HYUNDAI AUTOEVER

AUTOSAR Nm User Manual

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SCOPE OF APPLICATION All Project/Engineering
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			6.3.3 7.2.1 8.4	• Nm_ChangeTWaitBusSleep API dded • Add Generation Errors : ERR029134 ~ 139 • Nm_ChangeTWaitBusSleep API configuration Guide Added

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.

The following terms on configuration categories mean:

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

2. Reference

Sl. No.	Title	Version
1	AUTOSAR_SWS_NetworkManagementInterface	4.0.3
2	AUTOSAR_SWS_NetworkManagementInterface	4.3.1
3		

3. AUTOSAR System

3.1 CAN Communication Stack

On Hyundai Autoever AUTOSAR platform, CAN Communication Stack consists of modules 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
- CanTrcv : Controls CAN transceiver hardware
- OsekNm/Nm : Handles the Sleep entry synchronization of CAN communication channel
- CanCM : Controls the activation/deactivation of CAN communication as per battery voltage and HKMC specification

3.2 Nm Module

NM module performs the followings in order to control Sleep and Wake-up of all communication channels.

- Notify ComM that the state of the lower layer <BusNm> has changed.
- Notify the lower layer <BusNm> of ComM module's requests for changing the communication mode

4. Product Release Notes

4.1 Overview

This chapter is intended to provide the release information on the Hyundai Autoever Nm module, describing the features and restrictions of different versions of the Nm software product.

4.2 Scope of the release

All content in this document limited to the following Hyundai Autoever Nm module.

Module name	AUTOSAR version	SWS version	Module version
Nm	4.0.3	3.0.0	2.5.0

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

4.3 Change log

4.3.1 Version 2.5.0.0

Feature

- Develop an API to change the WaitBusSleep Time

Rationale	Required to Change Wait Bus Sleep Timer Development.
Impact on behavior	None
Impact on settings	Refer to the Appendix 8.4 Nm_ChangeTWaitBusSleep API Configuration Guide.
Required ASW actions	None

Improvement

- Move the position of Pre-compile Options in Nm_Cfg.h to the top for consistency with other modules

Rationale	The macro declarations in the Nm_Cfg.h file need to adjusted to resemble those in other modules.
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

4.3.2 Version 2.4.0.0

Feature

- Add Nm Coordinator Function

Rationale	Required to Nm Coordinator Function Development.
Impact on behavior	None
Impact on settings	Refer to the Appendix 8.3 Nm Coordinator Functionality Configuration Guide.
Required ASW actions	None

Improvement

- Change Det Report Error parameter

Rationale	Among the parameter value of the Nm_IntDetReportError function, the Instance ID value is incorrectly entered as the Network Hanble ID value.
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

4.3.3 Version 2.3.2.1

Improvement

- English Ver. UM Distribution

Rationale	English Ver. UM
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

4.3.4 Version 2.3.2.0

Improvement

- UNECE Cyber Security

Rationale	UNECE Cyber Security
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

4.3.5 Version 2.3.1.0

Improvement

- Code improvement to comply with the UNECE Cyber Security regulations

Rationale	Required to comply with the UNECE Cyber Security regulations.
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

4.3.6 Version 2.3.0.0

Improvement

- Misra-C Verification

Rationale	Misra-C Verification
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

New feature

- Feature improved so that it works for PduR M:N configuration as well

Rationale	Feature improved so that it works for PduR M:N configuration as well
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

4.3.7 Version 2.2.1

Corrected errors

- Fixed a compile error incurred by a call of Com_SendSignal when there is 0 Tx ComSignal.

Rationale	Fixed a compile error incurred by a call of Com_SendSignal when there is 0 Tx ComSignal.
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

4.3.8 Version 2.2.0

Feature improvement

- NmStateChangeIndUserCallout added

Rationale	NmStatechangeIndUserCallout added
Impact on behavior	None
Impact on settings	None

Required ASW actions	None

■ NmPduRxIndUserCallout added

Rationale	NmPduRxIndUserCallout added
Impact on behavior	None
Impact on settings	None
Required ASW actions	None

4.4 Module Release Notes

4.4.1 Limitations

- **Nm Coordinator Functionality – Only supports CanNm**

  A feature that synchronizes Sleep mode entry of different networks belonging to one cluster. Currently, the mobilgene platform supports this function only for channels using CanNm modules.

- **Nm ChangeTWaitBusSleep API**

  You cannot use the NM Coordinator feature along with the Nm Change TWaitBusSleep API. When used together, it alters the Wait Bus Sleep Time value of CanNm. Currently, the ShutdownDelayTimer value in Nm is generated by taking Wait Bus Sleep Time from the CanNm settings, so if it changes in the middle, it causes errors in the Nm Coordinator's operation. so modifications are also necessary for the ShutdownDelayTimer value.

- **Passive Mode Support**

  Network nodes in passive mode do not transmit NM messages and operate according to the network's mode: Sleep or Wake-up. Currently, the mobilgene platform does not support this feature.

- **State Report Signal**

  Allows transmitting the current state of NM by designating the transmission signal. Currently, the mobilgene platform does not support this feature.

- **Car Wake Up Support**

  A Wake-up feature that uses CWU bit in the Nm message. Currently, the mobilgene platform does not support this feature as it needs to be added to CanNm module.

4.4.2 Deviations

- **Nm Coordinator Functionality**

  The Nm Coordinator functionality follows AUTOSAR_SWS_NetworkManagementInterface R4.3.1.

- **Nm_ChangeTWaitBusSleep API**

  The AUTOSAR Nm module specification does not document it, but it supports an API to change the Wait Bus Sleep Time for all CanNm and OsekNm channels. If the requested value is less than 3 hours, the Wait Bus Sleep Time will be adjusted to the requested value. For values exceeding 3 hours, the Wait Bus Sleep Time will default to 18 hours. As a matter of caution, the desired Wait Bus Sleep Time should be a multiple of the CanNm and OsekNm MainFunction Period, and this API must be called immediately after Bsw Init upon vehicle restart.

5. Configuration Guide

5.1 NmGlobalFeatures

Parameter Name	Value	Categor
[1)]NmBusSynchronizationEnabled	False	C
NmCarWakeUpRxEnabled	False	N
[2)]NmComControlEnabled	True	F
[3)]NmComUserDataSupport	True	F
[4)]NmCoordinatorSupportEnabled	False	C
[5)]NmNodeDetectionEnabled	False	C
[6)]NmNodeIdEnabled	False	C
[7)]NmPduRxIndicationEnabled	False	C
[8)]NmRemoteSleepEnabled	False	N
NmRepeatMsgIndEnabled	False	N
[9)]NmStateChangeIndEnabled	False	C
[10)]NmUserDataEnabled	True	F
[11)]NmCoordinatorSyncSupport	False	C
[12)]NmGlobalCoordinatorTime	0	C
NmCarWakeUpCallback		N
[13)]NmHeaderFileInclusion		C
[14)]NmChangeTwaitBusSleepEnabled	False	C

1) NmBusSynchronizationEnabled
   Enables bus synchronization support of the <BusNm>'s. (Only required for Nm Coordinator nodes)
2) NmComControlEnabled :
   Enables control of the sending and receiving of NM PDU. (Nm_EnableCommunication, Nm_DisableCommunication)
3) NmComUserDataSupport:
   Determines how user data in NM PDU is written. (True: accessed via Com module, False: accessed via Nm_SetUserData API
4) NmCoordinatorEnabled

Enables Nm Coordinator function support. (Only required for Nm Coordinator nodes)

5) NmNodeDetectionEnabled:
   Enables the handling of RepeatMessage Request.
   Nm_RepeatMessageRequest
6) NmNodeIdEnabled:
   Enables the handling of node identifier.
7) NmPduRxIndicationEnabled
   Enables the handling of Pdu Rx Indication. (Nm_PduRxIndication)
8) NmRemoteSleepEnabled
   Enables Remote Sleep Indication function support. (Only required for Nm Coordinator nodes)
9) NmStateChangeIndEnabled
   Enables the handling of State Change Indication (Nm_StateChangeNotification)
10) NmUserDataEnabled
    Enables the handling of user data in NM PDU. (Nm_SetUserData, Nm_GetUserData)
11) NmCoordinatorSyncSupport
    Enables Nm Coordinator Sync function support. (Only required for TopMost or Nested sub-busess Nm Coordinator nodes)
12) NmGlobalCoordinatorTime
    Set the maximum Shutdown time among all Networks belonging to the connected Coordinated NM-Cluster, including those not directly connected.(Only required for Nm Coordinator nodes)
    ** Shutdown time for a specific network : NM-Timeout Time(Ready Sleep Time) + Wait Bus Sleep Time(Prepare Bus Sleep Time)*
13) NmHeaderFileInclusion
    Allows inclusion of user-defined header files.
14) NmChangeTwaitBusSleepEnabled
    Enables the handling of Nm_ChangeTWaitBusSleep API.
    ** The AUTOSAR Nm module specification does not document it, but it supports an API to change the Wait Bus Sleep Time for all CanNm and OsekNm channels. If the requested value is less than 3 hours, the Wait Bus Sleep Time will be adjusted to the requested value. For values exceeding 3 hours, the Wait Bus Sleep Time will default to 18 hours. As a matter of caution, the desired Wait Bus Sleep Time should be a multiple of the CanNm and OsekNm MainFunction Period, and this API must be called immediately after Bsw Init upon vehicle restart.*

5.2 NmGlobalConstants

Parameter Name	Value	Categor
[1)]NmNumberOfChannels	-	Fixed

1) NmNumberOfChannels
   Specifies the number of NM channels.

5.3 NmGlobalProperties

Parameter Name	Value	Categor
[1)]NmCycleMainFunction	0.01	F
[2)]NmDevErrorDetect	False	C
[3)]NmVersionInfoApi	False	C

1) NmCycleMainFunction
   Defines the cycle time of the Nm_MainFunction.
2) NmDevErrorDetect
   Detects development errors.
3) NmVersionInfoApi
   Provides a feature for VersionInfo. (Nm_GetVersionInfo)

5.4 NmChannelConfig

Parameter Name	Value	Categor
[1)]NmActiveCoordinator	False	C
[2)]NmChannelId	-	F
NmChannelSleepMaster	False	N
[3)]NmCoordClusterIndex	-	C
NmPassiveModeEnabled	False	N
NmStateReportEnabled	False	N
NmSynchronizingNetwork	False	N
[4)]NmComMChannelRef	-	F
NmStateReportSignalRef	-	N
[5)]NmStateChangeIndUserCallout		C
[6)]NmPduRxIndUserCallout		C

1) NmActiveCoordinator
   Specifies whether the corresponding channel is Activey Coordinated Channel or Passively Coordinated Channel.
2) NmChannelId
   NmChannel ID value should be the same as ComMChannel ID value.
3) NmCoordClusterIndex
   Specified which cluster the channel belongs to.
4) NmComMChannelRef
   Specifies ComMChannel corresponding to NmChannel.
5) NmStateChangeIndUserCallout
   Specifies the User Callout function to be called in Nm_StateChangeNotification.
   GenericBusNm types such as OsekNm are not supported.
6) NmPduRxIndUserCallout
   Specifies the User Callout function to be called in Nm_PduRxIndication.

6. Application Programming Interface (API)

6.1 Type Definitions

None

6.2 Macro Constants

None

6.3 Functions

6.3.1 Nm_GetNodeIdentifier

Function Name	Nm_GetNodeIdentifier	
Syntax:	Std_ReturnType Nm_GetNodeIdentifier(NetworkHandleType NetworkHandle, uint8* nmNodeIdPtr)	
Service ID	0x0a	
Sync/Async	Synchronous	
Reentrancy	Non-Reentrant	
Parameters (In)	NetworkHandle	Identification of the NM-channel
Parameters (Inout)	None	
Parameters (Out)	nmNodeIdPtr	Pointer where node identifier out of the last successfully received NM-message shall be copied to
Return Value	Std_ReturnType	E_OK: No error E_NOT_OK: Getting of the node identifier out of the last received NM-message has failed
Description	Get node identifier out of the last successfully received NM-message.	
Preconditions	Nm module should be initialized.	
Configuration Dependency	Nm/NmGlobalConfig/NmGlobalFeatures/NodeIdEnabled == true.	

6.3.2 Nm_GetPduData

Function Name	Nm_GetPduData	
Syntax:	Std_ReturnType Nm_GetPduData(NetworkHandleType NetworkHandle, uint8* nmPduData)	
Service ID	0x08	
Sync/Async	Synchronous	
Reentrancy	Non-Reentrant	
Parameters (In)	NetworkHandle	Identification of the NM-channel
Parameters (Inout)	None	
Parameters (Out)	nmPduData	Pointer where NM PDU shall be copied to.
Return Value	Std_ReturnType	E_OK: No error E_NOT_OK: Getting of NM PDU data has failed
Description	Get the whole PDU data out of the most recently received NM message.	
Preconditions	Nm module should be initialized.	

Configuration Dependency	Nm/NmGlobalConfig/NmGlobalFeatures/NodeIdEnabled == true Or Nm/NmGlobalConfig/NmGlobalFeatures/UserDataEnabled == true

6.3.3 Nm_ChangeTWaitBusSleep

Function Name	Nm_ChangeTWaitBusSleep	
Syntax:	FUNC(void, NM_CODE) Nm_ChangeTWaitBusSleep (CONST(uint32, NM_APPL_CONST) TwaitBusSleep)	
Service ID	0x21	
Sync/Async	Synchronous	
Reentrancy	Non-Reentrant	
Parameters (In)	TwaitBusSleep	The value of the Wait Bus Sleep Time that the User wants to change. (unit: msec)
Parameters (Inout)	None	
Parameters (Out)	None	
Return Value	None	
Description	This function shall change the Wait Bus Sleep Time(Only available for CanNm and OsekNm). If the requested value is less than 3 hours, the Wait Bus Sleep Time is changed to that value, and if the requested value exceeds 3 hours, the Wait Bus Sleep Time is changed to 18 hours.	
Preconditions	Nm module should be initialized.	
Configuration Dependency	Nm/NmGlobalConfig/NmGlobalFeatures/NmChangeTwaitBusSleepEnabled == true And (CanNm/CanNmGlobalConfig/CanNmChangeTwaitBusSleepEnabled == true Or OsekNm/CanNmGlobalConfig/OsekNmChangeTwaitBusSleepEnabled == true)	

7. Generator

7.1 Generator Option

Option	Description
-V	Displays the version of module in use.
-O	Designate the location where Output is generated.

7.2 Generator Message

7.2.1 Error Messages

ERR029001: Unexpected Error Found. Please contact AUTOEVER AUTOSAR Support System.

This error occurs, if the number of fields is not same in the structure that is to be generated in the C Source file. Contact AUTOEVER.

ERR029002: Unexpected Error Found. This error may be due to the incorrect configuration of the

element(s) 'Element Name'. If the error is not resolved, then please contact AUTOEVER.

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. For more information refer Section 4.

ERR029003: 'Component Name' Component is not present in the input file(s).

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

ERR029004: The Reference path is empty for the parameter 'NmComMChannelRef' in the container 'NmChannelConfig', having short name 'NmChannelConfig0'.

This error occurs, if no reference path is configured for the parameter NmComMChannelRef in the container NmChannelConfig.

ERR029005: 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
BSW-IMPLEMENTATION	AR-RELEASE-VERSION
	VENDOR-ID
	SW-VERSION
BSW-MODULE-DESCRIPTION	MODULE-ID
NmChannelConfig	NmChannelId
	NmPassiveModeEnabled
	NmStateReportEnabled
	NmComMChannelRef
NmGenericBusNmConfig	NmGenericBusNmPrefix
NmStandardBusNmConfig	NmStandardBusType
NmGlobalConstants	NmNumberOfChannels
NmGlobalFeatures	NmBusSynchronizationEnabled
	NmCarWakeUpRxEnabled
	NmComControlEnabled
	NmComUserDataSupport
	NmCoordinatorSupportEnabled
	NmNodeDetectionEnabled
	NmNodeIdEnabled
	NmPduRxIndicationEnabled

Container Name	Parameter Name
	NmRemoteSleepIndEnabled
	NmRepeatMsgIndEnabled
	NmStateChangeIndEnabled
	NmUserDataEnabled
	NmCoordinatorSyncSupport
	NmChangeTwaitBusSleepEnabled
NmGlobalProperties	NmCycletimeMainFunction
	NmDevErrorDetect
	NmVersionInfoApi

ERR029006: The value configured for the parameter 'Parameter Name' in the container 'Container Name' should follow the pattern: 〈Pattern〉.

This error occurs, when the parameter 'Parameter Name' is not configured as per the pattern.

Parameter Name	Container Name	Pattern	Example
AR-RELEASE-VERSION	BSW-IMPLEMENTATION	4.[0-9]+.[0-9]+	4.0.3
SW-VERSION		1.[0-9]+.[0-9]+	1.0.0
NmGenericBusNmPrefix	NmGenericBusNmConfig	[a-zA-Z][a-zA-Z0-9₩_]*	GenericNm

ERR029013: The reference path 〈Reference Path〉 provided for the parameter 'NmComMChannelRef' in the container 'NmChannelConfig', having short name 〈Short Name〉 is incorrect.

This error occurs, if the reference path provided for the parameter NmComMChannelRef in the container NmChannelConfig is incorrect.

ERR029017: Calcuation result of NmGlobalCoordinatorTime – (CanNmTimeOutTime + CanNmWaitBusSleepTime) is not divisible by the parameter NmCycletimeMainFunction.

This error occurs, if NmShutdownTimer(NmGlobalCoordinatorTime – (CanNmTimeOutTime + CanNmWaitBusSleepTime)) is not divisivle by the parameter NmCycletimeMainFunction.

ERR029021: Number of Channels configured should be equal to the value configured for the parameter 'NmNumberOfChannels' in the container 'NmGlobalConstants'.

This error occurs, if the number of channels configured is not equal to the value configured for the parameter 'NmNumberOfChannels' in the container NmGlobalConstants.

ERR029022: Value of the parameter 'Parameter Name' in the container 'Container Name' should not be configured as 〈0〉.

This error occurs, if value of the below mentioned parameters are configured as zero.

Parameter Name	Container Name
NmCycletimeMainFunction	NmGlobalProperties

ERR029023: Parameter 'NmCarWakeUpCallback' in the container 'NmGlobalFeatures' should be configured, since value of the parameter 'NmCarWakeUpRxEnabled' in the container 'NmGlobalFeatures is configured as <true/1>.

This error occurs, if parameter NmCarWakeUpCallback is not configured, when the value of the parameter NmCarWakeUpRxEnabled is configured as <true/1> in the container NmGlobalFeatures.

ERR029024: Calculated number of ticks = INT (NmShutdownDelayTimer / NmCycletimeMainFunction) should not be zero.

This error occurs, if calculated number of ticks for parameter NmShutdownDelayTimer divided by NmCycletimeMainFunction results in a value of zero. And NmShutdownDelayTimer is the result of subtracting (CanNmTimeoutTime + CanNmWaitBusSleepTime) from NmGlobalCoordinatorTime. Therefore, NmGlobalCoordinatorTime should always be greater than (CanNmTimeoutTime + CanNmWaitBusSleepTime), so This error occurs when NmGlobalCoordinatorTime is smaller.

ERR029051: Number of Channels configured should not be <1> when the value configured for the parameter 'NmNumberOfChannels' in the container 'NmGlobalConstants' is greater than <1>.

This error occurs, if Number of Channels configured is <1> when the value of the parameter 'NmNumberOfChannels' in the container NmGlobalConstants is configured as <1>.

ERR029052: Value of the parameter 'NmStateReportEnabled' should not be configured as <true/1>, when the value of the parameters 'NmStateChangeIndEnabled' and '<Bus>NmComUserDataSupport' are configured as <false/0>.

This error occurs, if the value of the parameter NmStateReportEnabled is configured as <true/1>, when the value of the parameters NmStateChangeIndEnabled and <Can/Fr/Lin/Udp>NmComUserDataSupport are configured as <false/0>.

ERR029053: Value of the parameter 'Dependent Parameter Name' in the container 'NmGlobalFeatures' should be configured as <false/0>, when the value of the parameter 'Parameter Name' in the container 'NmChannelConfig' is configured as <true/1>.

This error occurs, if value of the below mentioned dependent parameter is configured as <true/1> when the value of the dependent parameter is configured as <true/1> in the container NmGlobalFeatures.

Dependent Parameter Name	Parameter Name
NmRemoteSleepIndEnabled	NmPassiveModeEnabled
NmBusSynchronizationEnabled	

ERR029054: The parameter 'Parameter Name' in the container 'NmChannelConfig' should be unique.

This error occurs, if any of the below mentioned parameters are not unique in the container NmChannelConfig.

Parameter Name	Container Name
NmChannelId	NmChannelConfig
NmComMChannelRef	

ERR029055: The reference path <Reference Path> provided for the parameter 'NmStateReportSignalRef' in the container 'NmChannelConfig', having short name <Short Name> is incorrect.

This error occurs, if the reference path configured for the parameter NmStateReportSignalRef in the container NmChannelConfig is incorrect when the value of the parameter NmStateReportEnabled is configured as <true/1>.

ERR029056: Value of the parameter 'NmChannelId' in the container 'NmChannelConfig' should be equal to the value of the parameter 'ComMChannelId' in the container 'ComMChannel'.

This error occurs, if value of parameter NmChannelId in the container NmChannelConfig is not same as value of the parameter ComMChannelId collected through the reference parameter NmComMChannelRef.

ERR029057: Parameter 'NmStateReportSignalRef' the container 'NmChannelConfig' should be configured, since value of the parameter 'NmStateReportEnabled' in the container 'NmChannelConfig' is configured as <true/1>.

This error occurs, if the reference path is not configured for the parameter NmStateReportSignalRef in the container NmChannelConfig when the value of the parameter NmStateReportEnabled is configured as <true/1>.

ERR029058: Parameter 'Parameter Name' in the container 'Container Name' should be configured, when the value of the parameter 'NmCoordClusterIndex' in the container 'NmChannelConfig' is configured.

This error occurs, if the parameter 'Parameter Name' in the container 'Container Name' is not configured, when the value of the parameter NmCoordClusterIndex in the container NmChannelConfig is configured.

Parameter Name	Container Name
NmChannelSleepMaster	NmChannelConfig
NmSynchronizingNetwork	

ERR029059: The coordinator feature is using, NmCoordClusterIndex has been set in channel.

This error occurs, If the coordinator feature is using, but NmCoordClusterIndex has not been set in channel.

ERR029060: Any corresponding CanNm channel has 'CanNmComMNetworkHandleRef' equal with 'NmChannelRef'.

This error occurs, If any corresponding CanNm channel has 'CanNmCoomMNetworkHandleRef' not equal with 'NmChannelRef'.

ERR029062: NmCoordClusterIndex has been set in 'NmChannel', 'CanNmSleepTime' and 'CanNmWaitBusSleepTime' should be configured in CanNm input file.

This error occurs, If NmCoordClusterIndex has been set in 'Nm channel', but CanNmTimeoutTime and CanNmWaitBusSleepTime has not configured in CanNm input file.

ERR029100: The number of NmGlobalFeatures in Nm shall be 1.
This error occurs, If the NmGlobalFeatures count is 0 or greater than 1, NmGlobalFeatures count shall be 1.

ERR029101: The number of NmGlobalConstants in Nm shall be 1.
This error occurs, If the NmGlobalConstants count is 0 or greater than 1, NmGlobalConstants count shall be 1.

ERR029102: The number of NmGlobalProperties in Nm shall be 1.
This error occurs, If the NmGlobalProperties count is 0 or greater than 1, NmGlobalProperties count shall be 1.

ERR029103: NmGlobalConfig in Nm is not set. NmGlobalConfig in Nm shall be set.
This error occurs, If the NmGlobalConfig count is 0 or greater than 1, NmGlobalConfig count shall be 1.

ERR029104: NmNumberOfChannels in NmGlobalConstants shall be greater than or equal to the maximum value of NmChannelConfig count.
This error occurs, NmNumberOfChannels in NmGlobalConstants shall be greater than or equal to the NmChannelConfig count.

ERR029105: NmBusSynchronizationEnabled in NmGlobalFeatures is not set. NmBusSynchronizationEnabled in NmGlobalFeatures shall be set.
This error occurs, NmBusSynchronizationEnabled in NmGlobalFeatures shall be set as True or False.

ERR029106: NmCarWakeUpRxEnabled in NmGlobalFeatures is not set. NmCarWakeUpRxEnabled in NmGlobalFeatures shall be set.
This error occurs, NmCarWakeUprxEnabled in NmGlobalFeatures shall be set as True or False.

ERR029107: NmComControlEnabled in NmGlobalFeatures is not set. NmComControlEnabled in NmGlobalFeatures shall be set.
This error occurs, NmComControlEnabled in NmGlobalFeatures shall be set as True or False.

ERR029108: NmComUserDataSupport in NmGlobalFeatures is not set. NmComUserDataSupport in NmGlobalFeatures shall be set.
This error occurs, NmComUserDataSupport in NmGlobalFeatures shall be set as True or False.

ERR029109: NmCoordinatorSupportEnabled in NmGlobalFeatures is not set. NmCoordinatorSupportEnabled in NmGlobalFeatures shall be set.
This error occurs, NmCoordinatorSupportEnabled in NmGlobalFeatures shall be set as True or False.

ERR029110: NmNodeDetectionEnabled in NmGlobalFeatures is not set. NmNodeDetectionEnabled in NmGlobalFeatures shall be set.
This error occurs, NmNodeDetectionEnabled in NmGlobalFeatures shall be set as True or False.

ERR029111: NmNodeIdEnabled in NmGlobalFeatures is not set. NmNodeIdEnabled in NmGlobalFeatures shall be set.
This error occurs, NmNodeIdEnabled in NmGlobalFeatures shall be set as True or False.

ERR029112: NmPduRxIndicationEnabled in NmGlobalFeatures is not set. NmPduRxIndicationEnabled in NmGlobalFeatures shall be set.
This error occurs, NmPduRxIndicationEnabled in NmGlobalFeatures shall be set as True or False.

ERR029113: NmRemoteSleepIndEnabled in NmGlobalFeatures is not set. NmRemoteSleepIndEnabled in NmGlobalFeatures shall be set.
This error occurs, NmRemoteSleepIndEnabled in NmGlobalFeatures shall be set as True or False.

ERR029114: NmRepeatMsgIndEnabled in NmGlobalFeatures is not set. NmRepeatMsgIndEnabled in NmGlobalFeatures shall be set.
This error occurs, NmRepeatMsgIndEnabled in NmGlobalFeatures shall be set as True or False.

ERR029115: NmStateChangeIndEnabled in NmGlobalFeatures is not set. NmStateChangeIndEnabled in NmGlobalFeatures shall be set.
This error occurs, NmStateChangeIndEnabled in NmGlobalFeatures shall be set as True or False.

ERR029116: NmUserDataEnabled in NmGlobalFeatures is not set. NmUserDataEnabled in NmGlobalFeatures shall be set.
This error occurs, NmUserDataEnabled in NmGlobalFeatures shall be set as True or False.

ERR029117: NmCoordinatorSyncSupport in NmGlobalFeatures is not set. NmCoordinatorSyncSupport in NmGlobalFeatures shall be set.
This error occurs, NmCoordinatorSyncSupport in NmGlobalFeatures shall be set as True or False.

ERR029118: NmCycletimeMainFunction in NmGlobalProperties is not set. NmCycletimeMainFunction in NmGlobalProperties shall be set.
This error occurs, NmCycletimeMainFunction in NmGlobalProperties shall be set.

ERR029119: NmDevErrorDetect in NmGlobalProperties is not set. NmDevErrorDetect in NmGlobalProperties shall be set.
This error occurs, NmDevErrorDetect in NmGlobalProperties shall be set as True or False.

ERR029120: NmVersionInfoApi in NmGlobalProperties is not set. NmVersionInfoApi in NmGlobalProperties shall be set.
This error occurs, NmVersionInfoApi in NmGlobalProperties shall be set as True or False.

ERR029121: NmChannelId in NmChannelConfig is not set. NmChannelId in NmChannelConfig shall be set.
This error occurs, NmChannelId in NmChannelConfig shall be set.

ERR029122: NmChannelSleepMaster in NmChannelConfig is not set. NmChannelSleepMaster in NmChannelConfig shall be set.
This error occurs, NmChannelSleepMaster in NmChannelConfig shall be set as True or False.

ERR029123: NmPassiveModeEnabled in NmChannelConfig is not set. NmPassiveModeEnabled in NmChannelConfig shall be set.
This error occurs, NmPassiveModeEnbled in NmChannelConfig shall be set as True or False.

ERR029124: NmStateReportEnabled in NmChannelConfig is not set. NmStateReportEnabled in NmChannelConfig shall be set.
This error occurs, NmStateReportEnabled in NmChannelConfig shall be set as True or False.

ERR029125: NmSynchronizingNetwork in NmChannelConfig is not set. NmSynchronizingNetwork in NmChannelConfig shall be set.
This error occurs, NmSynchronizingNetwork in NmChannelConfig shall be set as True or False.

ERR029126: NmComMChannelRef in NmChannelConfig is not set. NmComMChannelRef in NmChannelConfig shall be set.
This error occurs, NmComMChannelRef in NmChannelConfig shall be set.

ERR029128: NmChannelConfig in Nm is not set. NmChannelConfig in Nm shall be set.
This error occurs, NmChannelConfig in Nm shall be set.

ERR029129: NmBusType in NmChannelConfig is not set. NmBusType in NmChannelConfig shall be set.
This error occurs, NmBusType in NmChannelConfig shall be set.

ERR029130: NmGenericBusNmConfig in NmBusType and NmStandardBusNmConfig in NmBusType shall be exclusively set.
This error occurs, NmGenericBusNmConfig in NmBusType and NmStandardBusNmConfig in NmBusType shall be exclusively set.

ERR029131: NmGenericBusNmPrefix in NmGenericBusNmConfig is not set. NmGenericBusNmPrefix in NmGenericBusNmConfig shall be set.
This error occurs, NmGenericBusNmPrefix in NmGenericBusNmConfig shall be set.

ERR029132: NmStandardBusType in NmStandardBusNmConfig is not set. NmStandardBusType in NmStandardBusNmConfig shall be set.
This error occurs, NmStandardBusType in NmStandardBusNmConfig shall be set.

ERR029133: NmStateChangeIndUserCallout in NmChannelConfig is set even though NmBusType of NmChannel is GenericBusNm. If NmBusType of NmChannel is GenericBusNm, NmStateChangeIndUserCallout in NmChannelConfig shall not be set.
This error occurs, NmStateChangeIndUserCallout in NmChannelConfig shall not be set.

ERR029134: NmChangeTwaitBusSleepEnabled in NmGlobalFeature shall be set.
This error occurs, NmChangeTwaitBusSleepEnabled in NmGlobalFeature shall not be set.

ERR029135: If NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'TRUE', either CanNmChangeTwaitBusSleepEnabled or OsekNmChangeTwaitBusSleepEnabled must be set.
This error occurs, NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'TRUE', but neither CanNmChangeTwaitBusSleepEnabled nor OsekNmChangeTwaitBusSleepEnabled is defined.

ERR029136: If NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'TRUE', OsekNmChangeTwaitBusSleepEnabled must be set 'TRUE'.
This error occurs, NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'TRUE', but OsekNmChangeTwaitBusSleep is set 'FALSE'.

ERR029137: If NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'TRUE', CanNmChangeTwaitBusSleepEnabled must be set 'TRUE'.
This error occurs, NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'TRUE', but CanNmChangeTwaitBusSleep is set 'FALSE'.

ERR029138: If NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'FALSE', CanNmChangeTwaitBusSleepEnabled must be set 'FALSE'. If you want to use Change Wait Bus Sleep Time featue, than NmChangeTwaitBusSleepEnabled is set 'TRUE'.
This error occurs, NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'FALSE', but CanNmChangeTwaitBusSleep is set 'TRUE'.

ERR029139: If NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'FALSE',

OsekNmChangeTwaitBusSleepEnabled must be set 'FALSE'. If you want to use Change Wait Bus Sleep Time featue, than NmChangeTwaitBusSleepEnabled is set 'TRUE'.
This error occurs, NmChangeTwaitBusSleepEnabled in NmGlobalFeature is set 'FALSE', but OsekNmChangeTwaitBusSleep is set 'TRUE'.

ERR029211: If NmCoordinatorSyncSupport is set, and CoordClusterIndex is also set, then ActiveCoordinator configuration should be set.
This error occurs, when NmCoordinatorSyncSupport value is set, and CoordClusterIndex is also set, but ActiveCoordinator configuration is unset.

ERR029212: There should be one Passively Coordinated Channel per Cluster.
This error occurs, when Multiple Passively Coordinated Channel exists per Cluster.

7.2.2 Warning Messages

7.2.3 Information Messages

INF029003: Parameter 'Parameter Name' in the container 'Container Name' is configured, when value of the parameter 'Parameter Name1' in the container 'Container Name1' is configured as <false/0>.

This information occurs, if the below mentioned parameters 'Parameter Name' are configured when value of the parameter 'Parameter Name1' is configured as <false/0>.

Parameter Name	Container Name	Parameter Name1	Container Name1
NmCycletimeMainFunction	NmGlobalProperties	NmCoordinatorSupportEnabled	NmGlobalFeatures
NmGlobalCoordinatorTime	NmGlobalFeatures	NmBusSynchronizationEnabled	
NmNodeDetectionEnabled		NmNodeIdEnabled	
NmActiveCoordinator	NmChannelConfig	NmBusSynchronizationEnabled	

INF029015: AUTOSAR Release version <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 the value of the element AR-RELEASE-VERSION present in the BSW Module Description template is configured other than 4.0.3.

INF029051: Value of the parameter 'NmStateReportSignalRef' in the container 'NmChannelConfig' is ignored, since value of the parameter 'NmStateReportEnabled' in the container 'NmChannelConfig' is configured as <false/0>.

This information occurs, if value of the parameter NmStateReportEnabled in the container NmChannelConfig is configured as ‹false/0›.

INF029052: The parameter 'NmCoordinatorSupportEnabled' in the container 'NmGlobalFeatures' should be configured as ‹false/0›, when the value of the parameter 'NmNumberOfChannels' in the container 'NmGlobalConstants' is configured as ‹1› and the value of the parameter 'NmRemoteSleepIndEnabled' in the container 'NmGlobalFeatures' is configured as ‹false/0› hence Generation Tool will reset the value of the parameter 'NmCoordinatorSupportEnabled' as ‹false/0›.

This information occurs, if value of the parameter 'NmCoordinatorSupportEnabled' in the container 'NmGlobalFeatures' is configured as ‹true/1›, when the value of the parameter 'NmNumberOfChannels' in the container 'NmGlobalConstants' is configured as ‹1› and the value of the parameter 'NmRemoteSleepIndEnabled' in the container 'NmGlobalFeatures' is configured as ‹false/0› hence Generation Tool will reset the value of the parameter 'NmCoordinatorSupportEnabled' as ‹false/0›.

INF029054: Value of the parameter 'Parameter Name' in the container 'NmChannelConfig' is ignored, since value of the parameter 'Parameter Name1' in the container 'NmChannelConfig' is not configured.

This information occurs, if the below mentioned parameter NmCoordClusterIndex is not configured.

Parameter Name	Parameter Name1
NmChannelSleepMaster	NmCoordClusterIndex
NmSynchronizingNetwork	

8. Appendix

8.1 Configuration Guide for each function

8.2 Configuration Guide for each use case

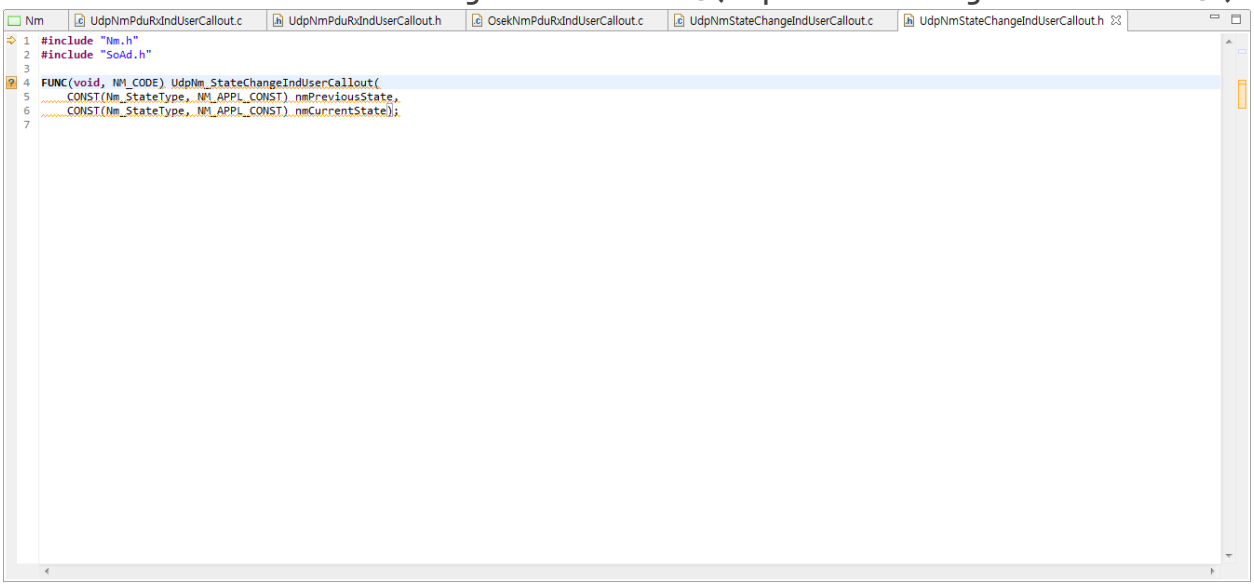
8.2.1 In case control is required according to different Nm states

8.2.1.1 An example of disabling routing when the state of UdpNm is ReadySleep, or PrepareBusSleep

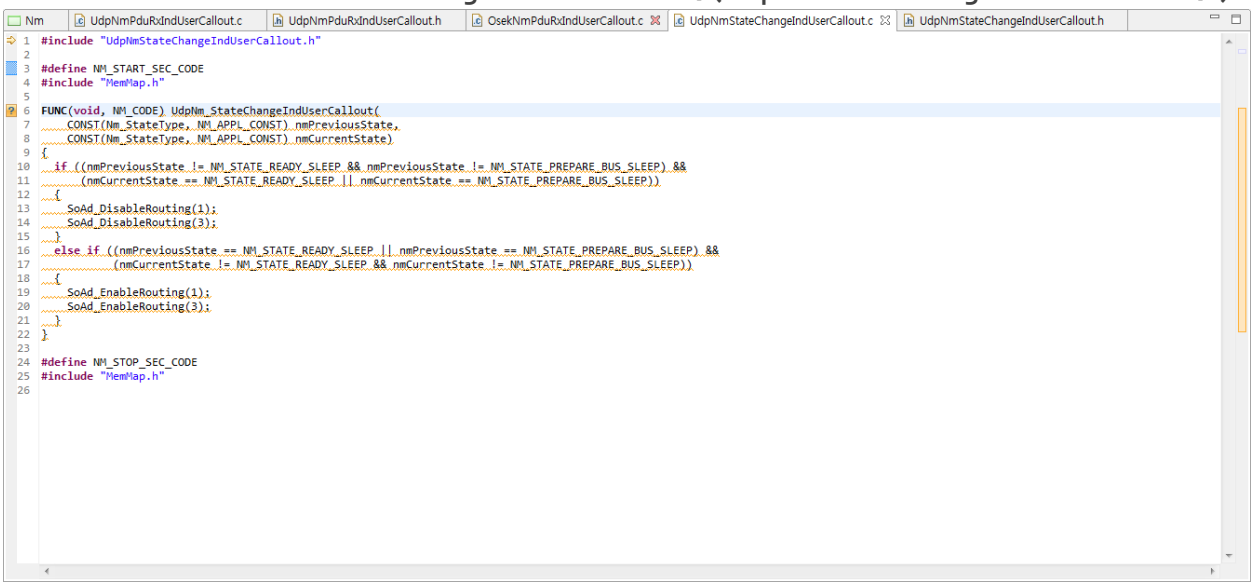
In the application, the code must be written according to the intended use and the specification of each control unit, and should include return value handling and exception handling.
Please note that codes below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

The code written can be used at the component level if ComplexDeviceDriverSwComponent is added and UserCallout header and source files are included.

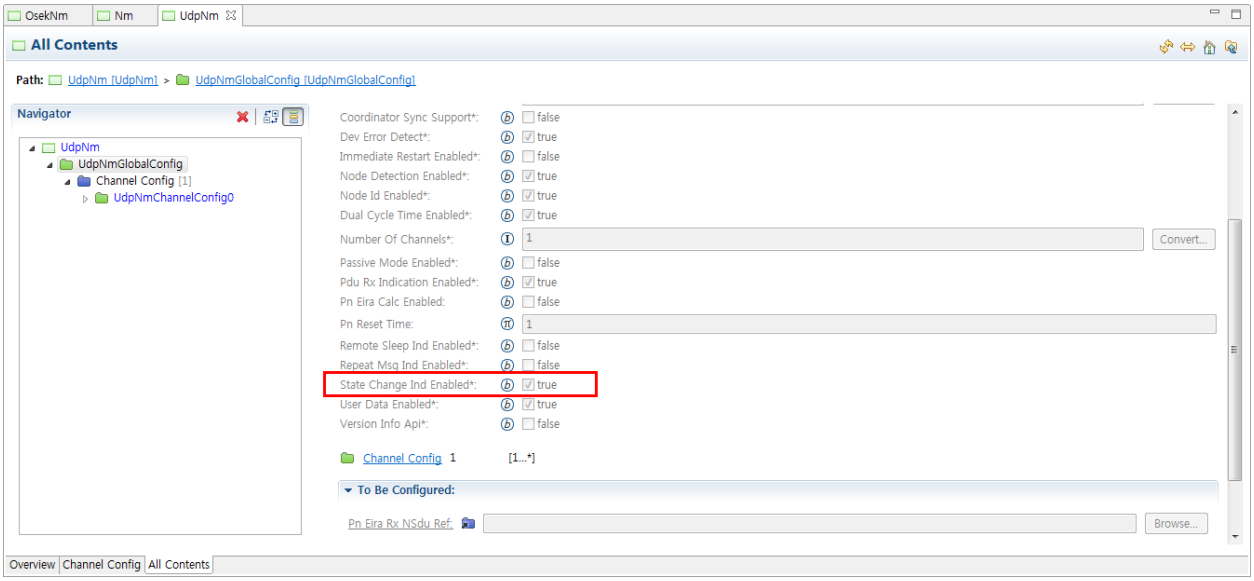
1) Create a header file for StateChangeIndUserCallout. (UdpNmStateChangeIndUserCallout.h)



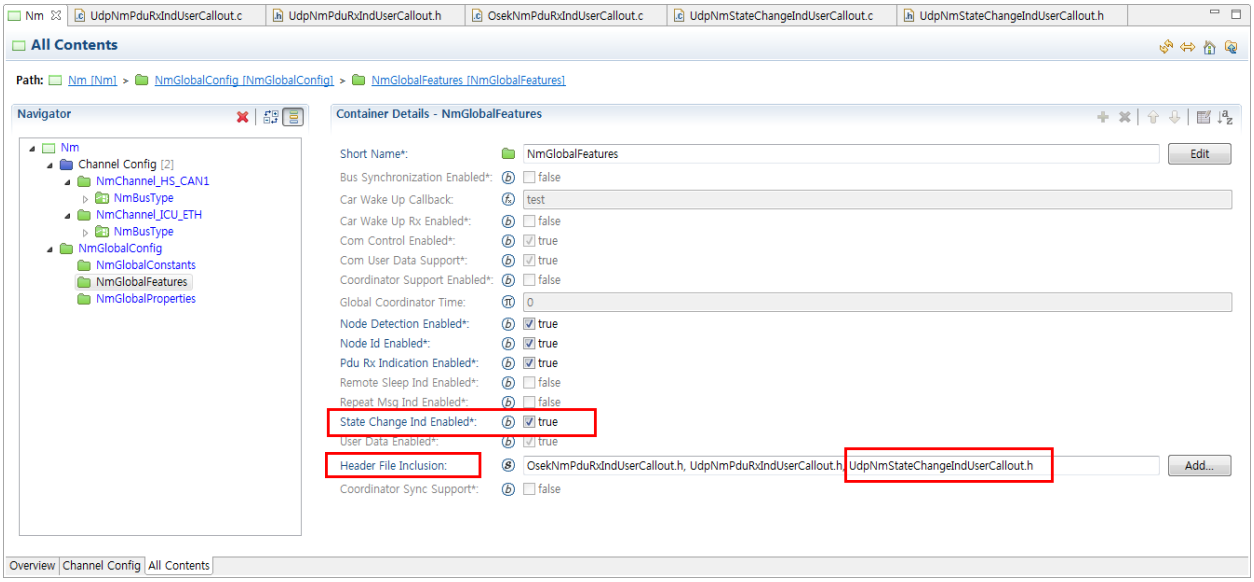
2) Create a source file for StateChangeIndUserCallout. (UdpNmStateChangeIndUserCallout.c)



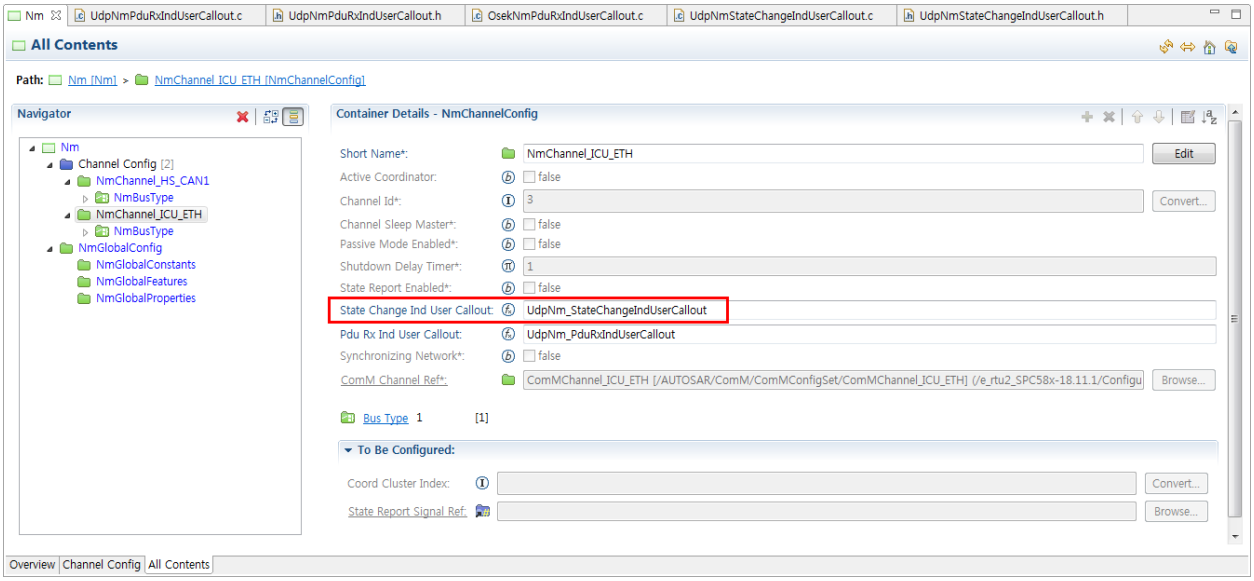
3) Set UdpNm/UdpNmGlobalConfig/StateChangeIndEnabled to true.



4) Set Nm/GlobalConfig/NmGlobalFeatures/StateChangeIndEnabled to true. Configure the header file for StateChangeIndUserCallout in Nm/GlobalConfig/NmGlobalFeatures/HeaderFileInclusion.



5) Configure the function name for StateChangeIndUserCallout in Nm/NmChannelConfig/StateChangeIndUserCallout.



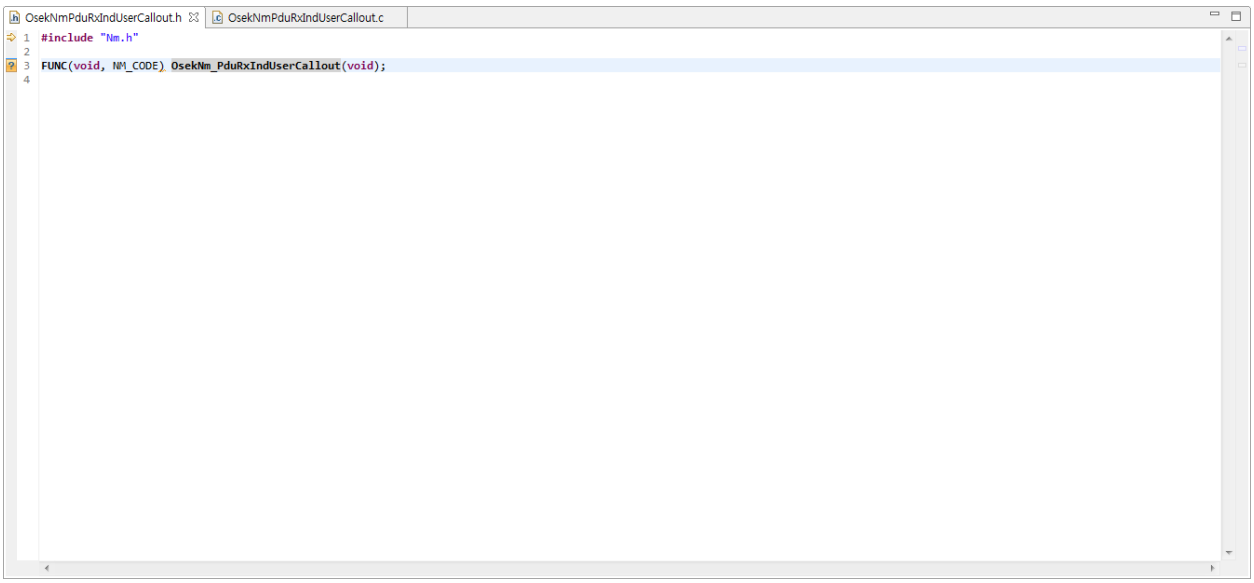
8.2.2 In case the user wants to know the received Nm Pdu data and node identifier

8.2.2.1 Example: In case user wants to know the Pdu data and node identifier when receiving Nm Pdu in OsekNm

In the application, the code must be written according to the intended use and the specification of each control unit, and should include return value handling and exception handling.
Please note that codes below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

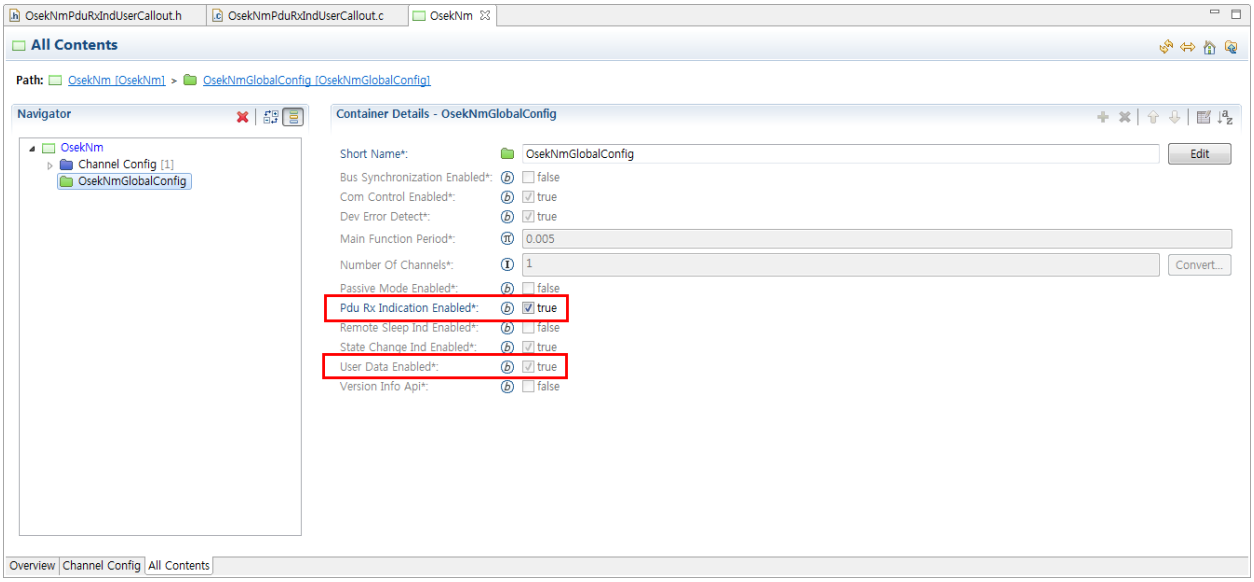
The code written can be used at the component level if ComplexDeviceDriverSwComponent is added and UserCallout header and source files are included.

1) Create a header file for PduRxIndUserCallout. (OsekNmPduRxIndUserCallout.h)

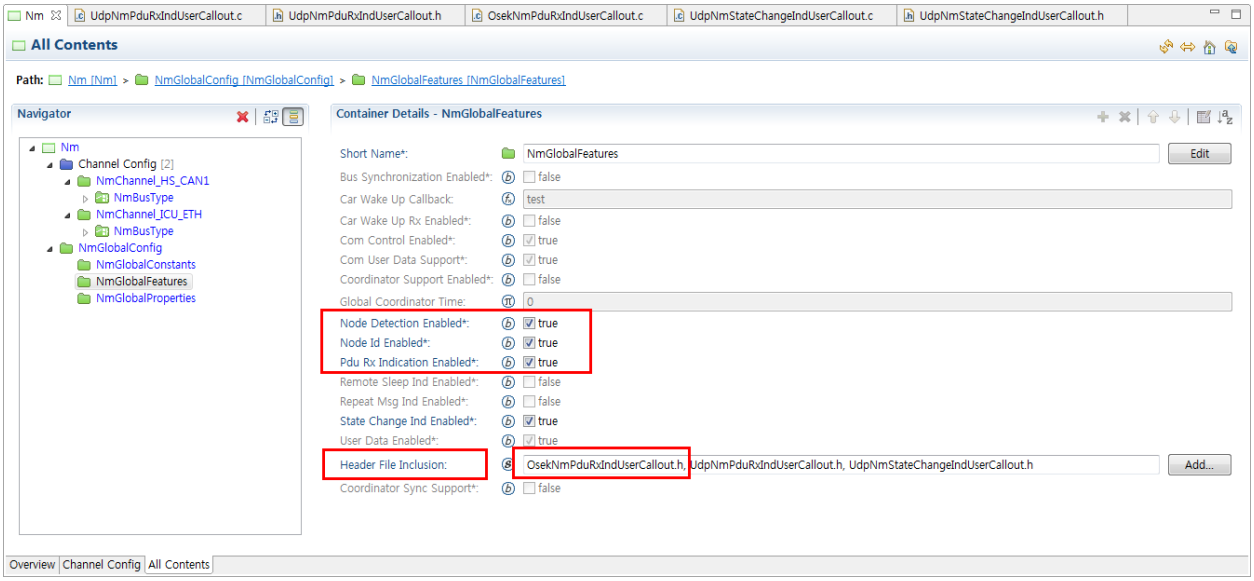


2) Create a source file for PduRxIndUserCallout. (OsekNmPduRxIndUserCallout.c)

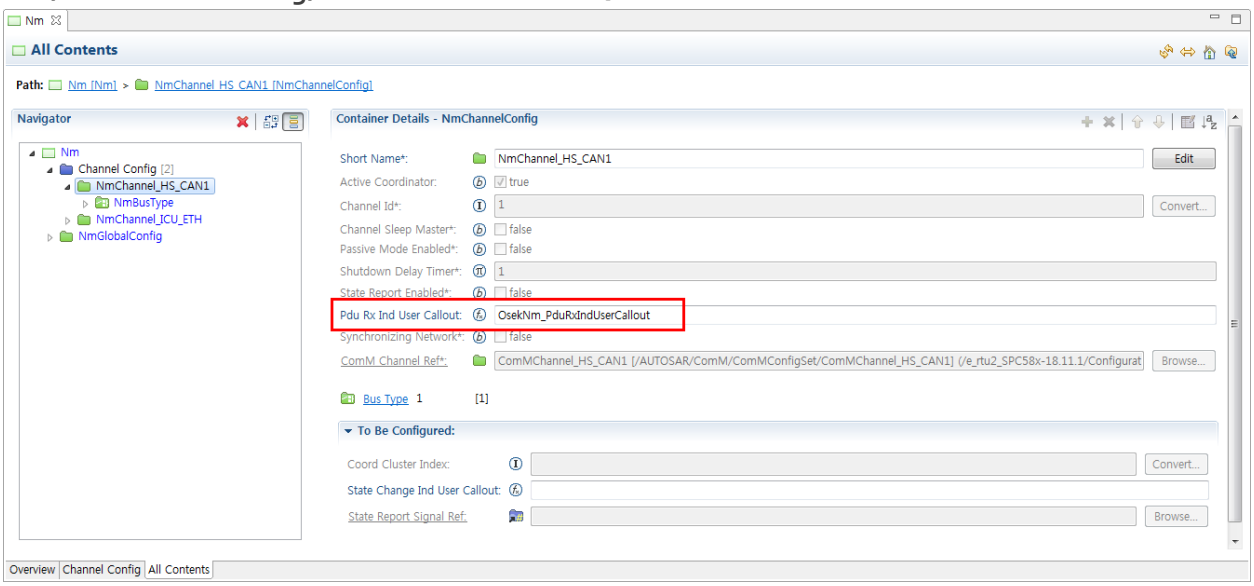
3) Set OsekNm/OsekNmGlobalConfig/PduRxIndicationEnabled to true.
Set OsekNm/OsekNmGlobalConfig/PduRxIndicationEnabled to true.



4) Set Nm/NmGlobalConfig/NmGlobalFeatures/NodeDetectionEnabled to true.
Set Nm/NmGlobalConfig/NmGlobalFeatures/NodeIdEnabled to true.
Set Nm/NmGlobalConfig/NmGlobalFeatures/PduRxIndicationEnabled to true.
Configure the header file for PduRxIndUserCallout in Nm/NmGlobalConfig/NmGlobalFeatures/HeaderFileInclusion.



5) Configure the function name for PduRxIndUserCallout in Nm/NmChannelConfig/PduRxIndUserCallout.

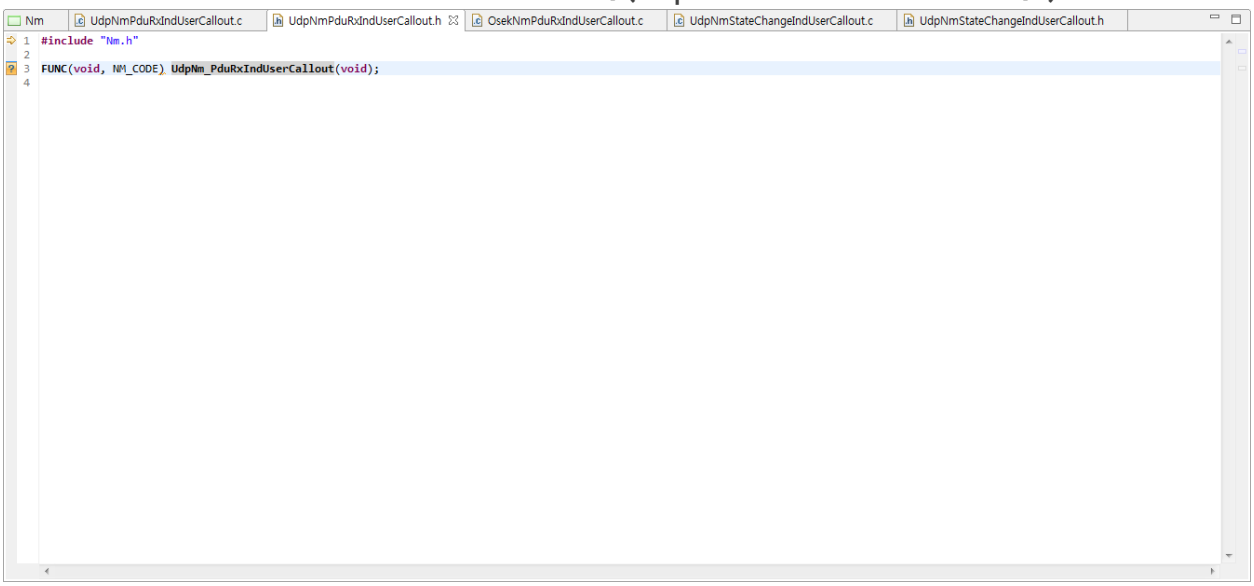


8.2.2.2 Example: In case the user wants to know the Pdu data and node identifier when receiving Nm Pdu in UdpNm

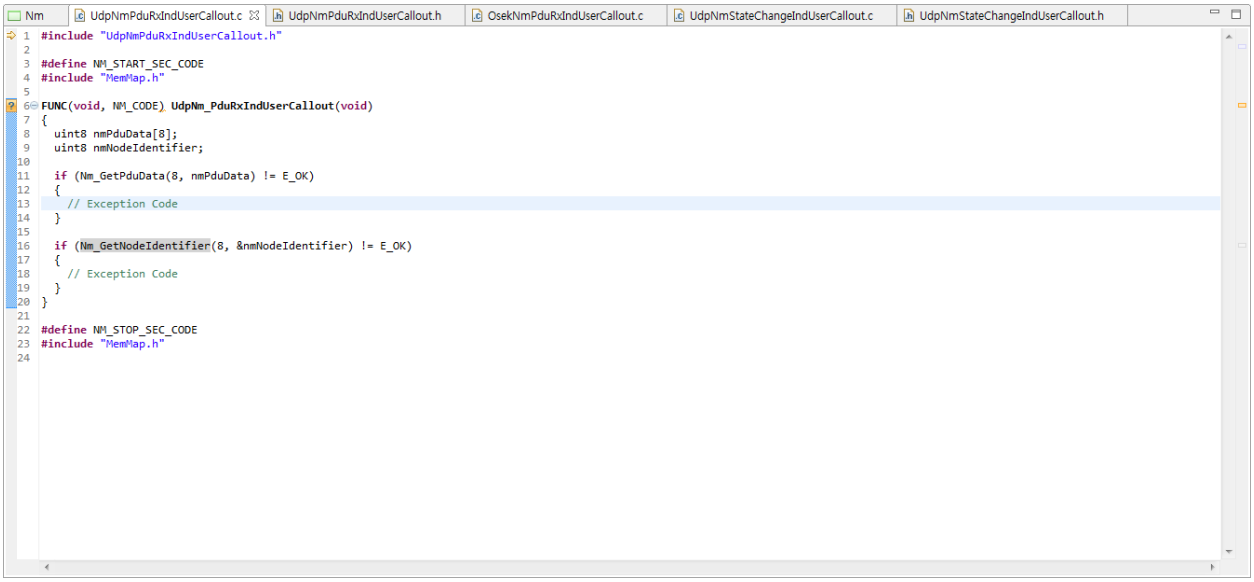
In the application, the code must be written according to the intended use and the specification of each control unit, and should include return value handling and exception handling.
Please note that codes below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

The code written can be used at the component level if ComplexDeviceDriverSwComponent is added and UserCallout header and source files are included.

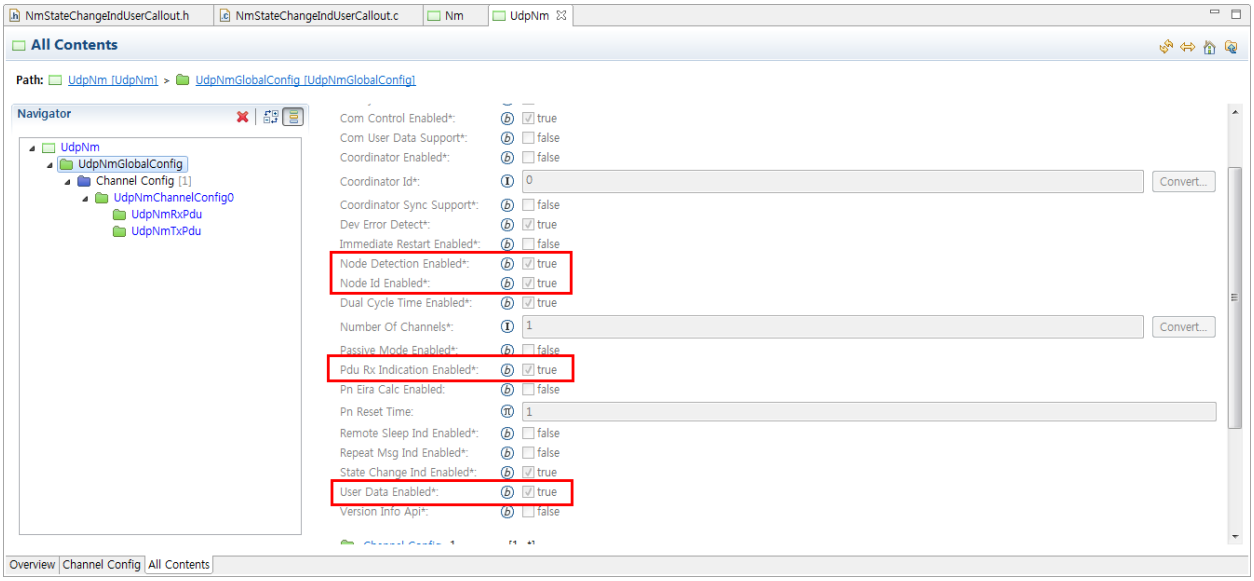
1) Create a header file for PduRxIndUserCallout. (UdpNmPduRxIndUserCallout.h)



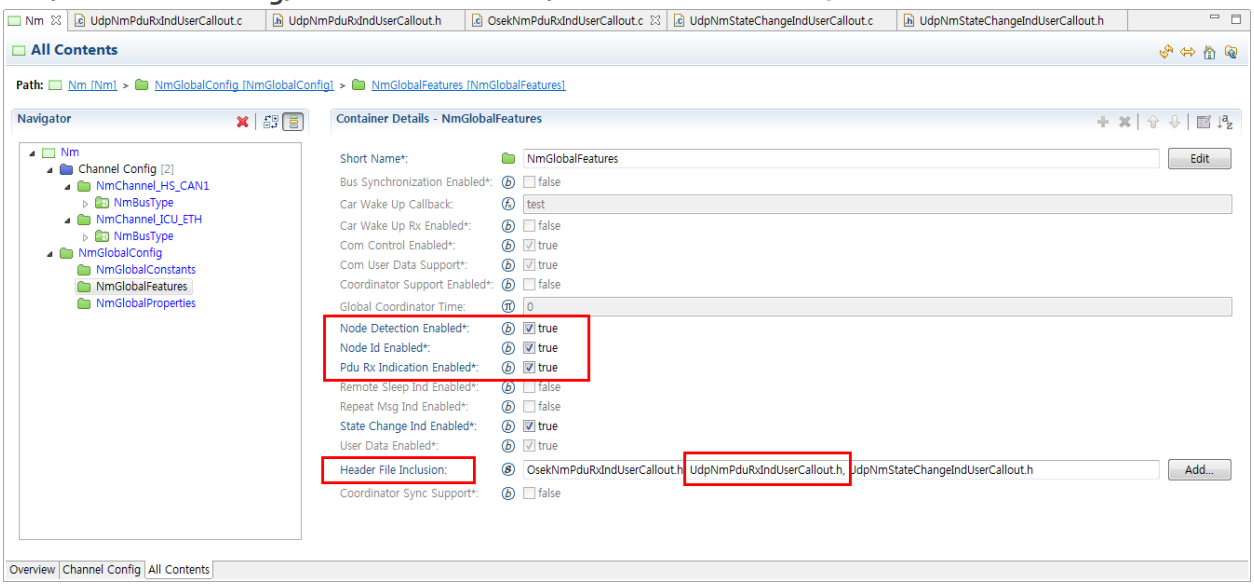
2) Create a source file for PduRxIndUserCallout. (UdpNmPduRxIndUserCallout.c)



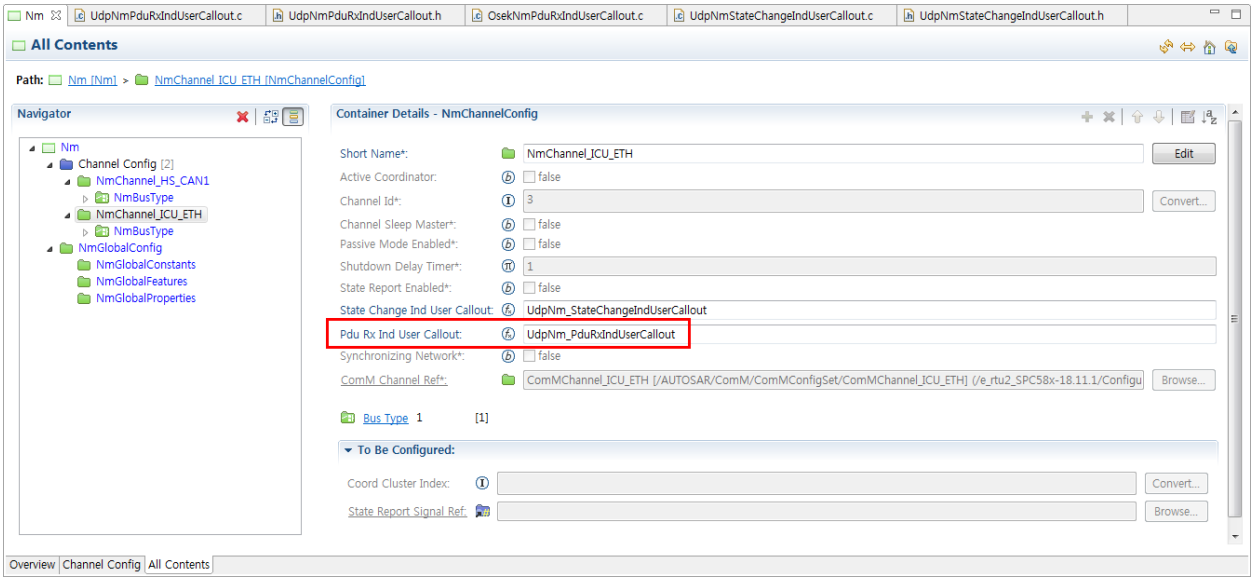
3) Set UdpNm/UdpNmGlobalConfig/NodeDetectionEnabled to true.
Set UdpNm/UdpNmGlobalConfig/NodeIdEnabled to true.
Set UdpNm/UdpNmGlobalConfig/PduRxIndicationEnabled to true.
Set UdpNm/UdpNmGlobalConfig/UserDataEnabled to true.



4) Set Nm/NmGlobalConfig/NmGlobalFeatures/NodeDetectionEnabled to true.
Set Nm/NmGlobalConfig/NmGlobalFeatures/NodeIdEnabled to true.
Set Nm/NmGlobalConfig/NmGlobalFeatures/PduRxIndicationEnabled to true.
Configure the header file for PduRxIndUserCallout in Nm/NmGlobalConfig/NmGlobalFeatures/HeaderFileInclusion.

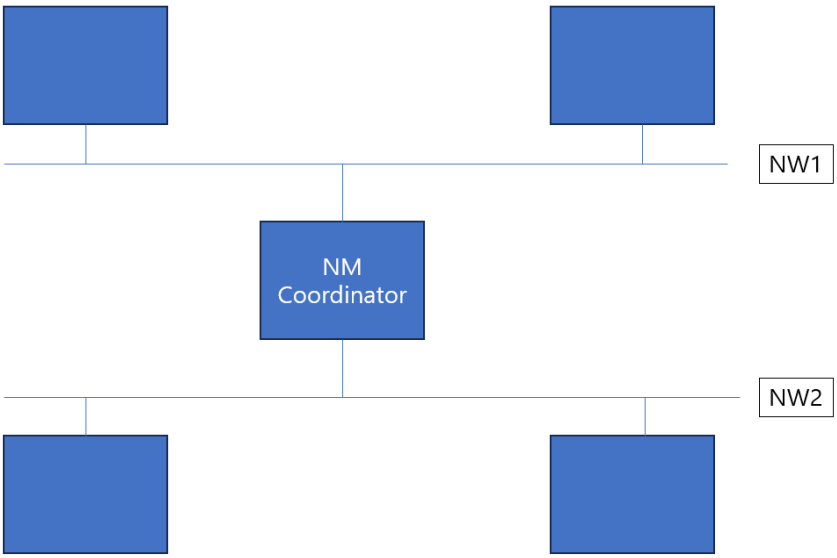


5) Configure the function name for PduRxIndUserCallout in Nm/NmChannelConfig/PduRxIndUserCallout.



8.3 Nm Coordinator Functionality configuration Guide

8.3.1 When there is one NM Coordinator in the NM Cluster (Single NM Coordinator structure)



When NW1 and NW2 are connected through a Gateway controller, the Gateway controller assumes the NM Coordinator functionality, and by grouping NW1 and NW2 into a single Coordination Cluster, it becomes possible to synchronize the Sleep of the nodes in NW1 and NW2.

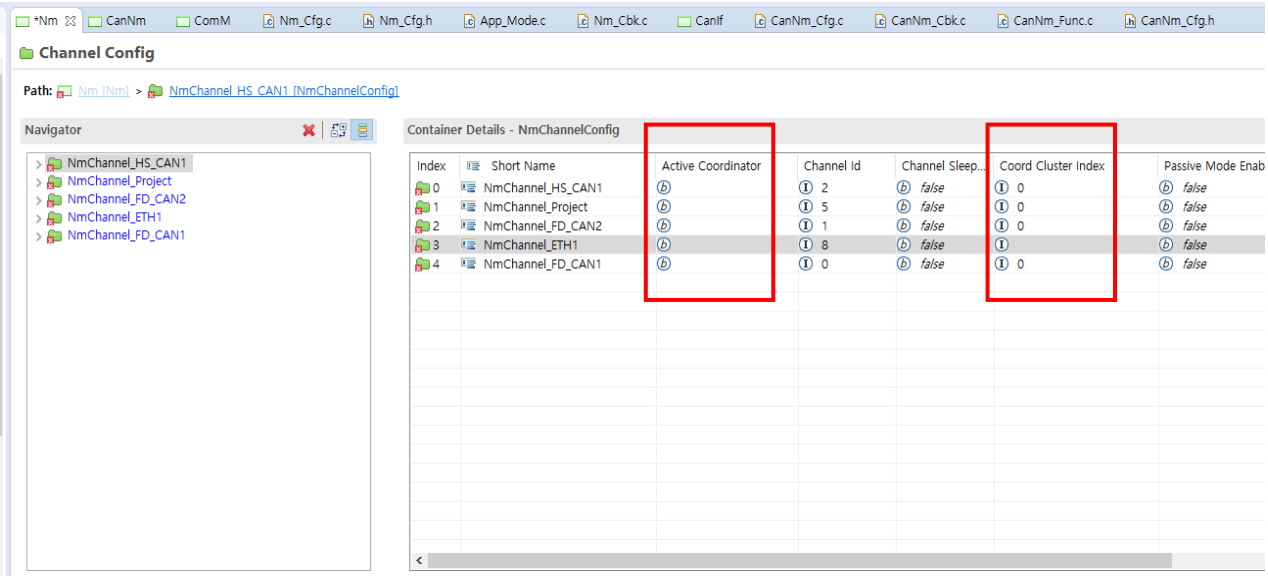
8.3.1.1 Example of Configuring one Nm Coordinator in single Nm cluster

In the application, each user must configure it according to the intended use and the specification of each control unit.
Please note that configuration below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

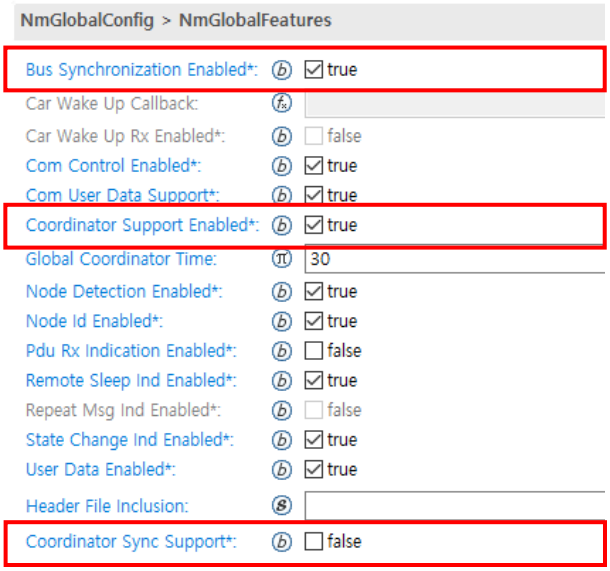
The following example demonstrates a scenario where HS_CAN1, Project, FD_CAN1, and FD_CAN2

networks are grouped into a single Coordination Cluster to synchronize Sleep.

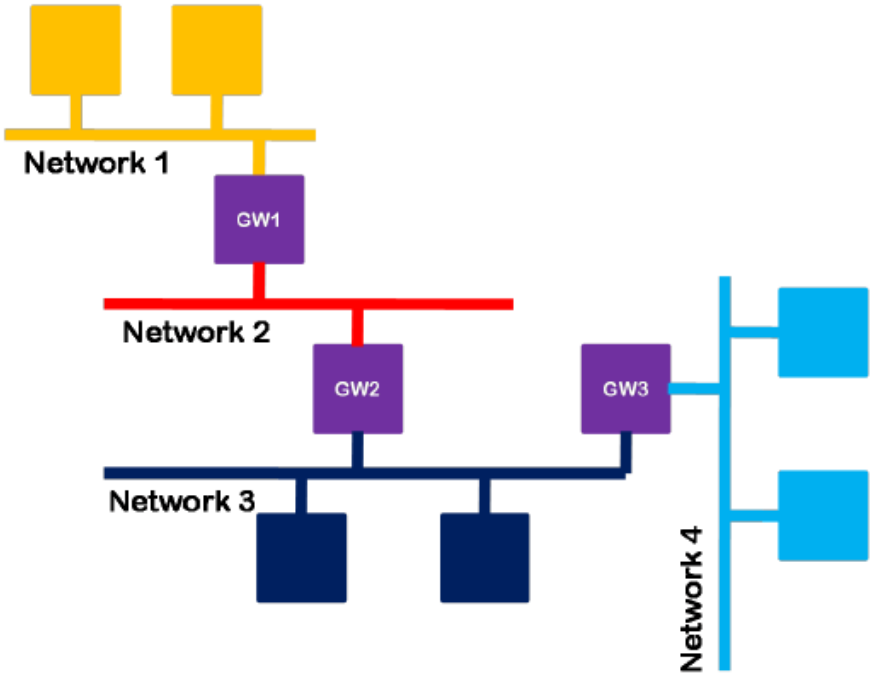
1) Configuration by Channel
   A. Set the **Coord Cluster Index** to 0 for all channels.
   B. The **Active Coordinator** configuration value should be left blank for all channels.



2) GlobalConfig > NmGlobalFeatures Configuration
   A. Set **Coordinator Support Enabled** to **TRUE.**
   B. Set **Bus Sychronization Enabled** to **TRUE.**
   C. Set **Coordinator Sync Support** to **FALSE.**



8.3.2 Multiple Nm Coordinator in the NM Cluster (Sub Nested Busses structure)



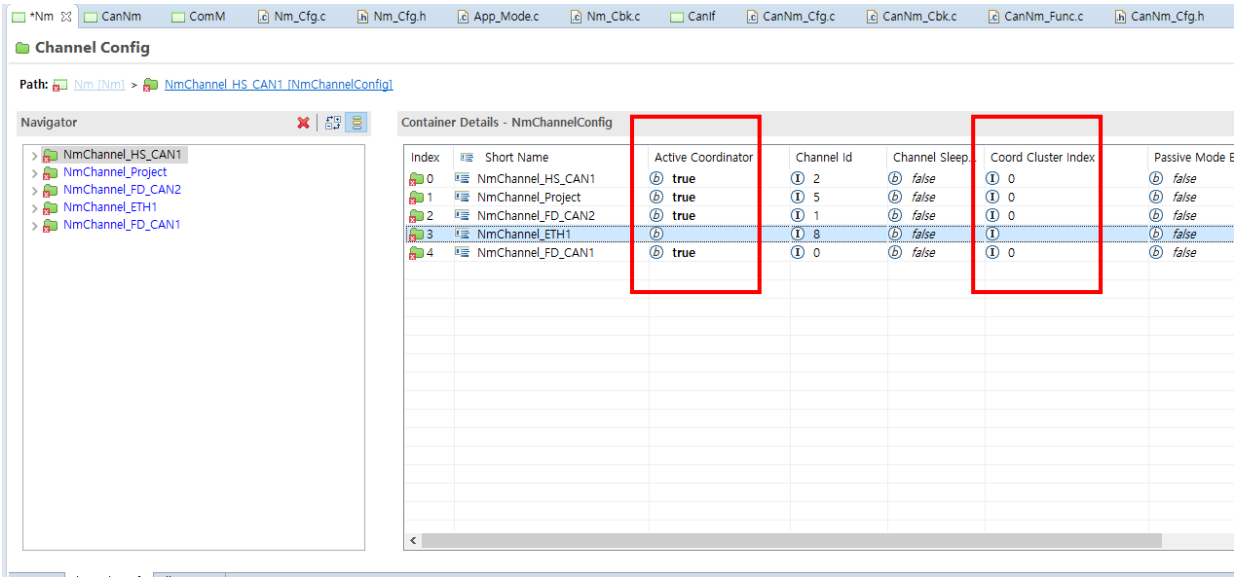
Even in cases where multiple netwokrs are nested to form a hierarchical structure, as described above, it is possible to group these networks into a single Coordination Cluster to synchronize Sleep.
To group Network 1, 2, 3 and 4 into a single Coordination Cluster in the above structure, each network must be controlled by NM Coordinator controllers within their respective Gateway controllers, GW1, GW2, and GW3.
In this case, the topmost GW1 controller acts as the TopMost Coordinator controller and must actively coordinate all connected networks.
Subsequently, GW2 and GW3 act as Nested Coordinator controllers. For networks actively coordinated by the higher-level NM Coordinator, they should coordinate passively, whereas for networks not connected to lower-level NM Coordinators or NM Coordinators, they should coordinate actively.

8.3.2.1 TopMost Coordinator Configuration Example

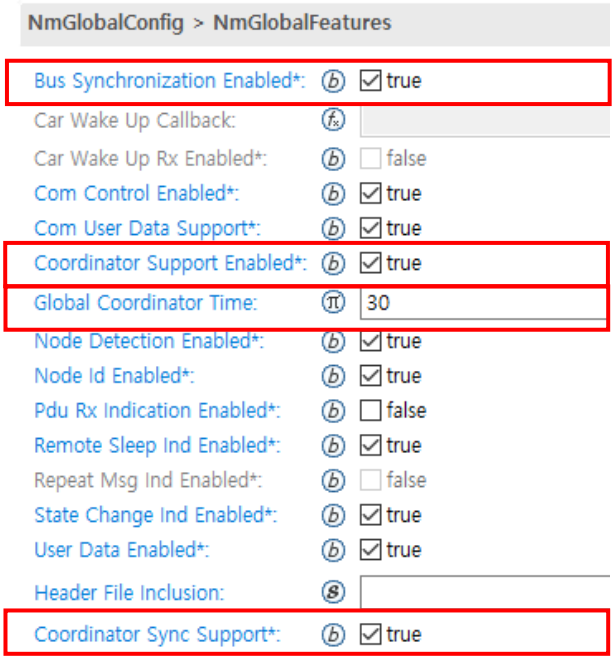
In the application, each user must configure it according to the intended use and the specification of each control unit.
Please note that configuration below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

The following example illustrates a scenario where HS_CAN1, Project, FD_CAN1, and FD_CAN2 networks are grouped into a single Coordination Cluster, and within that cluster, a controller assumes the role of the TopMost Coordinator, aiming to synchronize Sleep.

1) Configuration by Channel
   A. Set the **Coord Cluster Index** to 0 for all channels.
   B. Set **Active Coordinator** to **TRUE** for all channels.



2) GlobalConfig > NmGlobalFeatures Configuration
   A. Set **Coordinator Support Enabled** to **TRUE.**
   B. Set **Bus Sychronization Enabled** to **TRUE.**
   C. Set **Coordinator Sync Support** to **TRUE.**
   D. Set the **Global Coordinator Time.** (Refer to 5.1 NmGlobalFeatures – section 12)

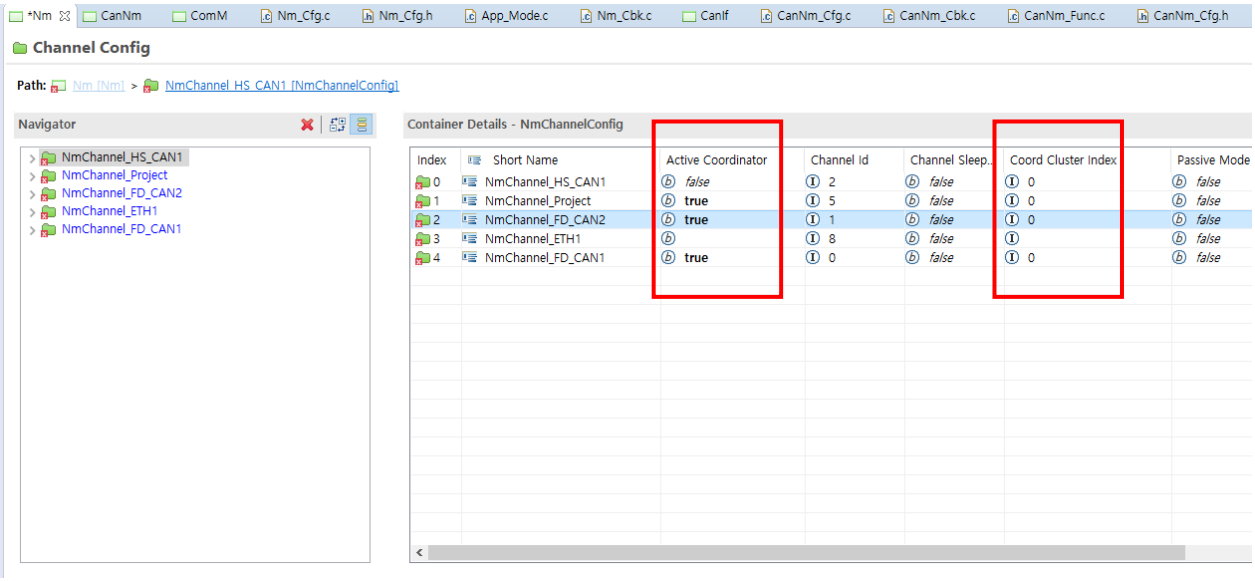


8.3.2.2 Nested Coordinator Configuration Example

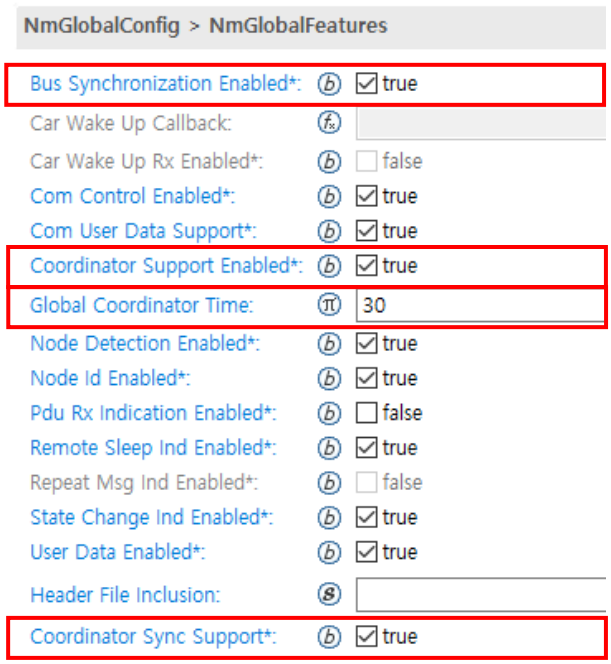
In the application, each user must configure it according to the intended use and the specification of each control unit.
Please note that configuration below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

The following example demonstrates a scenario where HS_CAN1, Project, FD_CAN1, and FD_CAN2 networks are grouped into a single Coordination Cluster, and within that cluster, a controller assumes the role of a Nested Coordinator, aiming to synchronize Sleep.

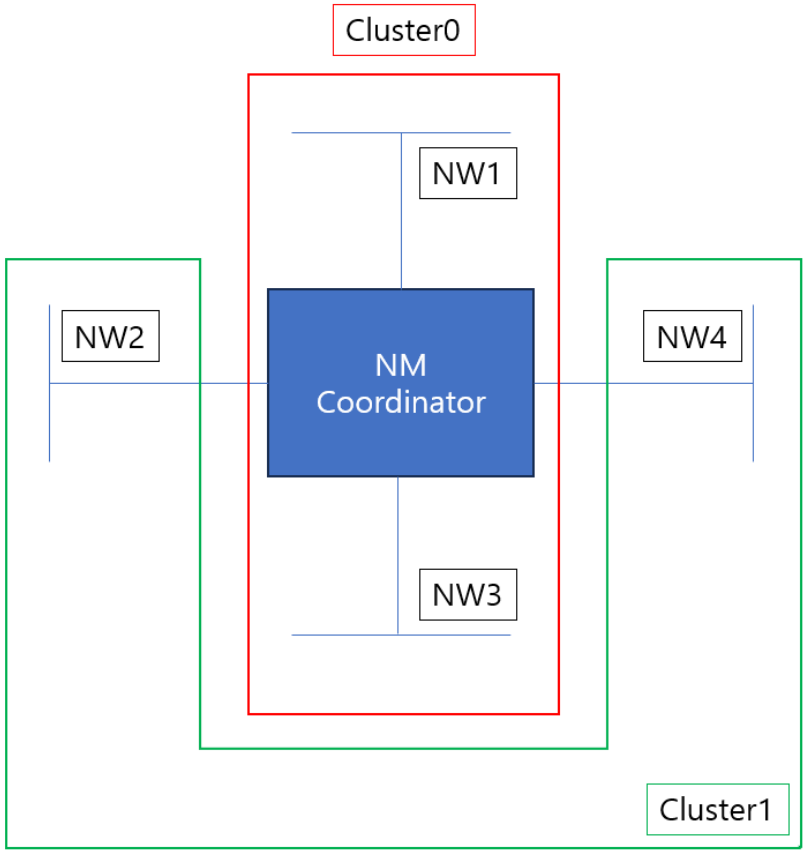
1) Configuration by Channel
   A. Set the **Coord Cluster Index** to 0 for all channels.
   B. For all channels, set **Active Coordinator** to **FALSE** for channels connected to the higher-level NM Coordinator's Actively Coordinated Channel, and set it to **TRUE** for the remaining channels.



3) GlobalConfig > NmGlobalFeatures Configuration
   A. Set **Coordinator Support Enabled** to **TRUE.**
   B. Set **Bus Sychronization Enabled** to **TRUE.**
   C. Set **Coordinator Sync Support** to **TRUE.**
   D. Set the **Global Coordinator Time.** (Refer to 5.1 NmGlobalFeatures – section 12)



8.3.3 One NM Coordinator controls multiple NM Clusters



In this way, a single Nm Coordinator can allocate multiple networks to different Nm Clusters, allowing each NM Cluster to independently control Sleep synchronization.

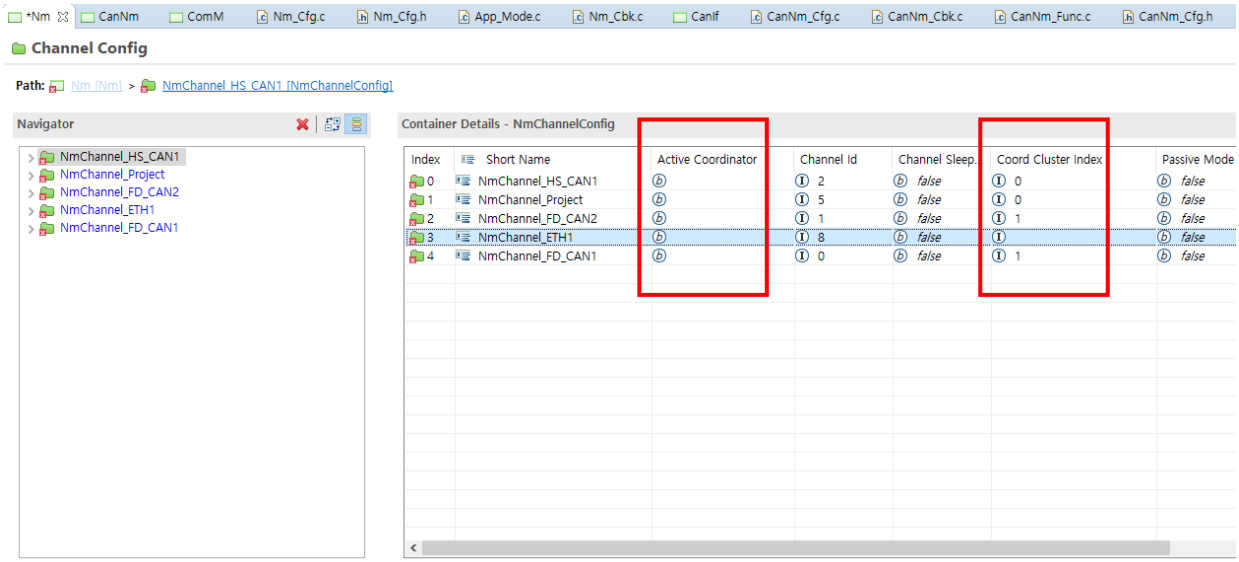
In the example mentioned above, where NW1(Network1) and NW3 belong to NM Cluster 0, and NW2 and NW4 belong to NM Cluster 1, Sleep synchronization for NW1 and NW3 operates independently from that of NW2 and NW4, with no impact on each other's sleep synchronization behaivor.

8.3.3.1 Example of Using Multiple NM Cluster with a Single NM Coordinator

In the application, each user must configure it according to the intended use and the specification of each control unit.
Please note that configuration below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

The following example illustrates a scenario where HS_CAN1 and Project are grouped into one NM Cluster, while FD_CAN1 and FD_CAN2 are configured as separate NM Clusters.

1) Configuration by Channel
   A. Set the **Coord Cluster Index** to 0 for the HS_CAN1 and Project channels, and set the **Coord Cluster Index** to 1 for the FD_CAN1 and FD_CAN2 channels.
   B. The **Active Coordinator** configuration value should be left blank for all channels.



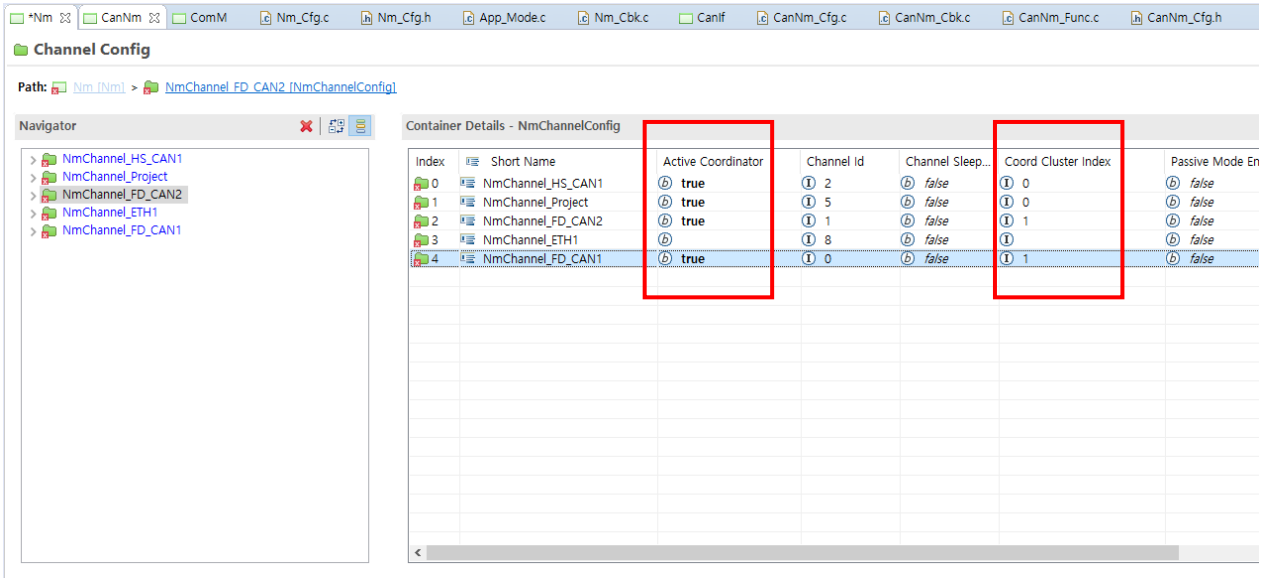
3) GlobalConfig > NmGlobalFeatures Configuration
   A. Set **Coordinator Support Enabled** to **TRUE.**
   B. Set **Bus Sychronization Enabled** to **TRUE.**
   C. Set **Coordinator Sync Support** to **FALSE.**

8.3.3.2 TopMost Coordinator Configuration Example

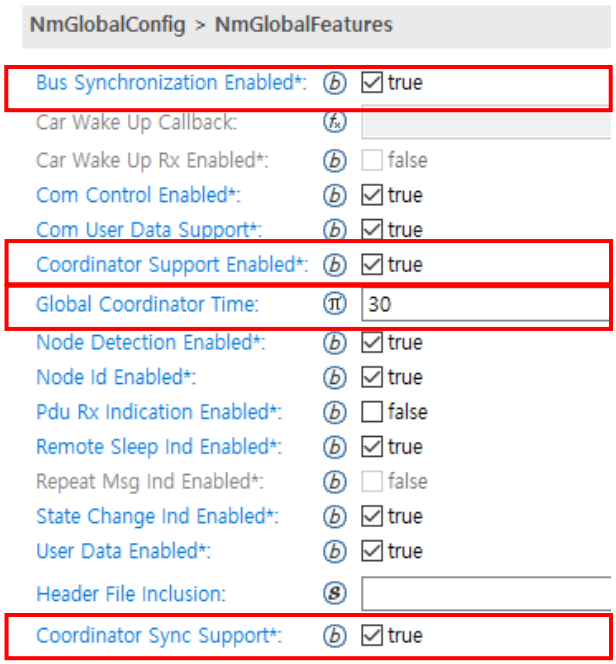
In the application, each user must configure it according to the intended use and the specification of each control unit.
Please note that configuration below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

The following example demonstrates a scenario where HS_CAN1 and Project are grouped into one NM Cluster, while FD_CAN1 and FD_CAN2 are configured as separate NM Clusters, and the NM Clusters are expected to operate under the control of a TopMost Coordinator.

1) Configuration by Channel
   A. Set the **Coord Cluster Index** to 0 for the HS_CAN1 and Project channels, and set the **Coord Cluster Index** to 1 for the FD_CAN1 and FD_CAN2 channels.
   B. Set **Active Coordinator** to **TRUE** for all channels.



4) GlobalConfig > NmGlobalFeatures Configuration
   A. Set **Coordinator Support Enabled** to **TRUE.**
   B. Set **Bus Sychronization Enabled** to **TRUE.**
   C. Set **Coordinator Sync Support** to **TRUE.**
   D. Set the **Global Coordinator Time.** (Refer to 5.1 NmGlobalFeatures – section 12)

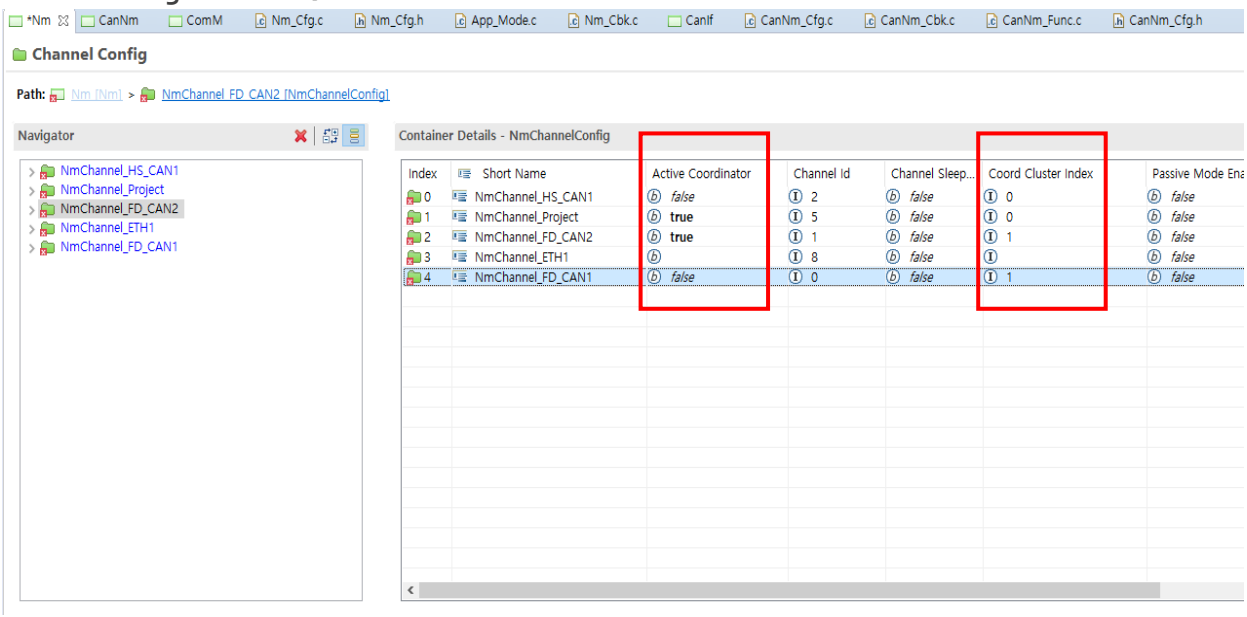


8.3.3.3 Nested Coordinator Configuration Example

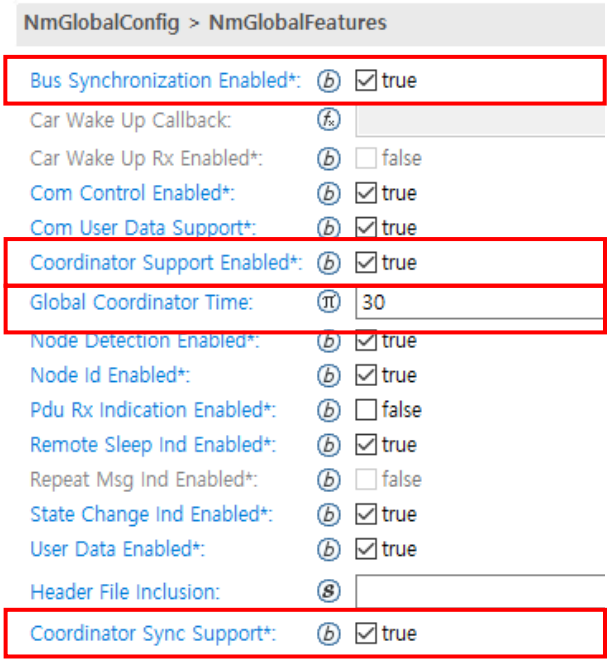
In the application, each user must configure it according to the intended use and the specification of each control unit.
Please note that configuration below are samples only. The platform will not be held responsible for any problem caused by the use of the below samples.

The following example demonstrates a scenario where HS_CAN1 and Project are grouped into one NM Cluster, while FD_CAN1 and FD_CAN2 are configured as separate NM Clusters, and the NM Clusters are expected to operate under the control of a Nested Coordinator.

1) Configuration by Channel
   A. Set the **Coord Cluster Index** to 0 for the HS_CAN1 and Project channels, and set the **Coord Cluster Index** to 1 for the FD_CAN1 and FD_CAN2 channels.
   B. For each NM Cluster, set **Active Coordinator** to **FALSE** for channels connected to the higher-level NM Coordinator's Actively Coordinated channel, and set it to **TRUE** for the remaining channels.



5) GlobalConfig > NmGlobalFeatures Configuration
   A. Set **Coordinator Support Enabled** to **TRUE.**
   B. Set **Bus Sychronization Enabled** to **TRUE.**
   C. Set **Coordinator Sync Support** to **TRUE.**
   D. Set the **Global Coordinator Time.** (Refer to 5.1 NmGlobalFeatures – section 12)



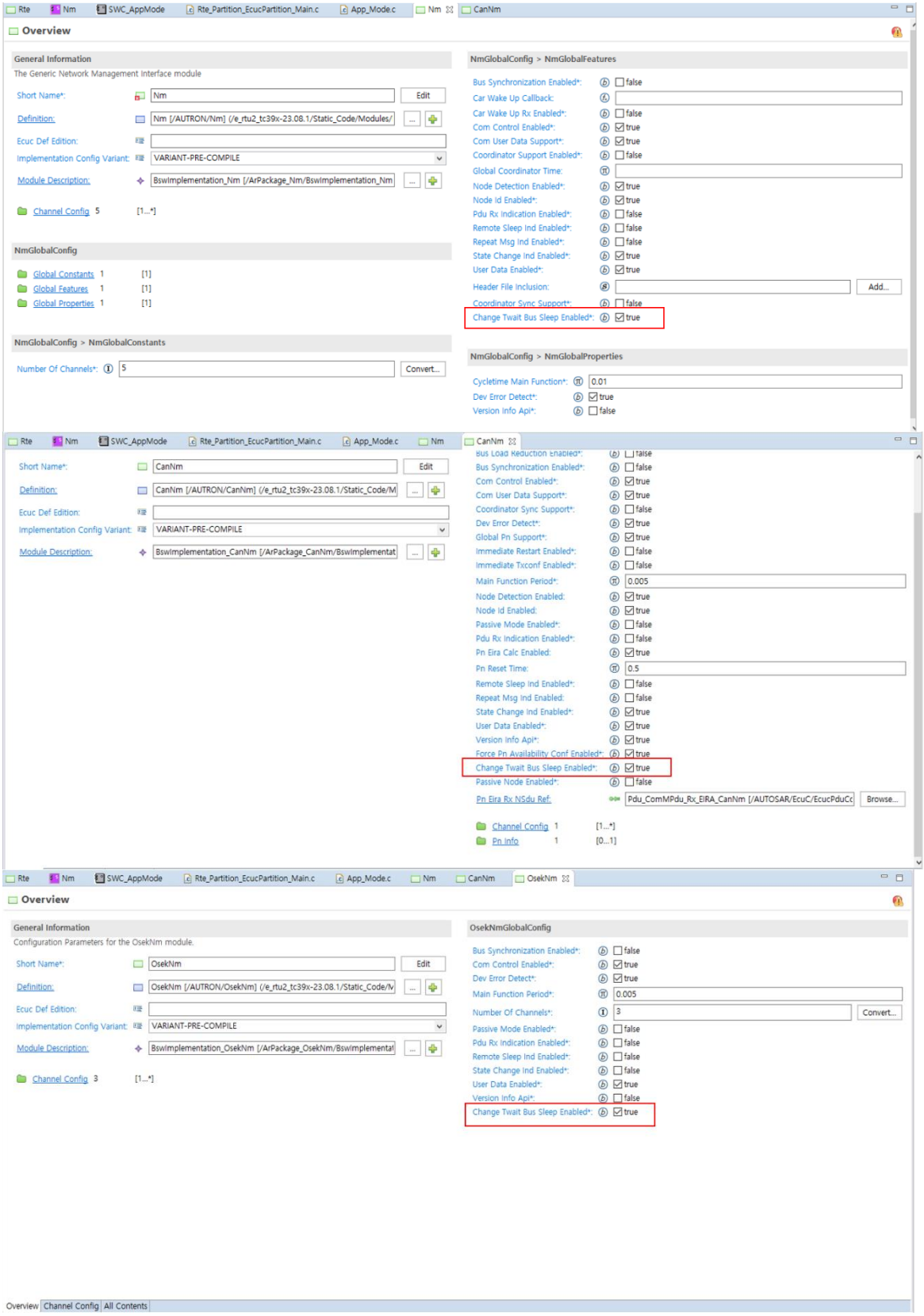
8.4 Nm_ChangeTWaitBusSleep API Configuration Guide

This chapter explains the settings users need to configure in order to utilize the 'Change Wait Bus Sleep Time' feature.

The following example is an illustration for changing Wait Bus Sleep Time in a controller utilizing both OsekNm and CanNm.

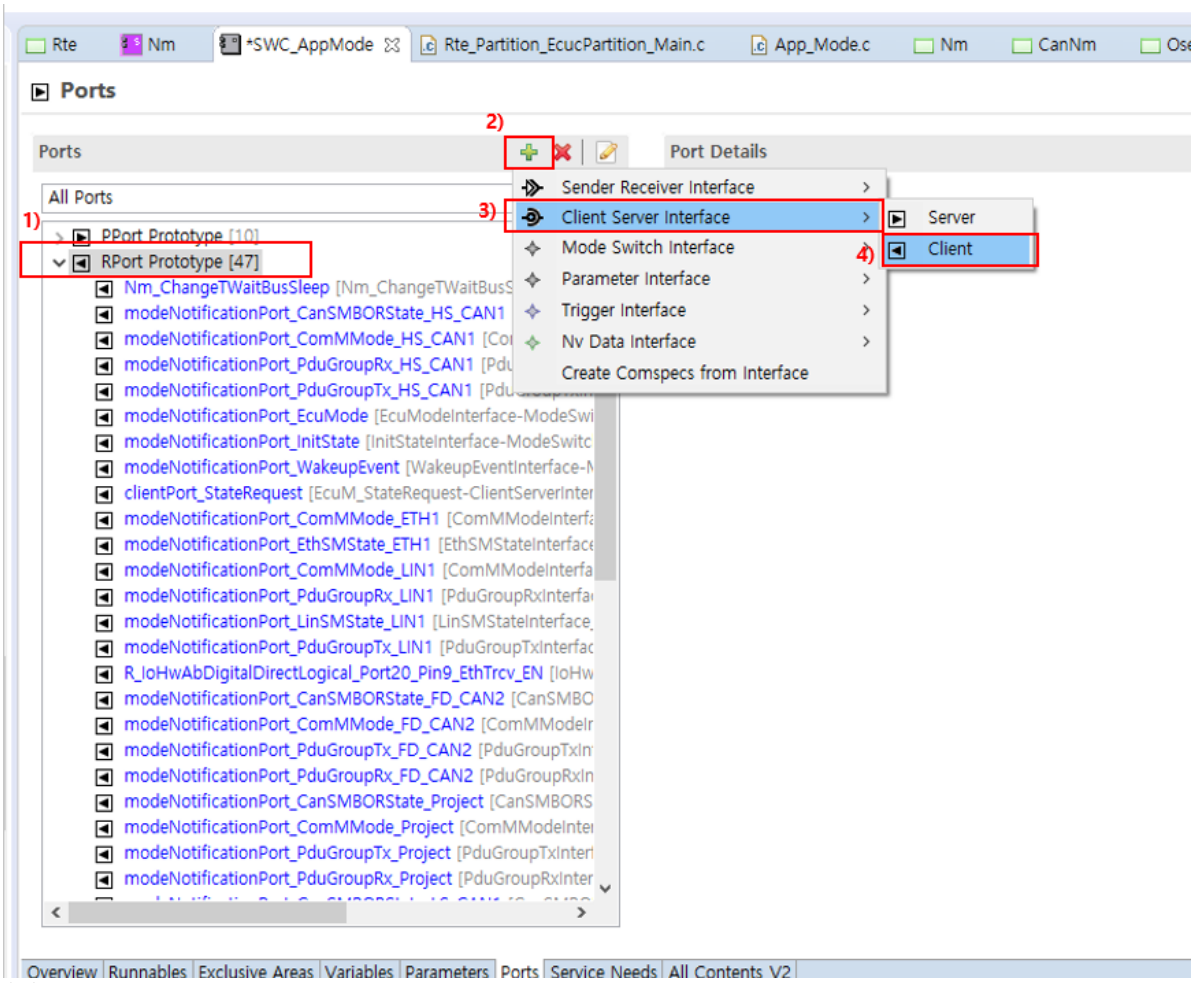
8.4.1 Module Configuration settings

1) Set Change Wait Bus Sleep Enabled to TRUE for Ecud_Nm.arxml, Ecud_CanNm.arxml, and Ecud_OsekNm.arxml.

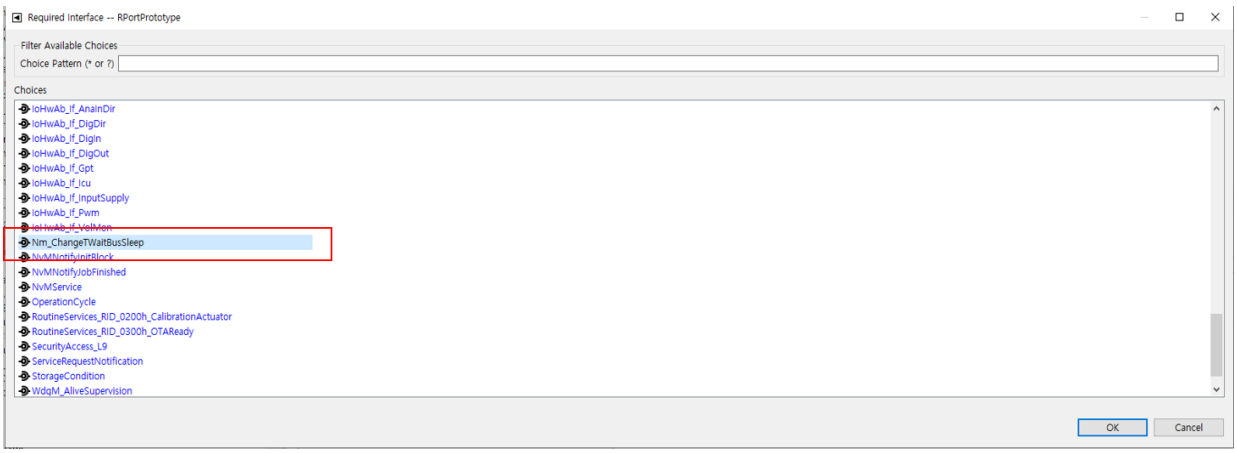


8.4.2 Addition of Client Port

1) In the SWC_AppMode of App_Mode.arxml, navigate to the Ports Tab and create an Client Port for Nm_ChangeTWaitBusSleep Call in the RPort Prototype.

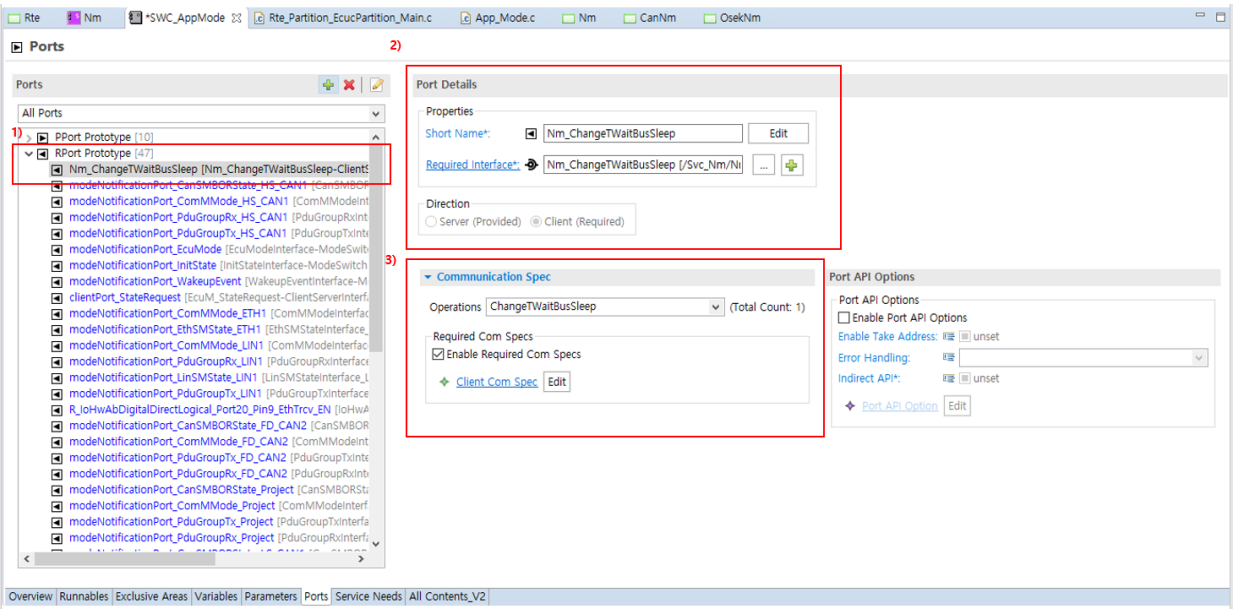


(1) Click on RPort Prototype
(2) Click on “+” button
(3) Click on Client Server Interface
(4) Click on Client



(1) Click on Nm_ChangeTWaitBusSleep and OK button

2) Client Port Detailed Configuration

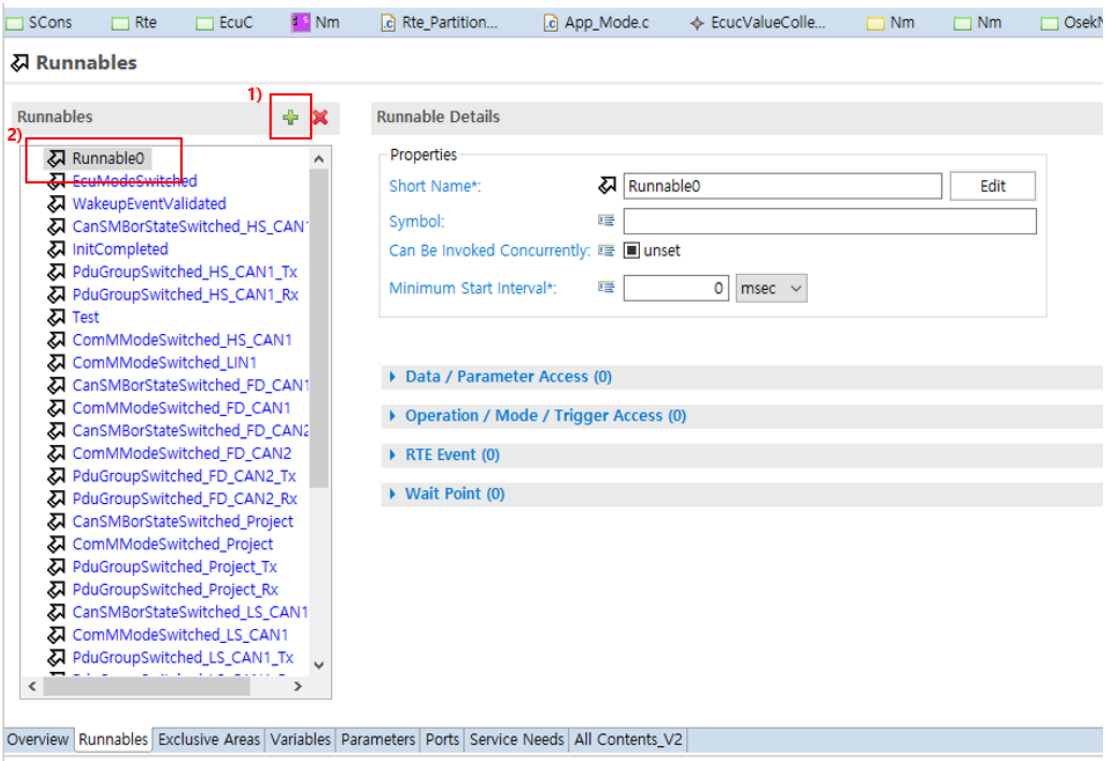


(1) Verify the Port creation
(2) Verify Port Details Information
    A. Properties
        i. Short Name : Nm_ChangeTWaitBusSleep
        ii. Required Interface : Nm_ChangeTWaitBusSleep(Ref : Swcd_Nm.arxml)
(3) Proceed with Communication Spec Settings
    A. Operations : ChangeTWaitBusSleep
    B. Required Com Specs : Enable Required Com Specs Check

8.4.3 Creating a new Runnable or adding settings to an existing Runnbale

[When creating a new Runnable]

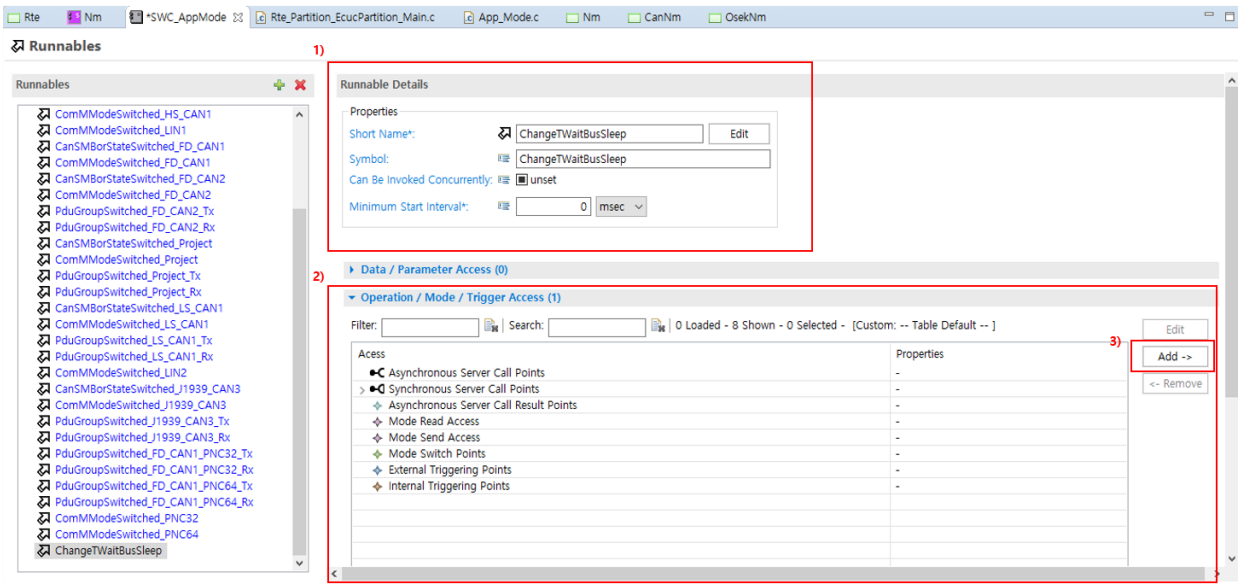
1) Navigate to the Runnables Tab and create a Runnable.



(1) Click on “+” button and Create a Runnable

(2) Verifiy the Runnable creation

2) Set up the Runnable after creating it.



(1) Runnable Details

A. Properties

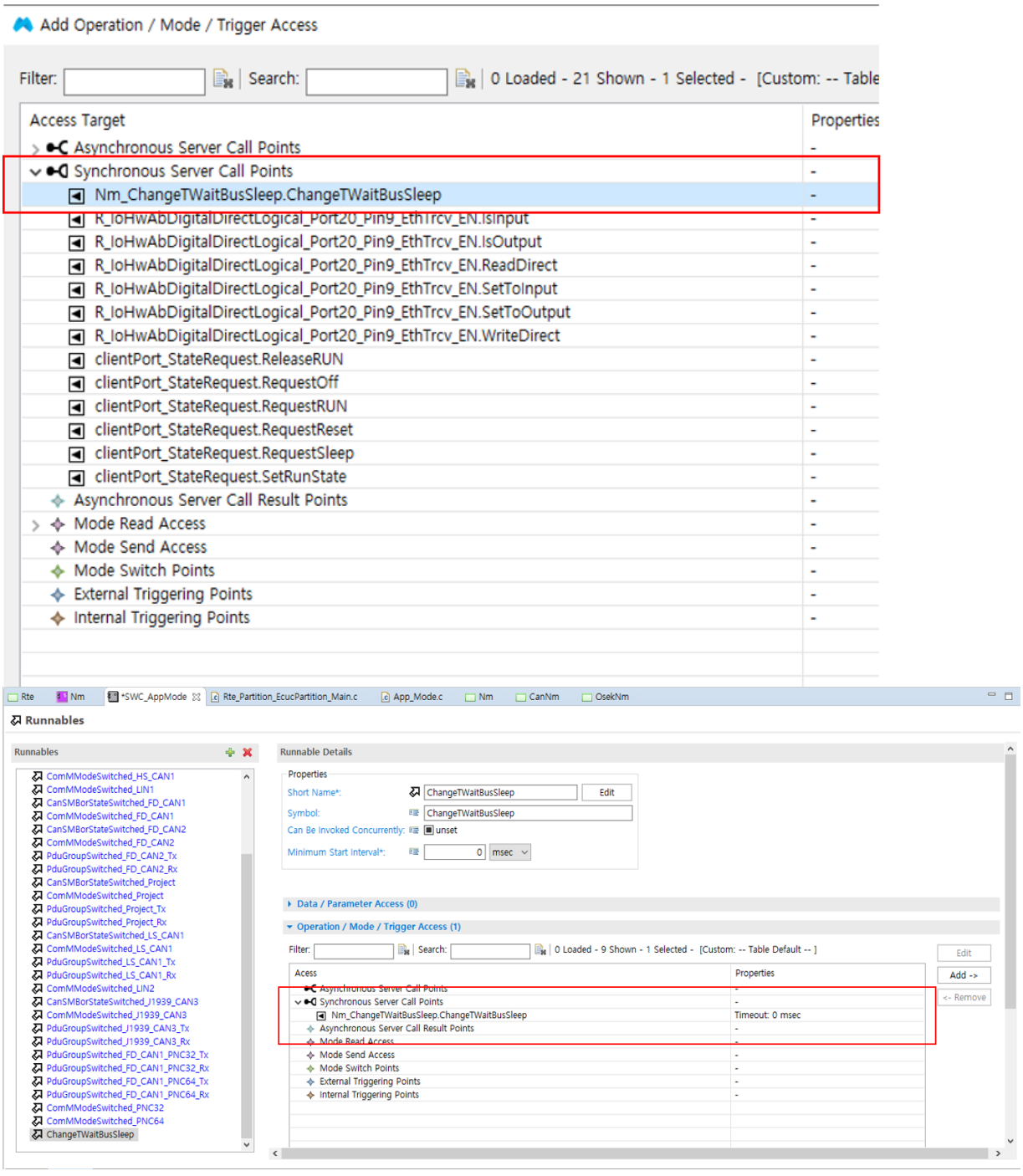
i. Short Name : ChangeTWaitBusSleep

ii. Symbol : ChangeTWaitBusSleep

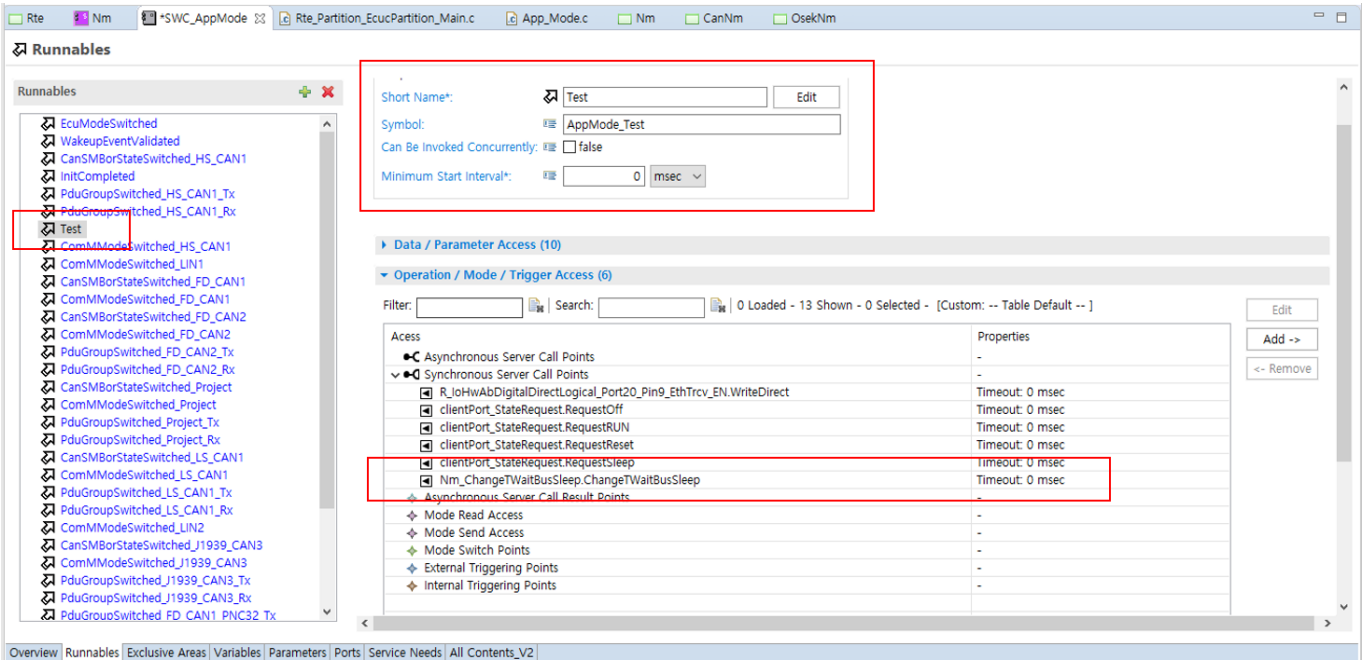
(2) Operation / Mode / Trigger Access

(3) Add button Click

3) Connect Client Port to Synchronous Server Call Points in Access Target



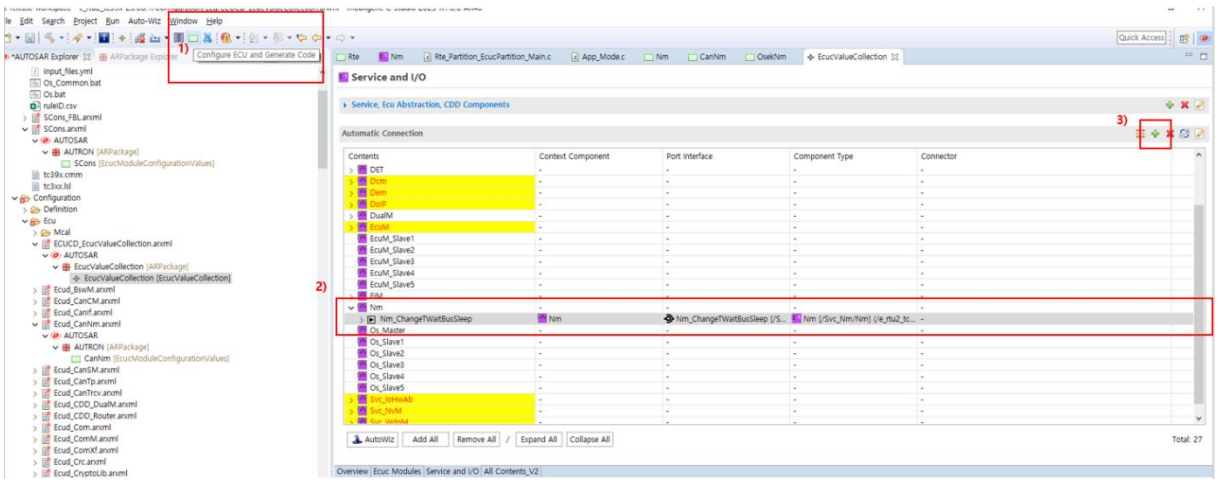
[When using an existing Runnable]



To add Nm_ChangeTWaitBusSleep.ChangeTWaitBusSleep to Synchronous Server Call Points of Operation / Mode / Trigger Access in Runnable named Test that has already been created, use “Add”.

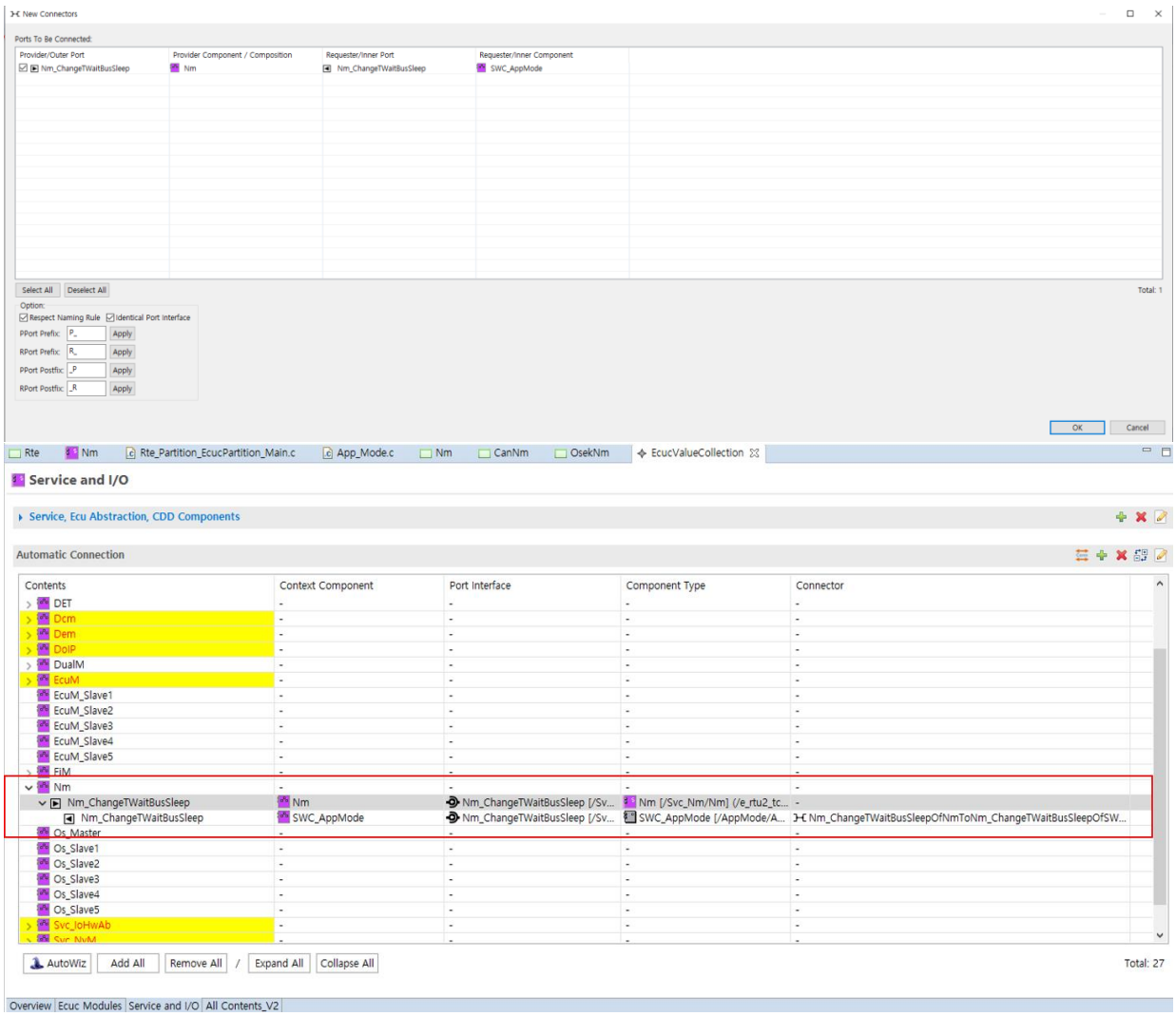
8.4.4 Connect to Service and I/O

1) Navigate to the Service and I/O Tab from EcucValueCollection in ECUCD_EcucValueCollection.arxml.



(1) Click on the green icon to move to EcucValueCollection
(2) Open the Nm Contents and Check Server Port
(3) Click on the “+” button and Connect to Server Port and Client Port

2) Check Ports To Be Connected and Connect to Server Port and Client Port



3) If you've set it up correctly, after Generatd, the Rte_Partition_EcucPartition_xxx.c file should contain the Rte_Call_SWC_AppMode_Nm_ChangeTWaitBusSleep_ChangeTWaitBusSleep FUNC.

```
FUNC(Std_ReturnType, RTE_CODE) Rte_Call_SWC_AppMode_Nm_ChangeTWaitBusSleep_ChangeTWaitBusSleep(
  /* polyspace<MISRA2012:D4.5:Not a defect:Justify with annotations> User defines parameter name */
  IN uint32 TwaitBusSleep)
{
  VAR(Std_ReturnType, RTE_DATA) LddRetVal = RTE_E_OK;
  /* polyspace<MISRA-C:14.2:Not a defect:Justify with annotations> AUTOSAR Standard rte_sws_1236 */
  Rte_Runnable_Nm_ChangeTWaitBusSleep_Start();
  Nm_ChangeTWaitBusSleep(
    TwaitBusSleep);
  /* polyspace<MISRA-C:14.2:Not a defect:Justify with annotations> AUTOSAR Standard rte_sws_1236 */
  Rte_Runnable_Nm_ChangeTWaitBusSleep_Return();
  return LddRetVal;
}
```