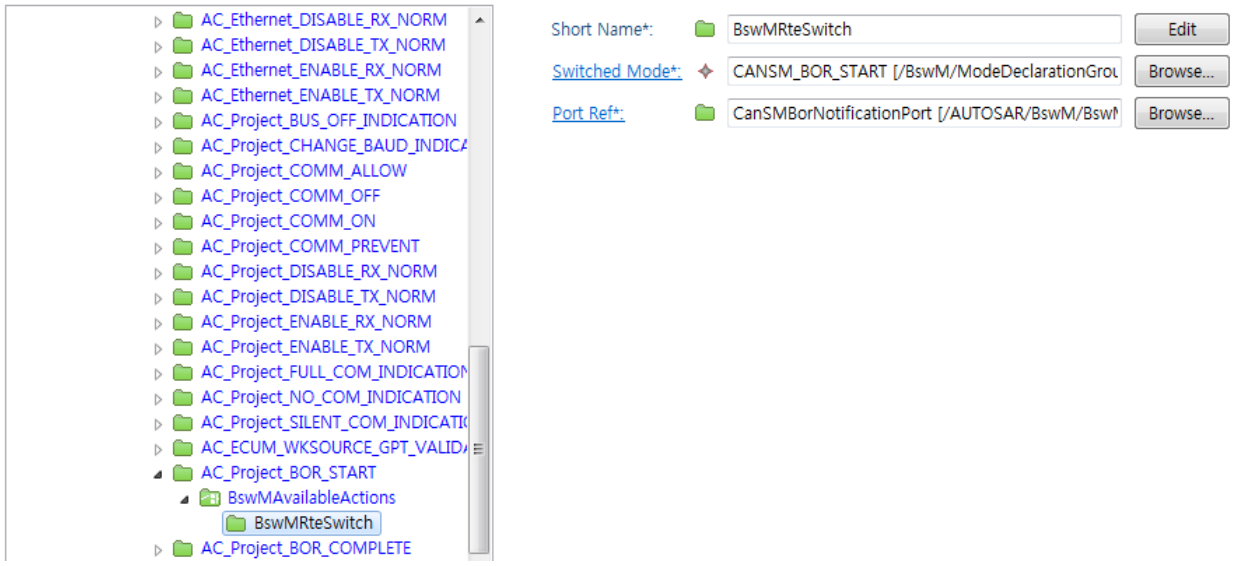
10.1.1.12 Adding Per-Channel Switch Port

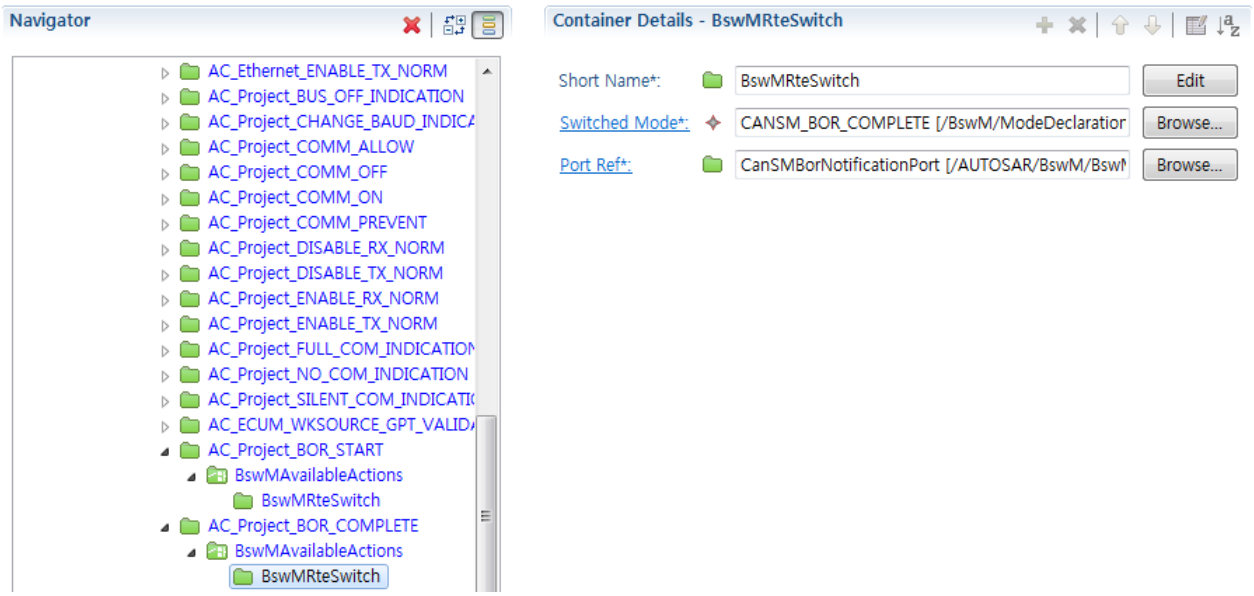


10.1.1.13 Adding Per-Channel, Per-Mode BswMAction

Add Action in BswMconfig – BswMmodeControl (add BOR_START and BOR_COMPLETE for each channel).
BOR_START: notifies the occurrence of a Bus-Off event
BOR_COMPLETE: notifies the completion of Bus-Off Recovery

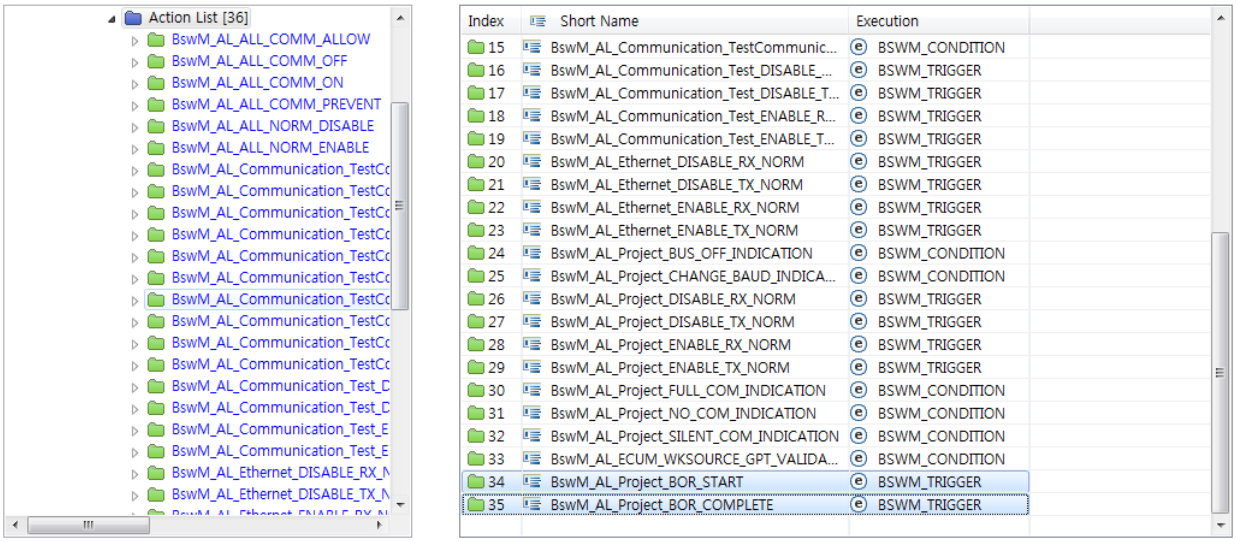


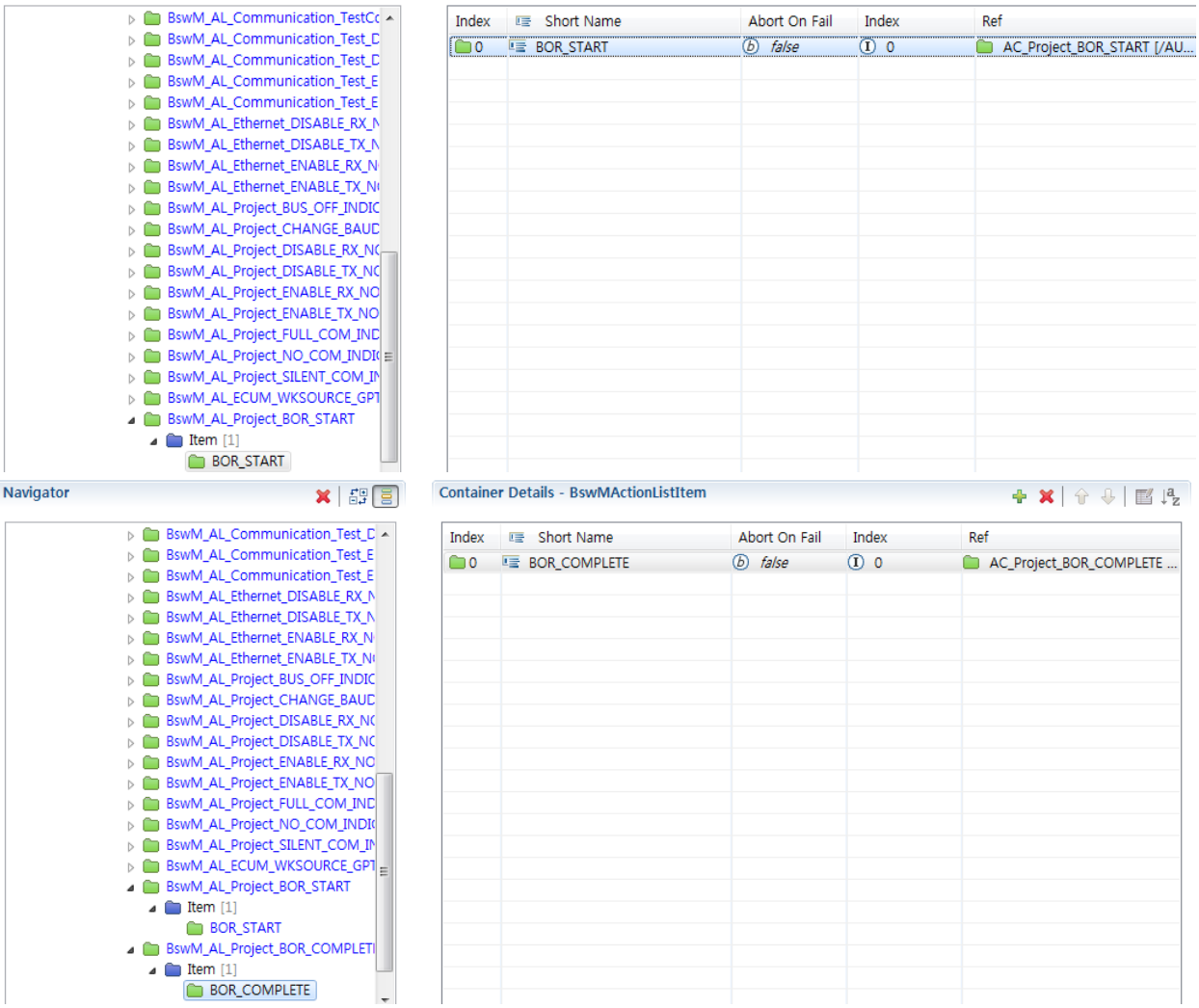




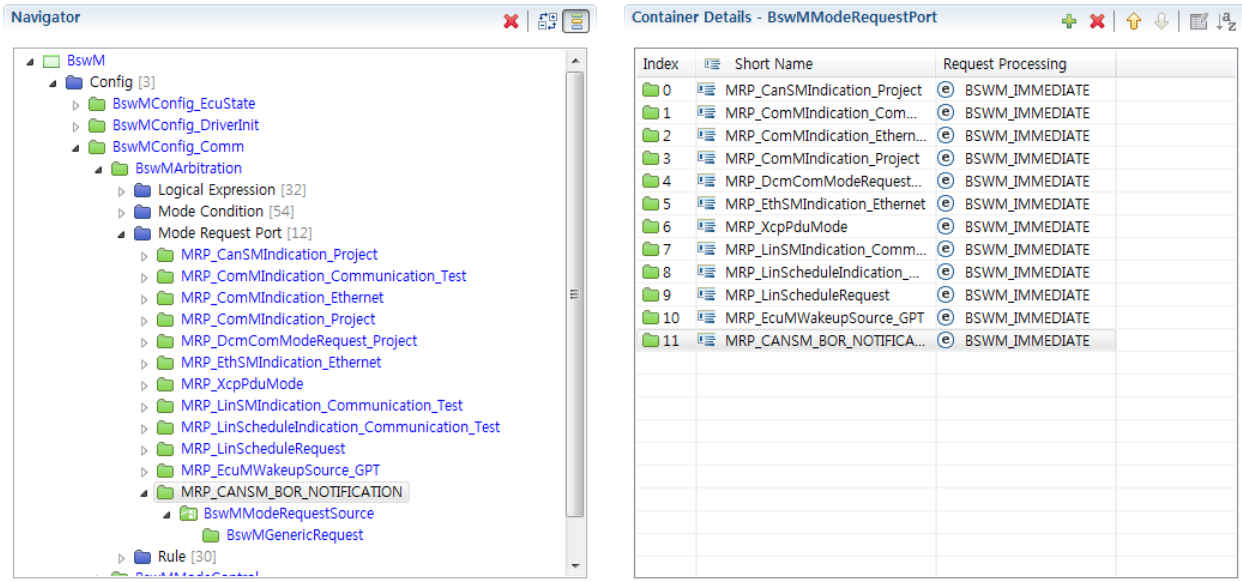
10.1.1.14 Adding Per-Channel, Per-Mode BswMActionList

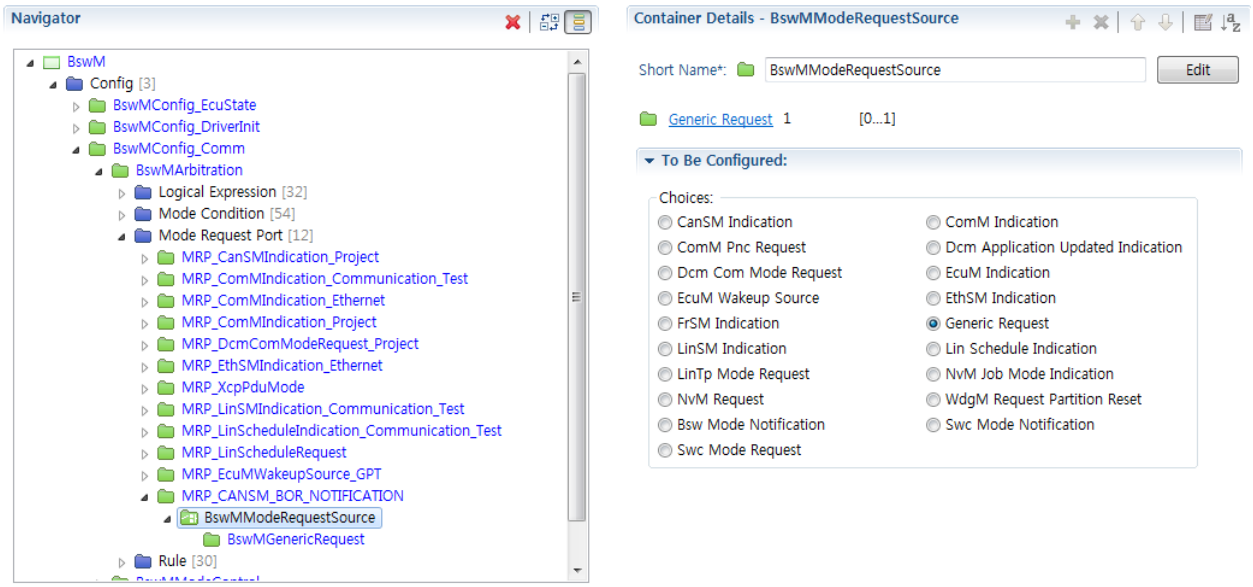
BSWM_TRIGGER: notifies only when a mode transition occurs
BSWM_CONDITION: notifies even when remaining in the same mode
(BSWM_TRIGGER is the recommended option. Consult the product owner of the distribution when using BSWM_CONDITION.)

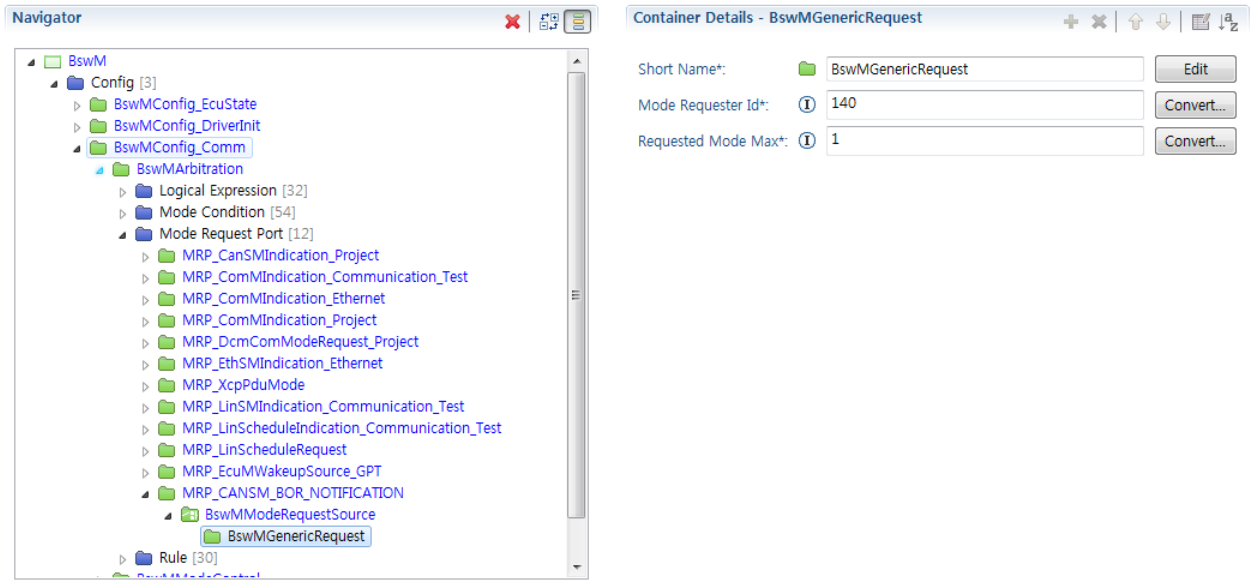




10.1.1.15 Adding Mode Request Port Configuration For Each Channel



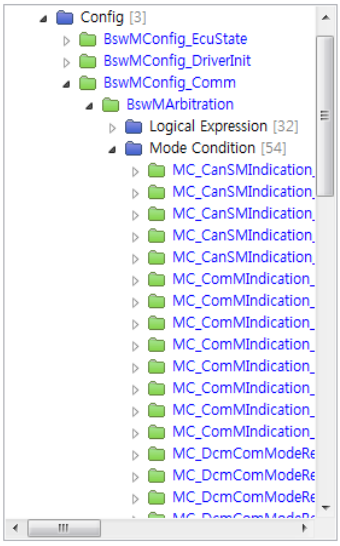


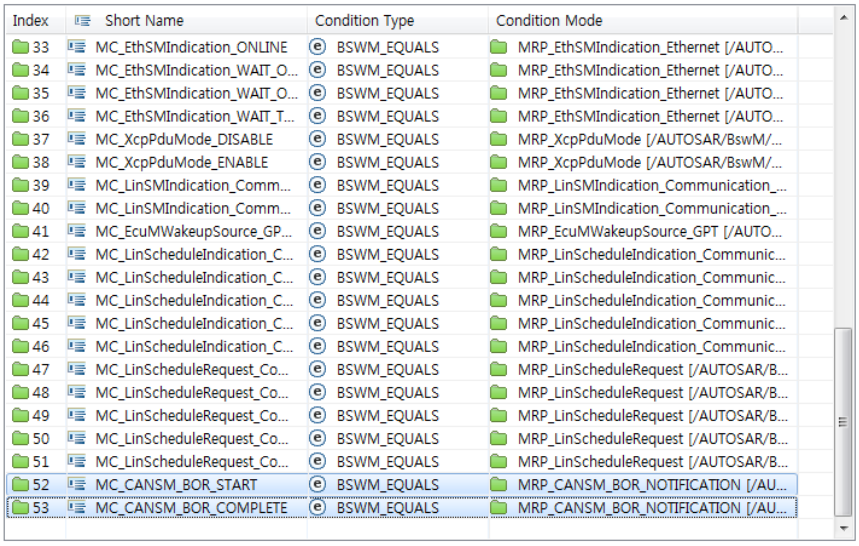


* The ComM Channel ID referenced in CanSM is the CHID.
Mode Requester ID = CHID << 8 + CANSM_MODULE_ID
140 = 0 << 8 + 140
If CHID equals 0, 0<<8 + 140 = 140 (0x08C);
If CHID equals 1, 1<<8 + 140 = 396 (0x18C);
If CHID equals 2, 2<<8 + 140 = 652 (0x28C); and
If CHID equals 3, 3<<8 + 140 = 908 (0x38C) should be the value.

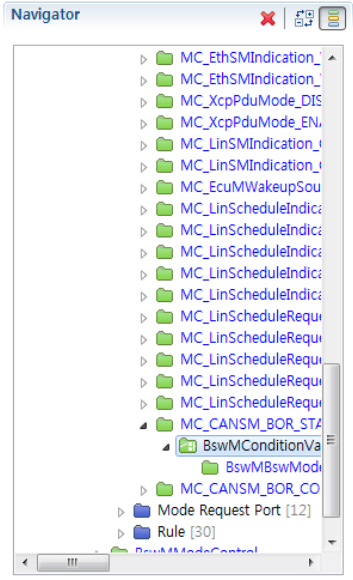
10.1.1.16 Adding Per-Channel, Per-Mode Mode Condition

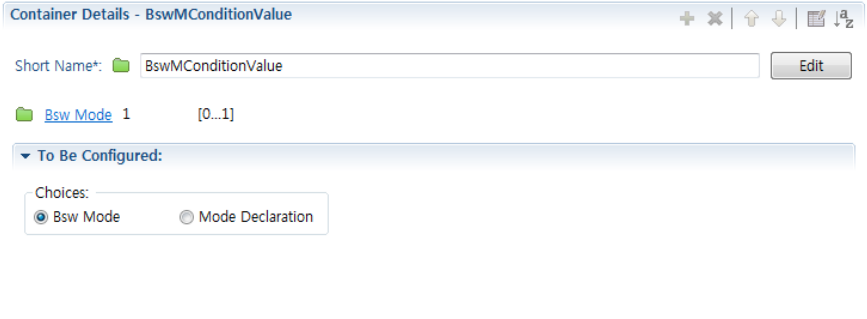
Add MC_CANSM_BOR_START, MC_CANSM_BOR_COMPLETE

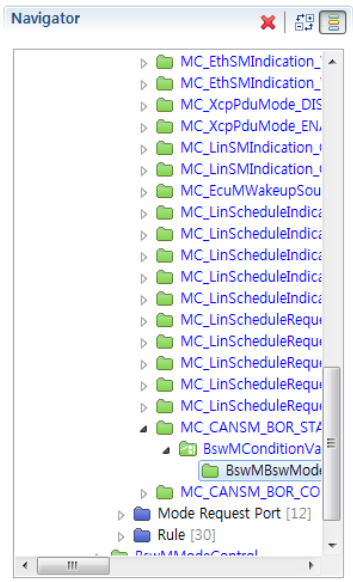


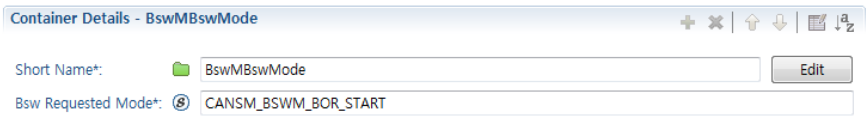


Index	Short Name	Condition Type	Condition Mode
33	MC_EthSMIndication_ONLINE	BSWM_EQUALS	MRP_EthSMIndication_Ethernet [/AUTO...
34	MC_EthSMIndication_WAIT_O...	BSWM_EQUALS	MRP_EthSMIndication_Ethernet [/AUTO...
35	MC_EthSMIndication_WAIT_O...	BSWM_EQUALS	MRP_EthSMIndication_Ethernet [/AUTO...
36	MC_EthSMIndication_WAIT_T...	BSWM_EQUALS	MRP_EthSMIndication_Ethernet [/AUTO...
37	MC_XcpPduMode_DISABLE	BSWM_EQUALS	MRP_XcpPduMode [/AUTOSAR/BswM/...
38	MC_XcpPduMode_ENABLE	BSWM_EQUALS	MRP_XcpPduMode [/AUTOSAR/BswM/...
39	MC_LinSMIndication_Comm...	BSWM_EQUALS	MRP_LinSMIndication_Communication_...
40	MC_LinSMIndication_Comm...	BSWM_EQUALS	MRP_LinSMIndication_Communication_...
41	MC_EcuMWakeupSource_GP...	BSWM_EQUALS	MRP_EcuMWakeupSource_GPT [/AUTO...
42	MC_LinScheduleIndication_C...	BSWM_EQUALS	MRP_LinScheduleIndication_Communic...
43	MC_LinScheduleIndication_C...	BSWM_EQUALS	MRP_LinScheduleIndication_Communic...
44	MC_LinScheduleIndication_C...	BSWM_EQUALS	MRP_LinScheduleIndication_Communic...
45	MC_LinScheduleIndication_C...	BSWM_EQUALS	MRP_LinScheduleIndication_Communic...
46	MC_LinScheduleIndication_C...	BSWM_EQUALS	MRP_LinScheduleIndication_Communic...
47	MC_LinScheduleRequest_Co...	BSWM_EQUALS	MRP_LinScheduleRequest [/AUTOSAR/B...
48	MC_LinScheduleRequest_Co...	BSWM_EQUALS	MRP_LinScheduleRequest [/AUTOSAR/B...
49	MC_LinScheduleRequest_Co...	BSWM_EQUALS	MRP_LinScheduleRequest [/AUTOSAR/B...
50	MC_LinScheduleRequest_Co...	BSWM_EQUALS	MRP_LinScheduleRequest [/AUTOSAR/B...
51	MC_LinScheduleRequest_Co...	BSWM_EQUALS	MRP_LinScheduleRequest [/AUTOSAR/B...
52	MC_CANSM_BOR_START	BSWM_EQUALS	MRP_CANSM_BOR_NOTIFICATION [/AU...
53	MC_CANSM_BOR_COMPLETE	BSWM_EQUALS	MRP_CANSM_BOR_NOTIFICATION [/AU...

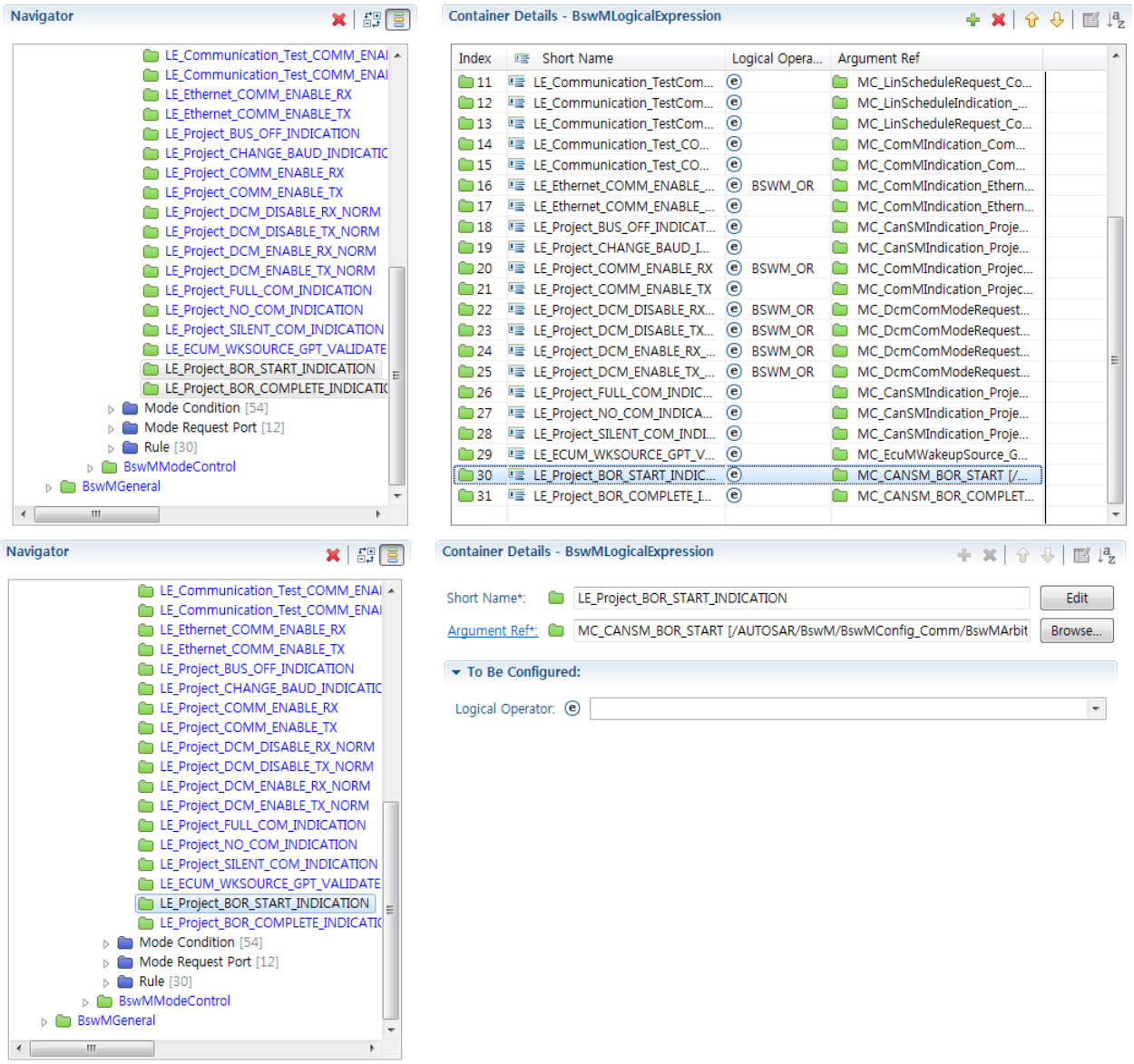




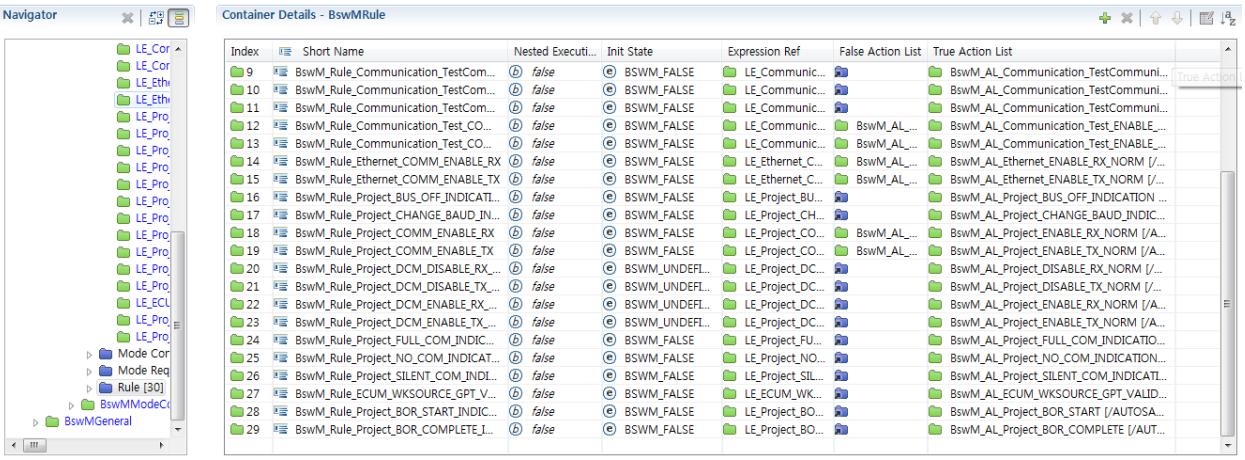


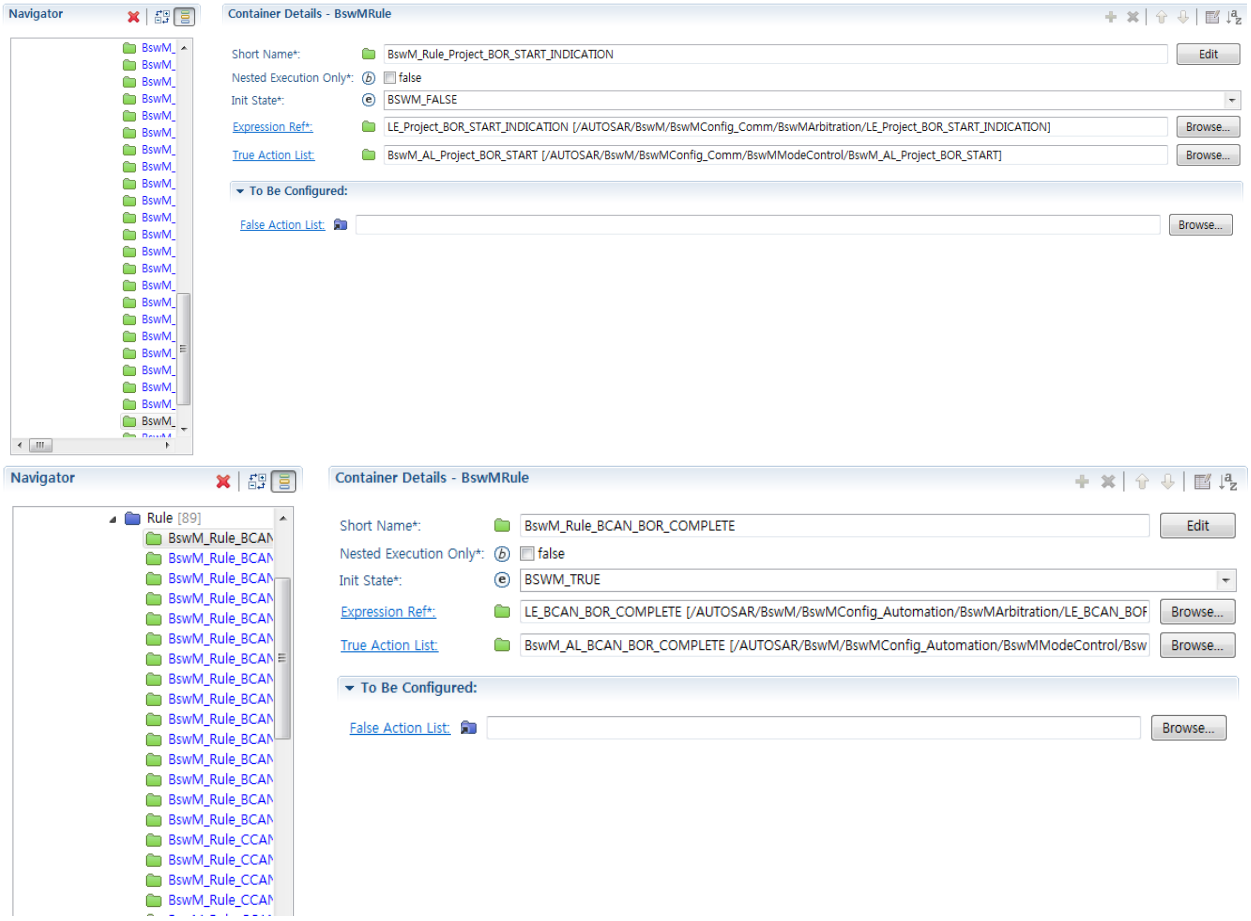


10.1.1.17 Adding Per-Channel, Per-Mode Logical Expression



10.1.1.18 Adding Per-Channel, Per-Mode Rule





10.1.1.19 Verifying the Application

Instances of Channel CanState should be distinguished using the generated API (e.g. Rte_Mode_CSM_R_CAN1_CanSMBorState vs Rte_Mode_CSM_R_CAN2_CanSMBorState).

```
FUNC(void,AppMode_CODE) AppMode_CanSMBorStateSwitched_CAN1(void)
{
  Rte_ModeType_CanSMBorStateType LddPrevCanState, LddNextCanState;
  Rte_Mode_CSM_R_CAN1_CanSMBorState(&LddPrevCanState, &LddNextCanState);

  if (LddNextCanState == RTE_MODE_CanSMBorStateType_CANSM_BUSOFF)
  {
    AppMode_GucBusoffCount_CAN1++;
  }
}

FUNC(void,AppMode_CODE) AppMode_CanSMBorStateSwitched_CAN2(void)
{
  Rte_ModeType_CanSMBorStateType LddPrevCanState, LddNextCanState;
  Rte_Mode_CSM_R_CAN2_CanSMBorState(&LddPrevCanState, &LddNextCanState);

  if (LddNextCanState == RTE_MODE_CanSMBorStateType_CANSM_BUSOFF)
  {
    AppMode_GucBusoffCount_CAN2++;
  }
}
```

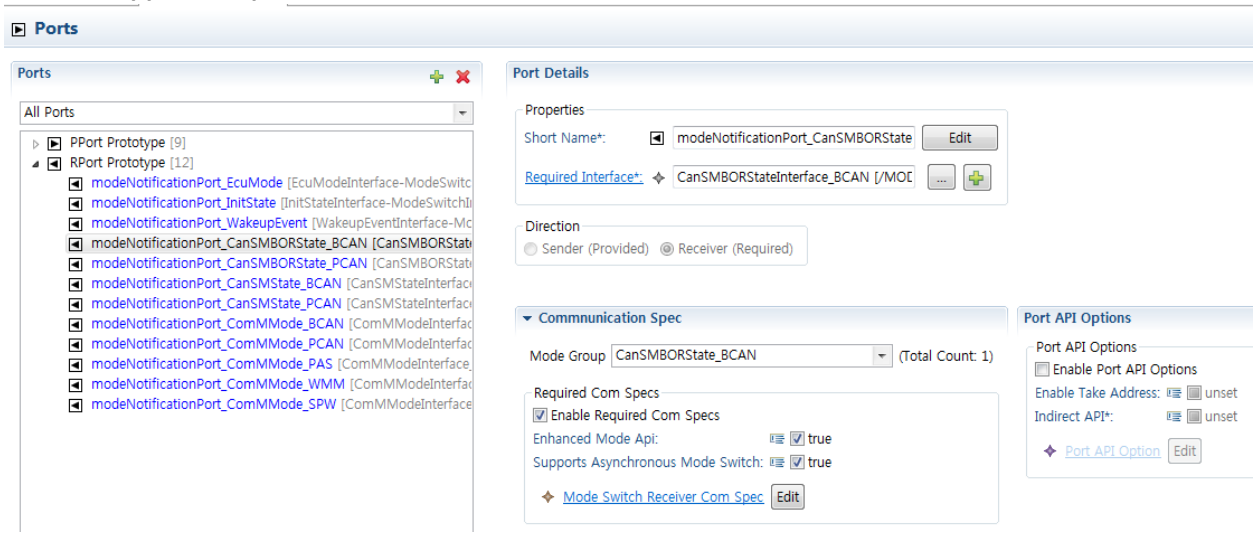
Verify the value with Rte_Mode_CAM_R_CanSMBorState
RTE_MODE_CanSMBorStateType_CANSM_BUSOFF = 1,
RTE_MODE_CanSMBorStateType_CANSM_NORMAL = 0

10.1.2 Automation Configuration Guide (for mobilgene 2016a Sp1 or later versions)

10.1.2.1 ApplicationSwComponentTypes Configuration

Create a Service R-Port for each channel (interface selection per channel).
Under R-Port, create Mode Switch Receiver Com Spec.

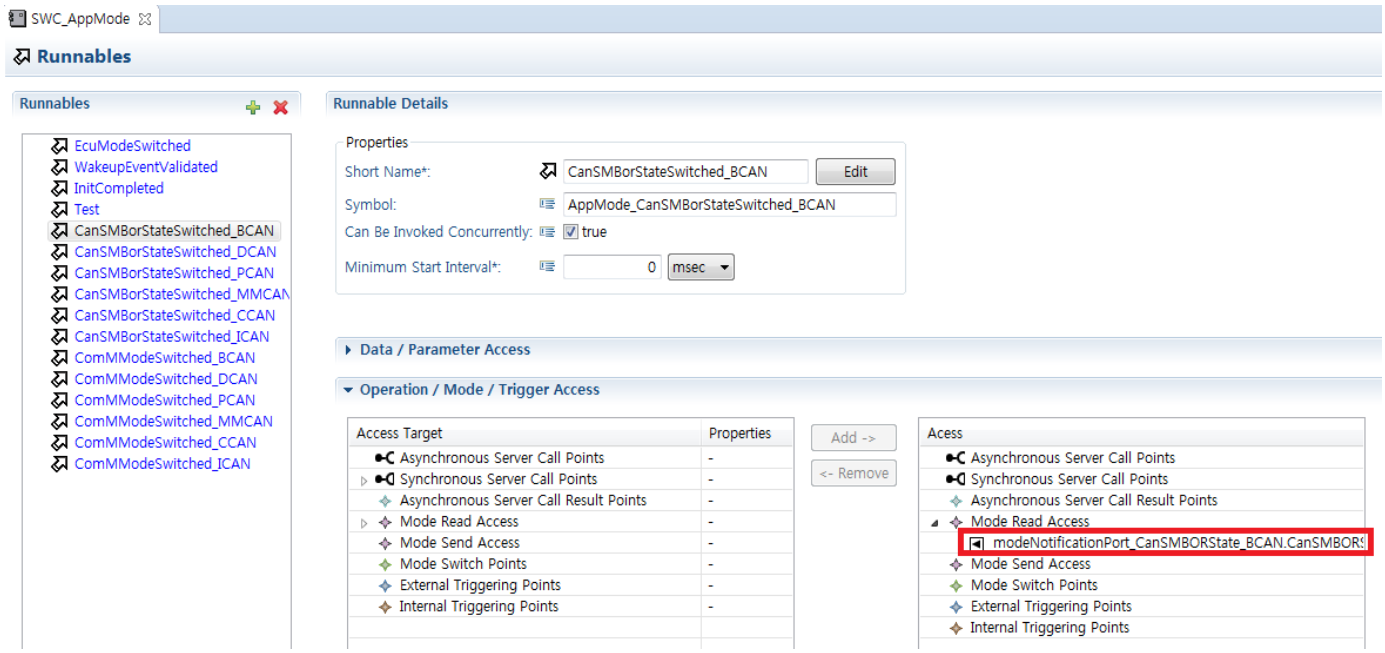
- RequiredInterface: CanSMBORStateInterface_<CHANNEL NAME>
- ModeGroup: CanSMBORState_<CHANNEL NAME>
- EnableRequiredComSpecs: true
- EnhancedModeApi: true
- Supports Asynchronous Mode Swtich: true



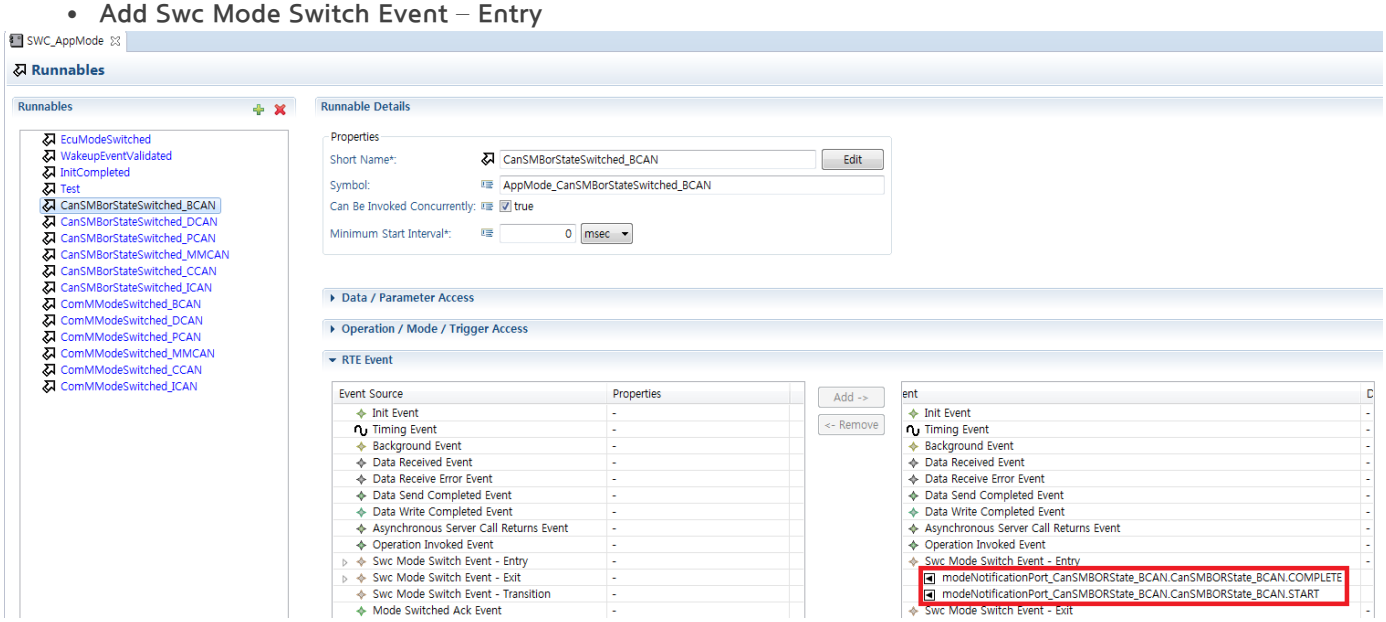
10.1.2.2 Creating Per-Channel Runnable

The symbol is generated as AppMode_CanSMBorStateSwitched_<CHANNEL NAME>

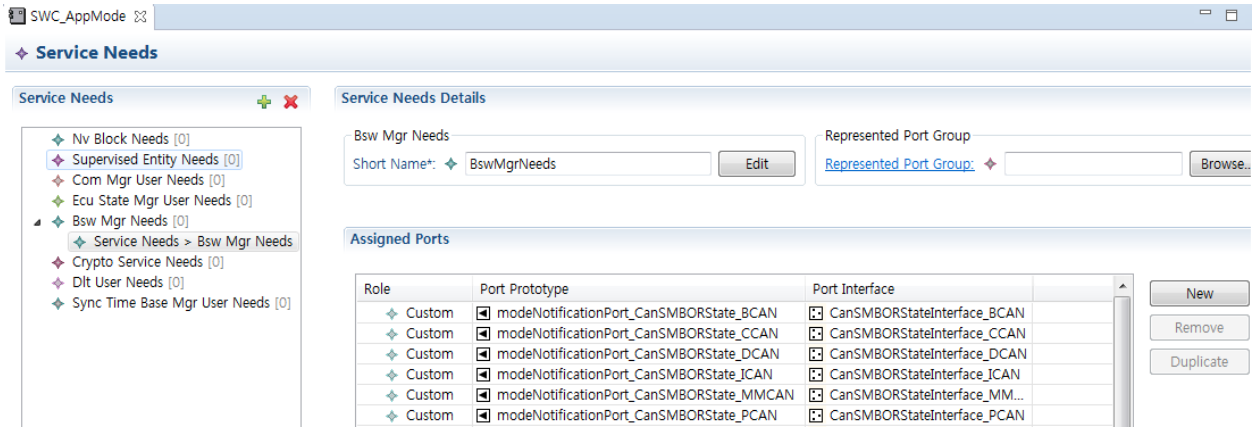
- Adding Mode Read Access



- Add Swc Mode Switch Event – Entry



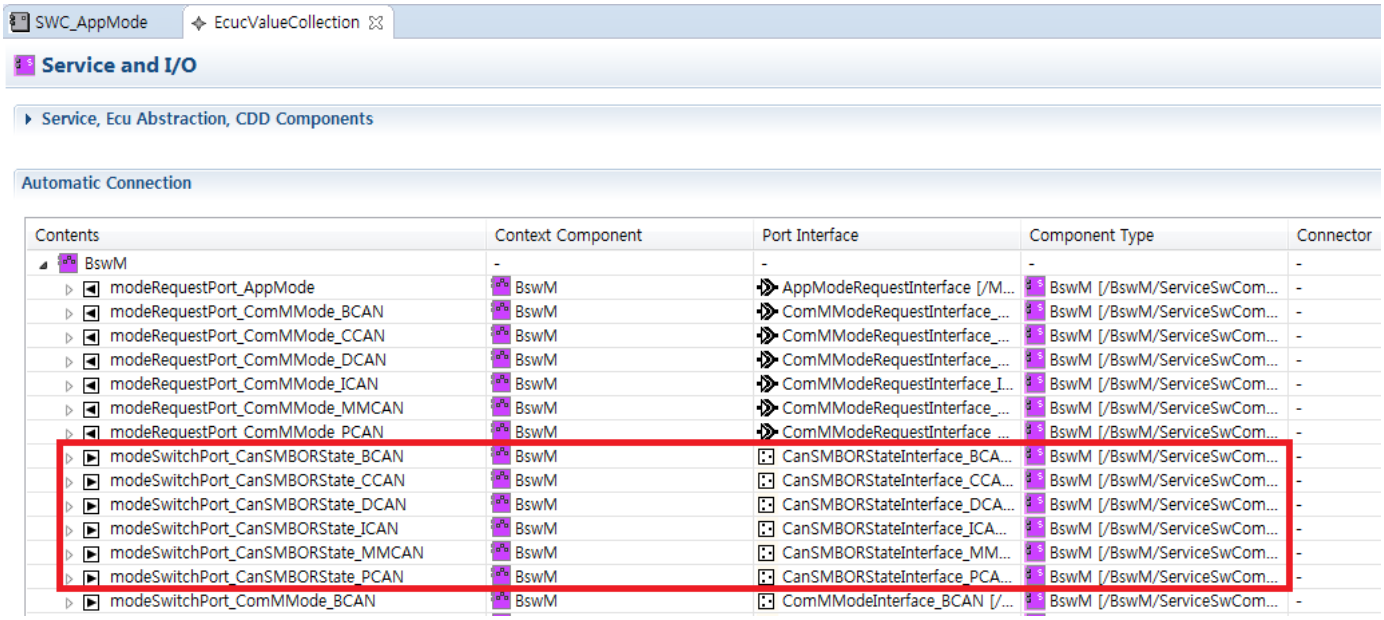
10.1.2.3 Adding ServiceDependency in BswMgrNeeds and R-Port (Configured Earlier) in AssignedPorts



10.1.2.4 Run BswM Harmonize

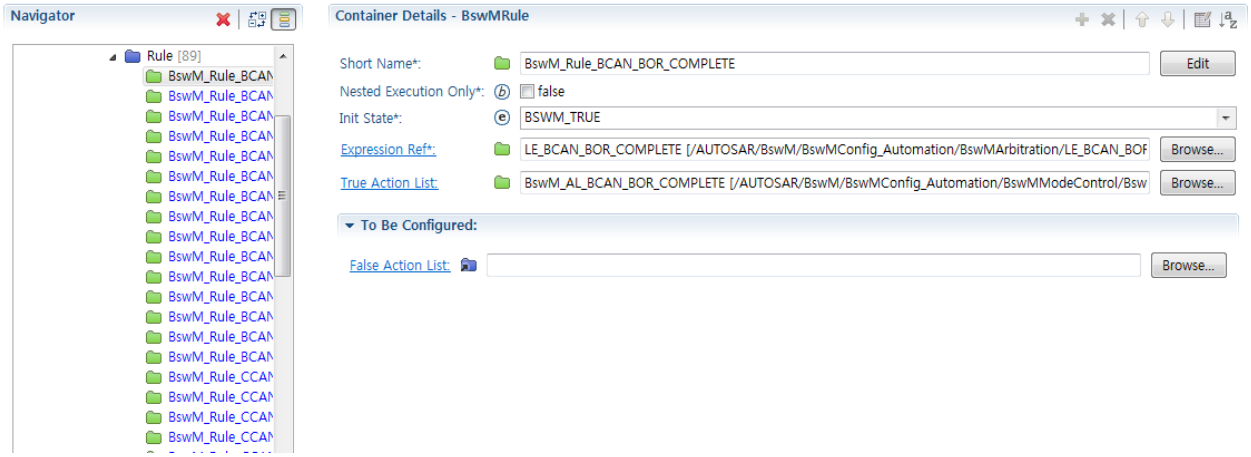
10.1.2.5 Event to Runnable Mapping

10.1.2.6 Connecting Assembly Connector



〈Checklist〉

Make sure the Init State of Rule in each channel and in each mode is set to BSWM_TRUE.



As for settings related to Dem, see DemEventParameter Guide in the Dem User Manual. (for mobilgene 1.5.0 or later)

10.2 Guide on CanSM E_MODE_CHANGE Error Notification

See E_MODE_CHANGE paragraph of section 5.5 of this CanSM User Manual for relevant information.

To check for E_MODE_CHANGE error:

- see if the parameter value of E_MODE_CHANGE is Fail (Fail notification after Pass notification).

  (See DemCallbackEventStatusChange section in the Dem User Manual.)

```
FUNC(Std_ReturnType, RTE_CODE) Rte_Call_Dem_CBStatusEvt_CANSM_E_MODE_CHANGE_BCAN_DemCallbackEventStatusChanged0_EventStatusChanged(
  IN Dem_EventStatusExtendedType EventStatusOld,
  IN Dem_EventStatusExtendedType EventStatusNew)
{
  VAR(Std_ReturnType, RTE_DATA) LddRetVal = RTE_E_OK;
  LddRetVal = CBStatusEvt_E_MODE_CHANGE_PROJECT(
    EventStatusOld,
    EventStatusNew);
  return LddRetVal;
}
```

The [Sample Code] is just an example for users; its use should strictly be limited to reference purposes only.