ComXf User Manual

Document Change History				
Date (YYYY-MM-DD)	Ver.	Editor	Chap	Change Descriptions
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2023-02-23	1.0.11.0	KhaLN1	4.2 4.3	- Scope of Release - Add Change Log
2023-04-26	1.0.11.1	KhaLN1	4.3	- Add Change Log

User Manual

Table of Contents

1   Overview

This document provides caution or reference information for users when setting parameters or designing systems for ComXf module in the Hyundai AutoEver AUTOSAR platform. It is written based on SRS/SWS AUTOSAR standard. More detailed information can be found in the reference document below.
The category characters are using for setting:

- Changeable (C)   : The items can be set by the user.
- Fixed (F)   : The items cannot be set by the user
- Not Supported (N)   : Unused items

2   Reference

Sl. No.	Title	Version
1	AUTOSAR_SWS_COMBasedTransformer.pdf	4.4.0
2	AUTOSAR_ASWS_TransformerGeneral.pdf	4.4.0

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# 3 AUTOSAR System

3.1 Overview of Transformer Module

A transformer is a BSW Module, which is using when AUTOSAR System need to use Data Transformation mechanism and has the following features:

- It is called by RTE Layer in AUTOSAR System.
- The RTE performs modification on the data received from the SW-C or BSW.
- Data type is transform on the sender side, and data get from communication is returned to the origin form (before the transformation) on the receiver side.
- Each Transformer Modules exist for each function(e.g. E2E Transformer, Com-Based Transformer)
- Transformer is divided into Serializer / Safety / Security / Custom class according to the role.
- Transformer Chain: The concept of the queue, which has the elements is the transformers.
- One Transformer Module belongs to a specific Transformer Chain and it is called in order by RTE
- Multiple Transformer Modules can be used in chain in one Transformer Chain.
- A data goes through a Transformer is always converted into a linear byte array.
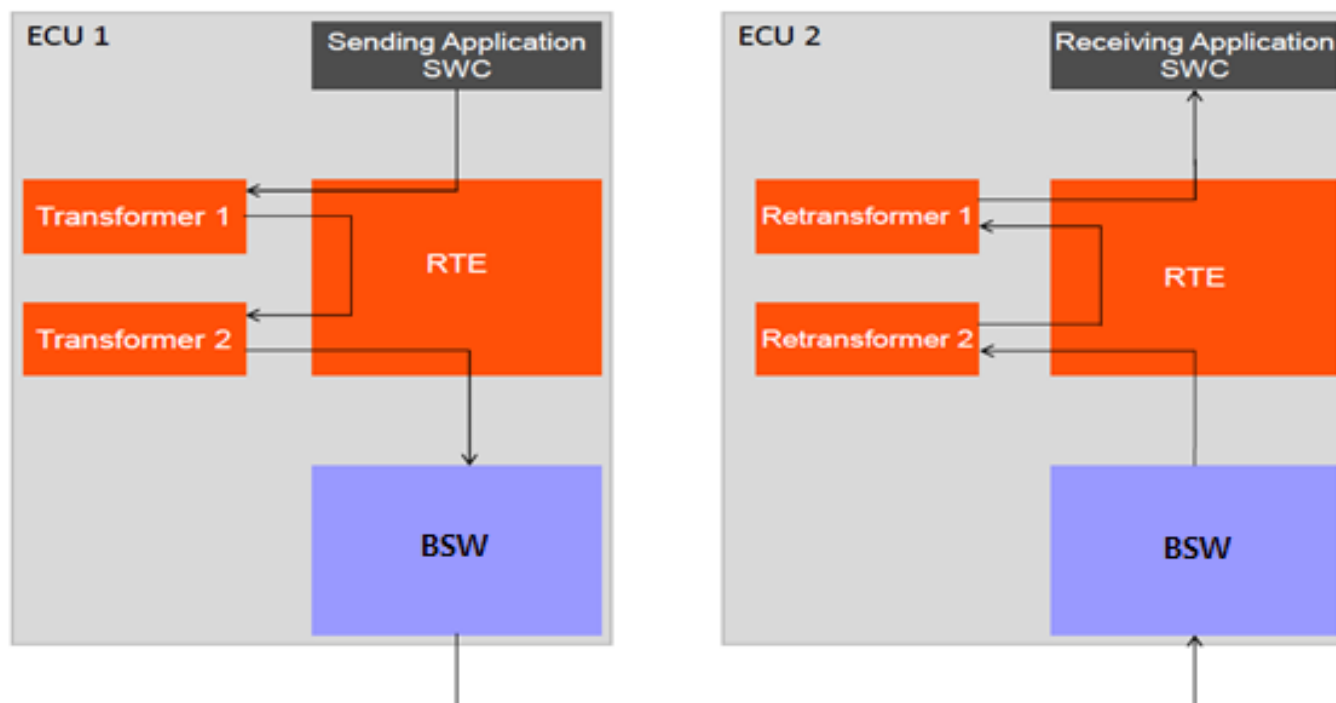
3.2 ComXf Module

The COM Based transformer is a module, which is used for signal serialization at the upper stage(RTE) of the COM module, when need to apply E2E. This module provides the APIs for packing(serialization)/unpacking(deserialization) the Signal Group in the RTE module. Following in the below, the COM Based transformer handles GroupSignal D1, D2, D3, D4, the E2E transformer handles CRC, SC of SignalGroup X into a uint8-array representation, which is handle at a Signal Pdu in the COM module.
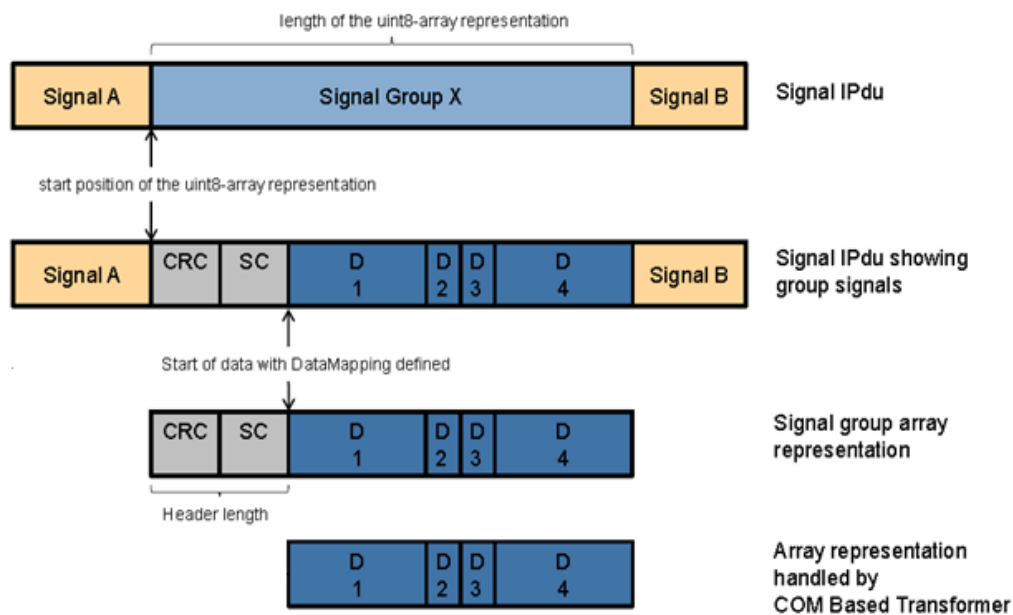
4 Product Release Notes

4.1 Overview

This chapter provides release related content for the Hyundai AutoEver ComXf module and describes restrictions and specifics for the release versions of ComXf Software product.

4.2 Scope of the Release

All contents of this document are limited following Hyundai AutoEver ComXf module in the table below.

Module name	AUTOSAR version	SWS version	Module version
ComXf	4.4.0	4.4.0	1.0.11

Module version is the SwVersion of each BswModule Description(Bswmd) file.

4.3 Change Log

4.3.1 Version 1.0.11.1

 ➢ Task

  ■ GTS/GTR for ComXf

Cause	Run GTTS for the latest version of ComXf

Operation effect	None
Setting effect	None
ASW Action	None

➢ Task

■ Apply the newest template to the work product

Cause	Apply the latest ComXf template for GTTS/GTTR
Operation effect	None
Setting effect	None
ASW Action	None

4.3.2 Version 1.0.11.0

➢ Improvement

■ Update conditions for generating ComXf_Kast_SigPackInfo and ComXf_Kast_SigUnPackInfo variables.

Cause	Missing conditions for generating ComXf_Kast_SigPackInfo and ComXf_Kast_SigUnPackInfo variables
Operation effect	None
Setting effect	None
ASW Action	None

4.3.3 Version 1.0.10.0

➢ Bug

■ Missing include ComXf_PbCfg.h in ComXf.h

Cause	Compilation error due to missing include ComXf_PbCfg.h in ComXf.h
Operation effect	None
Setting effect	None
ASW Action	None

4.3.4 Version 1.0.9.0

➢ Improvement

■ Add a message error "ERR1750055" when a Post Build is set but EcuC instance or PredefinedVariant is missing.

Cause	There is no error message in case Post Build is set but EcuC instance or PredefinedVariant is missing.
Operation effect	None

Setting effect	None
ASW Action	None

> ➢ Bug

■ Fix issue generation broken when PostBuild is set.

Cause	Generation broken when PostBuild is set.
Operation effect	None
Setting effect	None
ASW Action	None

4.3.5 Version 1.0.8.0

➢ Improvement

■ Update Post-Build generation structure

Cause	Update Post-Build generation structure
Operation effect	None
Setting effect	None
ASW Action	None

4.3.6 Version 1.0.7.0

➢ Feature

■ Support Post-build feature

Cause	Support Post-build feature
Operation effect	None
Setting effect	None
ASW Action	None

4.3.7 Version 1.0.6.1

➢ Task

■ Editorial Changes of Work Products

Cause	• Clarify the copyright of code • Delete Module.bat file in the module
Operation effect	None
Setting effect	None
ASW Action	None

4.3.8 Version 1.0.6.0

➢ Defect

■ Fix SW patch version mismatch

Cause	Fix SW patch version mismatch in Bswmd_ComXf.arxml in test code
Operation effect	None
Setting effect	None
ASW Action	None

4.3.9 Version 1.0.5.0

➢ Change Request

■ Fix compile warning

Cause	Fix compile warning in ComXf_APIs.c and ComXf_Cfg.c
Operation effect	None
Setting effect	None
ASW Action	None

4.3.10 Version 1.0.4.0

➢ Change Request

■ Fix security coding rule violations

Cause	CERT-C EXP39-C and ISO17961 ptrcomp coding issues.
Operation effect	None
Setting effect	None
ASW Action	None

4.3.11 Version 1.0.3.0

➢ Change Request

■ Improve the execution time of ComXf Generator

Cause	The execution time of ComXf Generator needs to be shorten.
Operation effect	None
Setting effect	None
ASW Action	None

➢ Change Request

■ Apply the change of company name to the work products

Cause	Company name change from Autron to AutoEver. Update ComXf work products to comply with new CM
Operation effect	None
Setting effect	None
ASW Action	None

4.3.12 Version 1.0.2.0

➢ Defect

■ Fix generator not to produce build error when there's no tx signal group or rx signal group

Cause	When there's no tx signal group or rx signal group, build error occurs because of the problem of ComXf_Cfg.c
Operation effect	None
Setting effect	None
ASW Action	None

4.3.13 Version 1.0.1.0

➢ Development

■ Modify generator not to raise ERR1750053 even though Signal Group that is Array Access 'true' is not byte aligned.

Cause	ERR1750053 is regarding the byte align check for Signal Group that is Array Access 'true'. Because there is no effect on behavior when we allow this error and there are lots of DBs having Signal Groups those are not byte aligned, this error should be allowed and removed.
Operation effect	None
Setting effect	None
ASW Action	None

4.3.14 Version 1.0.0.0

➢ Feature

■ New ComXf module development

Cause	New development
Operation effect	None

Setting effect	None
ASW Action	None

4.4 Module Release Notes

4.4.1 Limitations

None

4.4.2 Deviations

➢ **XfrmGeneral-XfrmInstanceId Add setting**
Xfrminstanceld configuration is added to specifies the InstanceId of this module instance.

➢ **XfrmGeneral-XfrmVersionInfoApi Add setting**
XfrmVersionInfoApi configuration is adding to active/deactive the version information API.

➢ **XfrmGeneral-XfrmDevErrorDetect Add setting**
XfrmDevErrorDetect configuration is added to switches the development error detection and notification on or off.

➢ **XfrmGeneral-XfrmCpuEndianness Add setting**
XfrmCpuEndianness configuration is added to check MCU endianess for API creation process.

5 Configuration Guide

ComXf configurations of AUTOSAR platform distributed by Hyundai AutoEver should be set by the users follow by the project requirements..

5.1 Xfrm-XfrmGeneral Setting

Parameter Name	Value	Category
XfrmDevErrorDetect	True	C
XfrmVersionInfoApi	False	C
XfrmInstanceId	0	C
XfrmCpuEndianness	From SRS	C

1) XfrmDevErrorDetect

   - Report the development errors to DET, On/Off setting.

   - False is default setting.

2) XfrmVersionInfoApi

   - Active or de-active the Version Information Api, True/False setting.

   - False is default setting.

3) XfrmInstanceId

- Set the InstanceId of the module instance.

- 0 is default setting

4) XfrmCpuEndianness

- Set the MCU endianness type.

5.2 Xfrm-XfrmImplementationMapping Setting

Parameter Name	Value	Category
XfrmInvTransformerBswModuleEntryRef	User Defined	C
XfrmTransformationTechnologyRef	User Defined	C
XfrmTransformerBswModuleEntryRef	User Defined	C
XfrmVariableDataPrototypeInstanceRef	User Defined	C
XfrmSignalGroupRef	User Defined	C

XfrmInvTransformerBswModuleEntryRef and XfrmTransformerBswModuleEntryRef should not be set or not set together. Using for PPort is XfrmTransformerBswModuleEntryRef, and RPort is XfrmInvTransformerBswModuleEntryRef.

1) XfrmInvTransformerBswModuleEntryRef

- Reference to BswModuleEntry configuration in bswmd file.

- Refer to API naming rule for Appendix.

2) XfrmTransformationTechnologyRef

- Reference to TransformationTechnology configuration in DataTransformation in system

description.

3) XfrmTransformerBswModuleEntryRef

- Reference to BswModuleEntry configuration in bswmd file.

- Refer to API naming rule in Appendix.

4) XfrmVariableDataPrototypeInstanceRef

- Reference to a VariableDataPrototype for case a dedicated transformer BswModuleEntry is

required per VariableDataPrototype access.

5) XfrmSignalGroupRef

- Reference to SignalGroup in COM module.

5.3 Xfrm-XfrmImplementationMapping-XfrmSignal-XfrmSignalChoice-XfrmISignalGroupRefChoice Setting

Parameter Name	Value	Category
XfrmISignalGroupRef	User Defined	C

Item Xfrm-XfrmImplementationMapping-XfrmSignal-XfrmSignalChoice-XfrmISignalRefChoice is not used for ComXf module.

1) XfrmISignalGroupRef

   - Reference to ISignalGroup using ComXf

6 Application Programming Interface (API)

6.1 Type Definitions

None

6.2 Macro Constants

None

6.3 Functions

Create a Packing(Serialization)/Unpacking(Deserialization) API for each SignalGroup using ComXf. These function is not called directly from the App, they is only used by App through RTE.

6.3.1 ComXf_<transformerId>

```
uint8 ComXf_<transformerId>
(
    uint8* buffer,
    uint16* bufferLength,
    const <type>* dataElement
)
```

buffer : Buffer allocated by the RTE, where the transformed data has to be stored by the transformer
bufferLength : Used length of the buffer
dataElement : Data element which shall be transformed
data element :
   - ✓ 0x00 (E_OK): Serialization successful

   - ✓ 0x81 (E_SER_GENERIC_ERROR): A generic error occurred

Refer to Appendix for <transformerId>.

6.3.2 ComXf_Inv_<transformerId>

```
uint8 ComXf_Inv_<transformerId>
(
    const uint8* buffer,
    uint16 bufferLength,
    <type>* dataElement
)
```

buffer : Buffer allocated by the RTE, where the still serialized data are stored by the Rte
bufferLength : Used length of the buffer
dataElement : Data element which is the result of the transformation and contains the deserialized data
element :

    ✓   0x00 (E_OK) : Serialization successful

    ✓   0x01 (E_NO_DATA) : No data available which can be deserialized

    ✓   0x81 (E_SER_GENERIC_ERROR) : A generic error occurred

Refer to Appendix for <transformerId>.

7 Generator

7.1 Generator 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.

1.	ERR1750001 : Value of the parameter XfrmCpuEndianness in container XfrmGeneral should be specified value
Description: Code generator will throw an error, if parameter XfrmCpuEndianness in the container XfrmGeneral is not set value.

2.	ERR1750004: Value of the parameter XfrmTransformationTechnologyRef in container XfrmImplementationMapping should be specified value.
Description: Code generator will throw an error, if parameter XfrmTransformationTechnologyRef in the container XfrmImplementationMapping is not set value.

3.	ERR1750005: Parameter XfrmTransformerBswModuleEntryRef or XfrmInvTransformerBswModuleEntryRef in container XfrmImplementationMapping should be specified

value.
Description: Code generator will throw a warning, if parameter XfrmTransformerBswModuleEntryRef and XfrmInvTransformerBswModuleEntryRef in the container XfrmImplementationMapping are not set value.

4.   ERR1750006:   Only   one   parameter   XfrmTransformerBswModuleEntryRef   or XfrmInvTransformerBswModuleEntryRef in container XfrmImplementationMapping should be specified value.
Description: Code generator will throw a warning, if parameter XfrmTransformerBswModuleEntryRef and XfrmInvTransformerBswModuleEntryRef in the container XfrmImplementationMapping are both set value.

5.   ERR1750007: Value of parameter XfrmSignalGroupRef in container XfrmImplementationMapping should be specified value.
Description: Code generator will throw an error, if parameter XfrmSignalGroupRef in the container XfrmImplementationMapping is not set value.

6.   ERR1750009: Value of parameter XfrmInstanceId in the container XfrmGeneral should be specified value.
Description: Code generator will throw an error, if parameter XfrmInstanceId in the container XfrmGeneral is not set value.

7.   ERR1750010: Value of attribute PROTOCOL of transformation technology that mapped to parameter XfrmTransformationTechnologyRef in the container XfrmImplementationMapping should be set to COMBased.
Description: Code generator will throw an error, if attribute PROTOCOL of transformation technology that mapped to parameter XfrmTransformationTechnologyRef in the container XfrmImplementationMapping is not set to COMBased.

8.   ERR1750011: Value of attribute TRANSFORMER-CLASS of transformation technology that mapped to parameter XfrmTransformationTechnologyRef in the container XfrmImplementationMapping should be set to SERIALIZER.
Description: Code generator will throw an error, if attribute TRANSFORMER-CLASS of transformation technology that mapped to parameter XfrmTransformationTechnologyRef in the container XfrmImplementationMapping is not set to SERIALIZER.

9.   ERR1750012: Value of attribute VERSION of transformation technology that mapped to parameter XfrmTransformationTechnologyRef in the container XfrmImplementationMapping should be set to 1.0.0.
Description: Code generator will throw an error, if attribute VERSION of transformation technology that mapped to parameter XfrmTransformationTechnologyRef in the container XfrmImplementationMapping is not set to 1.0.0.

10.   ERR1750014: The Module Description values arReleaseVersion, swVersion and vendorId of the Ecuc module configuration values should not be null.
Description: Code generator will throw an error, if This error occurs when the module description values arReleaseVersion, swVersion and vendorId is null in the Bsw module description file.

11.   ERR1750015: ComSignalLength should be configured for ComGroupSignal with ComSignalType is UINT8_N.

Description: Code generator will throw an error, if ComSignalLength is not configured for ComGroupSignal with ComSignalType is UINT8_N.

12.   ERR1750016: ComSignalGroupArrayAccess should be set to true in the Com module configuration. Description: Code generator will throw an error, if ComSignalGroupArrayAccess is not set to true in the Com module configuration.

13.   ERR1750017: ComBitSize should be configured in ComGroupSignal.
Description: Code generator will throw an error, if ComBitSize is not configured in ComGroupSignal.

14.   ERR1750018: ComSignalBitPosition should not be overlapped for the ComSignalGroup.
Description: Code generator will throw an error, if ComSignalBitPosition is overlapped for the ComSignalGroup.

15.   ERR1750019: ComSignalBitPosition should not be overlapped across two ComGroupSignal which are mapped to same ISignalIpdu.
Description: Code generator will throw an error, if ComSignalBitPosition is overlapped across two ComGroupSignal which are mapped to same ISignalIpdu.

16.   ERR1750020: ComSystemTemplateSystemSignalRef should be same configured for the ComGroupSignal.
Description: Code generator will throw an error, if ComSystemTemplateSystemSignalRef is same configured for the ComGroupSignal.

17.   ERR1750021: ComGroupSignalBitSize or SignalType should be configured properly for ComSignalGroup.
Description: Code generator will throw an error, if ComGroupSignalBitSize or SignalType is not configured properly for ComSignalGroup.

18.   ERR1750022: ComSystemTemplateSignalGroupRef should be configured in the ComSignalGroup.
Description: Code generator will throw an error, if ComSystemTemplateSignalGroupRef is not configured in the ComSignalGroup.

19.   ERR1750023: ComSystemTemplateSignalRef should be configured in the ComGroupSignal.
Description: Code generator will throw an error, if ComSystemTemplateSignalRef is not configured in the ComGroupSignal.

20.   ERR1750024: ComGroupSignal comSignalEndianness should be either BIG or LITTLE Endian for signal type other than UINT8_N.
Description: This error occurs, if ComSignalEndianness is neither BIG Endian nor LITTLE Endian for ComGroupSignal type other than UINT8_N.

21.   ERR1750025: ComGroupSignal ComSignalEndianness should be OPAQUE for signal type UINT8_N.
Description: This error occurs, if ComSignalEndianness is not set OPAQUE for signal type UINT8_N.

22.   ERR1750026: SystemSignalGroup should be configured in the ISignalGroup.
Description: This error occurs, if SystemSignalGroup is not configured in the ISignalGroup.

23. ERR1750027: ISignalGroup should be configured in the ComXfISignalToIPduMapping.
Description: This error occurs, if ISignalGroup is not configured in the ComXfISignalToIPduMapping.

24. ERR1750028: ISignal should be configured in the ComXfISignalToIPduMapping.
Description: This error occurs, if ISignal is not configured in the ComXfISignalToIPduMapping.

25. ERR1750029: XfrmTransformationTechnologyRef should be present in ComBasedSignalGroupTransformations.
Description: This error occurs, if XfrmTransformationTechnologyRef is not present in ComBasedSignalGroupTransformations.

26. ERR1750030: SystemSignal should be configured in the ISignal.
Description: This error occurs, if SystemSignal is not configured in the ISignal.

27. ERR1750032: SignalLength for Uint8_N or ComBitSize for the other than UINT8_N should not be 0.
Desccription: This error occurs, if SignalLength for Uint8_N or ComBitSize for the ComGroupSignal other than UINT8_N is 0.

28. ERR1750034: The SenderReceiverToSignalGroupMapping should be configured in DataMapping.
Description: This error occurs, if the SenderReceiverToSignalGroupMapping is not configured in DataMapping.

29. ERR1750035: TypeMapping should be configured in SenderReceiverToSignalGroupMapping.
Description: This error occurs, if TypeMapping is not configured in SenderReceiverToSignalGroupMapping.

30. ERR1750036: SystemSignal should be configured for SignalGroup in recordElementMappings.
Description: This error occurs, if SystemSignal is not configured for SignalGroup in recordElementMappings.

31. ERR1750037: ImplementationDataType reference should be given in variable data prototype.
Description: This error occurs, if ImplementationDataType reference is not given in variable data prototype.

32. ERR1750038: VariableDataPrototypeInSystemInstanceRef should be configured in SenderReceiverToSignalGroupMapping for ComSignalGroup.
Description: This error occurs, if VariableDataPrototypeInSystemInstanceRef is not configured in SenderReceiverToSignalGroupMapping for ComSignalGroup.

33. ERR1750039: SystemSignalGroup should be configured in SenderReceiverToSignalGroupMapping for ComSignalGroup.
Description: This error occurs, if SystemSignalGroup is not configured in SenderReceiverToSignalGroupMapping for ComSignalGroup.

34. ERR1750040: The COM Based Transformer should not support Client-Server Mapping
Description: This error occurs, if Client-Server Mapping is configured.

35. ERR1750041: The COM Based Transformer should not support UINT8_DYN data type

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Description: This error occurs, if TypeMapping is not configured in SenderReceiverToSignalGroupMapping

36.   ERR1750042: Composite data types other than STRUCTURE, ARRAY should not be configured for Implementation Data Type.
Description: This error occurs, if Composite data types other than STRUCTURE, ARRAY is configured for Implementation Data Type.

37.   ERR1750043: Value of parameter XfrmDevErrorDetect in the container XfrmGeneral should be specified value
Description: This error occurs, if parameter XfrmDevErrorDetect in the container XfrmGeneral is not set value.

38.   ERR1750044: Value of parameter XfrmVersionInfoApi in the container XfrmGeneral should be specified value.
Description: This error occurs, if parameter XfrmVersionInfoApi in the container XfrmGeneral is not set value.

39.   ERR1750049: ComTxIPduUnusedAreasDefault should be configured properly for ComSignalGroup.
Description: This error occurs, if parameter ComTxIPduUnusedAreasDefault in the container ComSignalGroup is not set value.

40.   ERR1750051: Value of attribute INPLACE of transformation technology should be set false.
Description: This error occurs when attribute INPLACE of transformation technology is not OutPlace.

41.   ERR1750054: In case of post-build-selectable configuration, the number of the variants in a post-build item should be same with other post-build items.
Description: This error occurs when number of the variants in a post-build item is not same with other post-build items.

42.   ERR1750055: The EcuC instance and PredefinedVariant must exist when Post Build is set.
Description: This error occurs when post-build is set but EcuC instance or PredefinedVariant is missing.

43.   WRN1750031: Multiple COMBased Transformation Technology Protocol should not be present in the transformer chain.
Description: Code generator will throw a warning, if the multiples COM Based Transformation Technology Protocol are present in the transformer chain.

44.   WRN1750046: Value of AR-RELEASE-VERSION in the BSW-IMPLEMENTATION should be set to 4.4.0.
Description: Code generator will throw a warning, if value of AR-RELEASE-VERSION in the BSW-IMPLEMENTATION is not set to 4.4.0.

45.   WRN1750047: Value of MODULE-ID in the BSW-MODULE-DESCRIPTION should be set to value 175.
Description: Code generator will throw a warning, if value of MODULE-ID in the BSW-MODULE-DESCRIPTION is no set to value 175.

46.   WRN1750048: Value of VENDOR-ID in the BSW-MODULE-DESCRIPTION should be set to 76.
Description: Code generator will throw a warning, if value of VENDOR-ID in the BSW-MODULE-DESCRIPTION is not set to 76.

8   Appendix

8.1 Bswmd File Setting

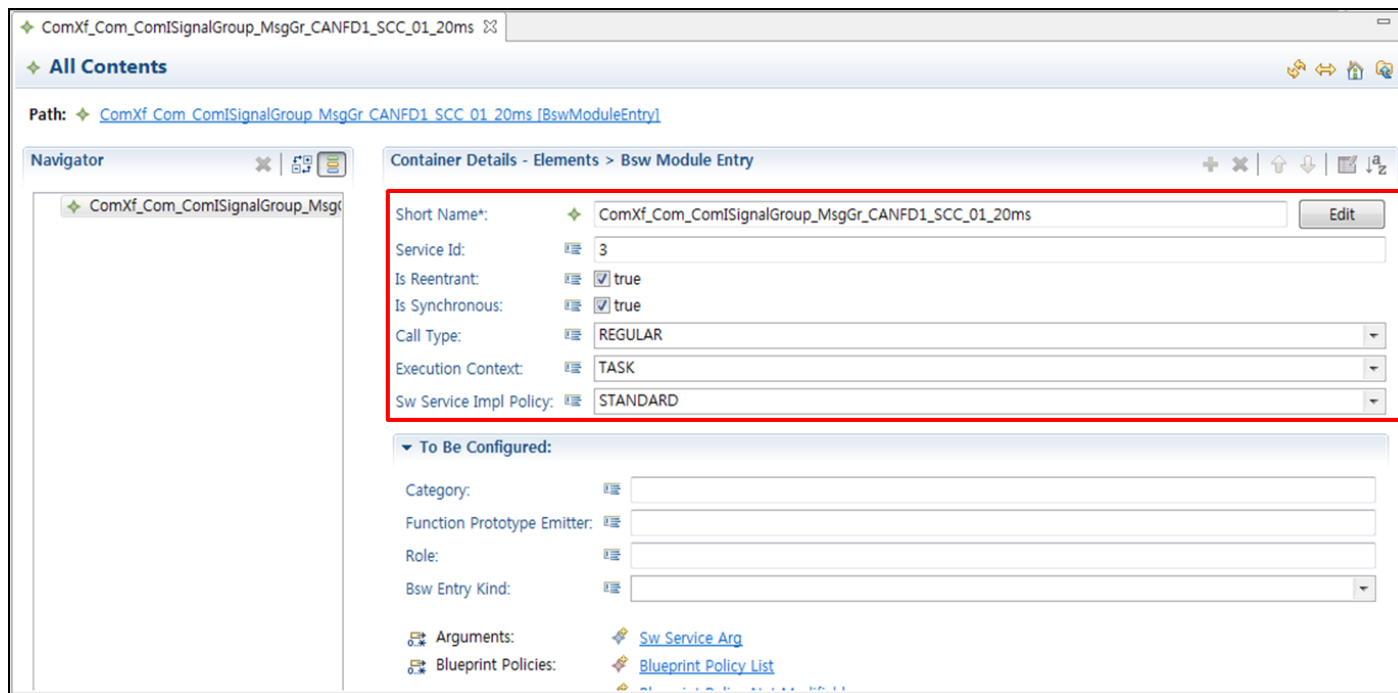BswModuleEntry should be added to the Bswmd_ComXf.arxml file according to the API Naming Rule:

   ComXf_<ComponentName>_<p>_<o>
   ComXf_Inv_<ComponentName>_<p>_<o>
    ✓ <ComponentName> : shortName of the SwComponentPrototype
    ✓ <p> : shortName of the PortPrototype
   ✓ <o> : shortName of the VariableDataPrototype

For each BswModuleEntry setting, refer to the following.There are no restrictions with the number of ServiceId.

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After adding the BswModuleEntry, open the BswModuleDescription of the ComXf module.

Add BswCalledEntity to BswInternalBehavior of BswModuleDescription as many as the number of BswModuleEntry added above..
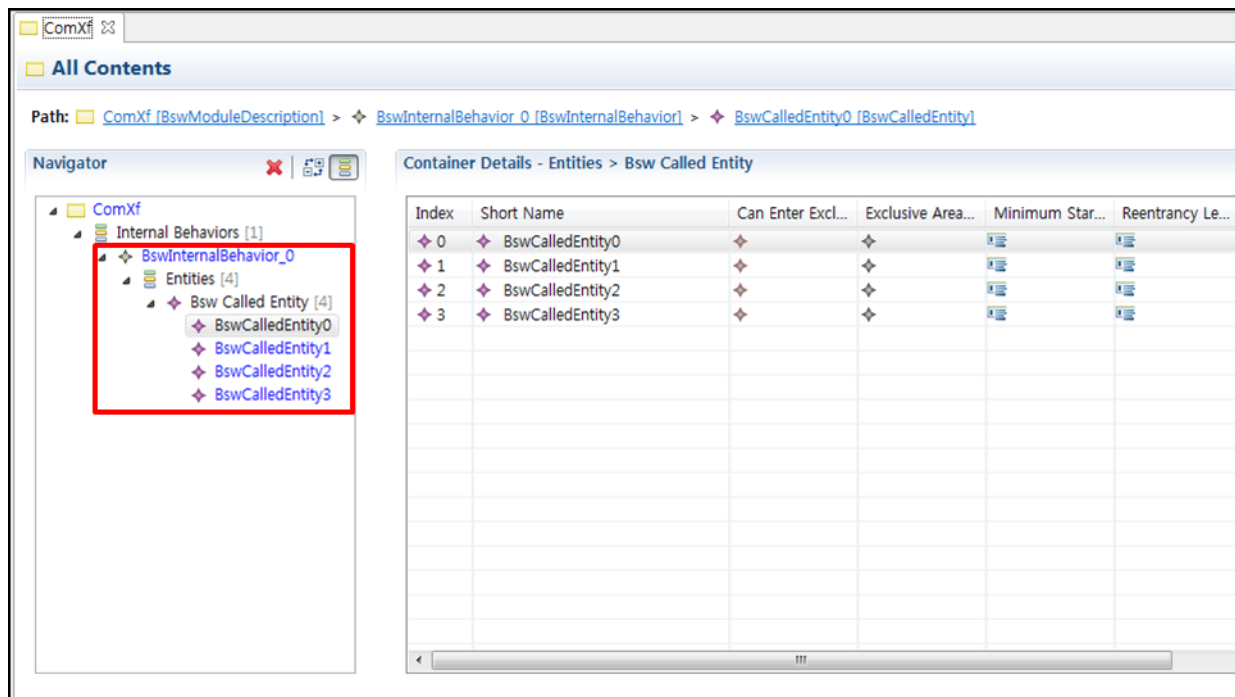
Connect BswModuleEntry to Implemented Entry setting of each BswCalledEntity.