



Elektrobit

EB tresos[®] E2E Profile Renault/Nissan documentation

product release 8.8.0



Elektrobit Automotive GmbH
Am Wolfsmantel 46
91058 Erlangen, Germany
Phone: +49 9131 7701 0
Fax: +49 9131 7701 6333
Email: info.automotive@elektrobit.com

Technical support

<https://www.elektrobit.com/support>

Legal disclaimer

Confidential information.

ALL RIGHTS RESERVED. No part of this publication may be copied in any form, by photocopy, microfilm, retrieval system, or by any other means now known or hereafter invented without the prior written permission of Elektrobit Automotive GmbH.

All brand names, trademarks, and registered trademarks are property of their rightful owners and are used only for description.

Copyright 2020, Elektrobit Automotive GmbH.

Table of Contents

1. Overview of EB tresos E2E Profile Renault/Nissan documentation	7
2. E2EPRN release notes	8
2.1. Overview	8
2.2. Scope of the release	8
2.2.1. Configuration tool	8
2.2.2. AUTOSAR modules	8
2.2.3. EB (Elektrobit) modules	8
2.2.4. MCAL modules and EB tresos AutoCore OS	9
2.3. Module release notes	9
2.3.1. E2E module release notes	9
2.3.1.1. Change log	9
2.3.1.2. New features	13
2.3.1.3. EB-specific enhancements	13
2.3.1.4. Deviations	13
2.3.1.5. Limitations	14
2.3.1.6. Open-source software	15
2.3.2. E2EPRN module release notes	15
2.3.2.1. Change log	15
2.3.2.2. New features	17
2.3.2.3. EB-specific enhancements	17
2.3.2.4. Deviations	17
2.3.2.5. Limitations	17
2.3.2.6. Open-source software	17
2.3.3. SCrc module release notes	17
2.3.3.1. Change log	17
2.3.3.2. New features	20
2.3.3.3. EB-specific enhancements	20
2.3.3.4. Deviations	20
2.3.3.5. Limitations	21
2.3.3.6. Open-source software	21
3. E2EPRN user's guide	22
3.1. Overview	22
3.2. Background information	22
3.2.1. Functional overview	22
3.2.1.1. Safety mechanisms	22
3.2.1.2. Failure modes and required safety mechanisms	24
3.3. Configuring E2EPRN	25
3.4. E2EPRN integration notes	25
4. E2EPRN module references	26

4.1. Overview	26
4.1.1. Notation in EB module references	26
4.1.1.1. Default value of configuration parameters	26
4.1.1.2. Range information of configuration parameters	26
4.2. E2E	27
4.2.1. Configuration parameters	27
4.2.1.1. CommonPublishedInformation	27
4.2.1.2. PublishedInformation	30
4.2.2. Application programming interface (API)	30
4.2.2.1. Type definitions	31
4.2.2.1.1. E2E_PCCheckStatusType	31
4.2.2.2. Macro constants	31
4.2.2.2.1. E2E_AR_MAJOR_VERSION	31
4.2.2.2.2. E2E_AR_MINOR_VERSION	31
4.2.2.2.3. E2E_AR_PATCH_VERSION	31
4.2.2.2.4. E2E_AR_RELEASE_MAJOR_VERSION	31
4.2.2.2.5. E2E_AR_RELEASE_MINOR_VERSION	31
4.2.2.2.6. E2E_AR_RELEASE_REVISION_VERSION	32
4.2.2.2.7. E2E_E_INPUTERR_NULL	32
4.2.2.2.8. E2E_E_INPUTERR_WRONG	32
4.2.2.2.9. E2E_E_INTERR	32
4.2.2.2.10. E2E_E_INVALID	32
4.2.2.2.11. E2E_E_OK	32
4.2.2.2.12. E2E_E_WRONGSTATE	33
4.2.2.2.13. E2E_MODULE_ID	33
4.2.2.2.14. E2E_P_ERROR	33
4.2.2.2.15. E2E_P_NONEWDATA	33
4.2.2.2.16. E2E_P_NOTAVAILABLE	33
4.2.2.2.17. E2E_P_OK	33
4.2.2.2.18. E2E_P_REPEATED	34
4.2.2.2.19. E2E_P_WRONGSEQUENCE	34
4.2.2.2.20. E2E_SW_MAJOR_VERSION	34
4.2.2.2.21. E2E_SW_MINOR_VERSION	34
4.2.2.2.22. E2E_SW_PATCH_VERSION	34
4.2.2.2.23. E2E_VENDOR_ID	34
4.2.2.3. Functions	35
4.2.2.3.1. E2E_GetVersionInfo	35
4.2.3. Integration notes	35
4.2.3.1. Exclusive areas	35
4.2.3.2. Production errors	35
4.2.3.3. Memory mapping	35
4.2.3.4. Integration requirements	36

4.3. E2EPRN	36
4.3.1. Configuration parameters	36
4.3.1.1. CommonPublishedInformation	36
4.3.1.2. PublishedInformation	40
4.3.2. Application programming interface (API)	40
4.3.2.1. Type definitions	40
4.3.2.1.1. E2E_PRNCheckStateType	40
4.3.2.1.2. E2E_PRNCheckStatusType	40
4.3.2.1.3. E2E_PRNConfigType	41
4.3.2.1.4. E2E_PRNDataIDMode	42
4.3.2.1.5. E2E_PRNProtectStateType	42
4.3.2.1.6. E2E_PRNReceiverStateType	42
4.3.2.1.7. E2E_PRNReceiverStatusType	43
4.3.2.1.8. E2E_PRNSenderStateType	44
4.3.2.2. Macro constants	44
4.3.2.2.1. E2EPRN_AR_MAJOR_VERSION	44
4.3.2.2.2. E2EPRN_AR_MINOR_VERSION	44
4.3.2.2.3. E2EPRN_AR_PATCH_VERSION	45
4.3.2.2.4. E2EPRN_AR_RELEASE_MAJOR_VERSION	45
4.3.2.2.5. E2EPRN_AR_RELEASE_MINOR_VERSION	45
4.3.2.2.6. E2EPRN_AR_RELEASE_REVISION_VERSION	45
4.3.2.2.7. E2EPRN_SW_MAJOR_VERSION	45
4.3.2.2.8. E2EPRN_SW_MINOR_VERSION	45
4.3.2.2.9. E2EPRN_SW_PATCH_VERSION	45
4.3.2.2.10. E2EPRN_VENDOR_ID	46
4.3.2.3. Functions	46
4.3.2.3.1. E2E_PRNCheck	46
4.3.2.3.2. E2E_PRNCheckInit	46
4.3.2.3.3. E2E_PRNMapStatusToSM	47
4.3.2.3.4. E2E_PRNProtect	48
4.3.2.3.5. E2E_PRNProtectInit	49
4.3.3. Integration notes	49
4.3.3.1. Exclusive areas	49
4.3.3.2. Production errors	49
4.3.3.3. Memory mapping	50
4.3.3.4. Integration requirements	50
4.4. SCrc	50
4.4.1. Configuration parameters	50
4.4.1.1. CommonPublishedInformation	51
4.4.1.2. PublishedInformation	54
4.4.1.3. SCrcPublishedInformation	54
4.4.2. Application programming interface (API)	54

4.4.2.1. Macro constants	55
4.4.2.1.1. SCRC_FUNCENABLED_SCRC_CRC16	55
4.4.2.1.2. SCRC_FUNCENABLED_SCRC_CRC32P4	55
4.4.2.1.3. SCRC_FUNCENABLED_SCRC_CRC8	55
4.4.2.1.4. SCRC_FUNCENABLED_SCRC_CRC8H2F	55
4.4.2.1.5. SCRC_SW_MAJOR_VERSION	55
4.4.2.1.6. SCRC_SW_MINOR_VERSION	56
4.4.2.1.7. SCRC_SW_PATCH_VERSION	56
4.4.2.1.8. SCRC_VENDOR_ID	56
4.4.2.2. Functions	56
4.4.2.2.1. SCrc_CalculateCRC16	56
4.4.2.2.2. SCrc_CalculateCRC32P4	57
4.4.2.2.3. SCrc_CalculateCRC8	57
4.4.2.2.4. SCrc_CalculateCRC8H2F	58
4.4.3. Integration notes	59
4.4.3.1. Exclusive areas	59
4.4.3.2. Production errors	59
4.4.3.3. Memory mapping	59
4.4.3.4. Integration requirements	59
5. Bibliography	60



1. Overview of EB tresos E2E Profile Renault/Nissan documentation

Welcome to the EB tresos E2E Profile Renault/Nissan (E2EPRN) product documentation.

This document provides:

- ▶ [Chapter 2, “E2EPRN release notes”](#): release notes for the E2EPRN modules
- ▶ [Chapter 3, “E2EPRN user's guide”](#): containing background information and instructions
- ▶ [Chapter 4, “E2EPRN module references”](#): information about configuration parameters and the application programming interface

2. E2EPRN release notes

2.1. Overview

This chapter provides the E2EPRN product specific release notes. General release notes that are applicable to all products are provided in the EB tresos AutoCore Generic documentation. Refer to the general release notes in addition to the product release notes documented here.

2.2. Scope of the release

2.2.1. Configuration tool

Your release of EB tresos AutoCore is compatible with the release of the EB tresos Studio configuration tool:

- ▶ EB tresos Studio: 27.1.0 b200625-0900

2.2.2. AUTOSAR modules

The following table lists the AUTOSAR modules that are part of this E2EPRN release.

Module name	AUTOSAR version and revision	SWS version and revision	Module version	Supplier
E2E	4.2.1 []	4.2.1 [0000]	2.0.16	Elektrobit Automotive GmbH
E2EPRN	4.0.3 []	2.0.0 [0000]	1.0.10	Elektrobit Automotive GmbH

Table 2.1. Hardware-Independent Modules specified by the AUTOSAR standard

2.2.3. EB (Elektrobit) modules

The following table lists all modules which are part of this release but are not specified by the AUTOSAR standard. These modules include tooling developed by EB or they may hold files shared by all other modules.

Module name	Module version	Supplier
SCrc	2.0.10	Elektrobit Automotive GmbH

Table 2.2. Modules not specified by the AUTOSAR standard

2.2.4. MCAL modules and EB tresos AutoCore OS

For information about MCAL modules and OS, refer to the respective documentation, which is available as PDF at `$TRESOS_BASE/doc/3.0_EB_tresos_AutoCore_OS` and `$TRESOS_BASE/doc/5.0_MCAL_modules`¹. It is also available in the online help in EB tresos Studio. Browse to the folders `EB tresos AutoCore OS` and `MCAL modules`.

2.3. Module release notes

2.3.1. E2E module release notes

- ▶ AUTOSAR R4.2 Rev 1
- ▶ AUTOSAR SWS document version: 4.2.1
- ▶ Module version: 2.0.16.B337087
- ▶ Supplier: Elektrobit Automotive GmbH

2.3.1.1. Change log

This chapter lists the changes between different versions.

Module version 2.0.16

2020-06-19

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.15

2020-02-21

¹`$TRESOS_BASE` is the location at which you installed EB tresos Studio.

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.14

2020-01-24

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.13

2019-10-11

- ▶ Improved implementation of signal unpack macros
- ▶ Improved range check implementation of signal pack macros
- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.12

2019-07-05

- ▶ ASCE2E-766 Fixed known issue: Wrong safety related ComXf serialization of 64bit ISignalGroup members
- ▶ ASCE2E-771, ASCCOMXF-492 Fixed known issue: Invalid safety-related ComXf support for XfrmBuffer-LengthType configured to UINT32 (Note: requires also ComXf module update)

Module version 2.0.11

2019-06-14

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.10

2019-02-15

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.9

2018-10-26

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.8

2018-05-29

- ▶ ASCE2E-626 Fixed known issue: Undefined behavior for safety related ComXf serialization

Module version 2.0.7

2018-03-16

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.6

2018-02-16

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.5

2017-10-27

- ▶ Implemented support for configurable type of BufferLength
- ▶ Implemented profile specific parts from E2E transformer in E2E profiles and library

Module version 2.0.4

2017-09-22

- ▶ Improved implementation of signal pack and unpack macros
- ▶ Implemented 64 bit signal pack and unpack macros
- ▶ Switch from MISRA-C:2004 to MISRA-C:2012

Module version 2.0.3

2017-06-30

- ▶ Implemented signal pack and unpack macros

Module version 2.0.2

2015-06-19

- ▶ Added additional return values required for E2E transformer concept
- ▶ Implemented deterministic start-up behavior for E2E State Machine according to Bugzilla #67553

Module version 2.0.1

2013-02-15

- ▶ Provide a Basic Software Module Description that specifies the Memory Mappings

Module version 2.0.0

2012-06-22

- ▶ Update to ASR 4.0 Rev3

Module version 1.0.4

2011-09-16

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 1.0.3

2011-05-20

- ▶ Update of version macros and Info
- ▶ Usage of unix line endings

Module version 1.0.2

2010-12-23

- ▶ Each profile is implemented as an individual module
- ▶ The E2E library shall use the SCrc module instead of the AUTOSAR Crc module

Module version 1.0.1

2010-11-30

- ▶ Enumeration E2E_P02ReceiverStateType must have defined values
- ▶ Removed dead code in E2E Library

- ▶ Input parameter is not correctly checked against Null pointer

Module version 1.0.0

2010-11-12

- ▶ Initial release

2.3.1.2. New features

- ▶ No new features have been added since the last release.

2.3.1.3. EB-specific enhancements

This chapter lists the enhancements provided by the module.

- ▶ Support for the usage with AUTOSAR E2E Transformer

Description:

In addition to AUTOSAR version R4.0 Rev 3, the following additional return values according to AUTOSAR release 4.2.1 are provided:

- ▶ `E2E_P_OK`
- ▶ `E2E_P_REPEATED`
- ▶ `E2E_P_WRONGSEQUENCE`
- ▶ `E2E_P_ERROR`
- ▶ Deterministic initialization behavior for E2E State Machine

Description:

In addition to AUTOSAR release 4.2.1, Bugzilla RfC 67553 is incorporated. That is, a new generic profile status type `E2E_P_NONEWDATA` is introduced in case no new data was received in the actual receive cycle. See also http://www.autosar.org/bugzilla/show_bug.cgi?id=67553.

2.3.1.4. Deviations

This chapter lists the deviations of the module from the AUTOSAR standard.

- ▶ [ASCE2E-10] No support for building customized E2E Profiles

Description:

The following functions are not supported:

- ▶ E2E_CRC8*
- ▶ E2E_UpdateCounter

Rationale:

The generic E2E library is only used in combination with specific E2E profiles.

Requirements:

E2E0106, E2E0107, E2E0092, E2E0091, E2E0094, E2E0095, E2E0096, E2E0276, E2E0097, E2E0098, E2E0099

2.3.1.5. Limitations

This chapter lists the limitations of the module. Refer to the module references chapter *Integration notes*, subsection *Integration requirements* for requirements on integrating this module.

- ▶ Packing of 64 bit signal types

Description:

In order to serialize 64-bit data types the following constraints apply to the configuration of a signal within a PDU:

- ▶ signal shall be byte aligned
 - ▶ bit length shall be a multiple of 8
 - ▶ the bitlength parameter value shall correlate with the value of the nbytes parameter
- ▶ Unpacking of 64 bit signal types

Description:

In order to deserialize 64-bit data types the following constraints apply to the configuration of a signal within a PDU:

- ▶ signal shall be byte aligned
 - ▶ bitlength shall be a multiple of 8
 - ▶ the bitlength parameter value shall correlate with the value of the nbytes parameter
- ▶ Range checks of 64 bit signal types

Description:

- ▶ Range checks for float signal types are not supported.
- ▶ Range checks for 64bit signal types are only supported on byte level.

2.3.1.6. Open-source software

Open-source software information is not available for this module.

2.3.2. E2EPRN module release notes

- ▶ Module version: 1.0.10.B337087
- ▶ Supplier: Elektrobit Automotive GmbH

2.3.2.1. Change log

This chapter lists the changes between different versions.

Module version 1.0.10

2020-06-19

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 1.0.9

2020-01-24

- ▶ ASCE2E-828, ASCE2E-825 Fixed known issue: SCrc is called with wrong Length parameter if exactly 256 bytes shall be protected

Module version 1.0.8

2019-10-11

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 1.0.7

2019-06-14

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 1.0.6

2019-02-15

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 1.0.5

2018-10-26

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 1.0.4

2018-05-10

- ▶ Extend counter range [0..15]

Module version 1.0.3

2018-03-16

- ▶ E2EPRN: Update profiles to support generic BSW/MCG E2EXf

Module version 1.0.2

2018-01-19

- ▶ RN profile: Data Id byte order changed from little endian to big endian.

Module version 1.0.1

2017-09-22

- ▶ Switch from MISRA-C:2004 to MISRA-C:2012

Module version 1.0.0

2017-08-21

- ▶ Initial release

2.3.2.2. New features

- ▶ No new features have been added since the last release.

2.3.2.3. EB-specific enhancements

This module is not part of the AUTOSAR specification.

2.3.2.4. Deviations

This module is not part of the AUTOSAR specification.

2.3.2.5. Limitations

This chapter lists the limitations of the module. Refer to the module references chapter *Integration notes*, subsection *Integration requirements* for requirements on integrating this module.

2.3.2.6. Open-source software

E2EPRN does not use open-source software.

2.3.3. SCrc module release notes

- ▶ Module version: 2.0.10.B337087
- ▶ Supplier: Elektrobit Automotive GmbH

2.3.3.1. Change log

This chapter lists the changes between different versions.

Module version 2.0.10

2020-06-19

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.9

2019-10-11

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.8

2019-06-14

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.7

2019-02-15

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.6

2018-10-26

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.5

2018-02-01

- ▶ Internal module improvement. This module version update does not affect module functionality

Module version 2.0.4

2017-09-22

- ▶ Switch from MISRA-C:2004 to MISRA-C:2012

Module version 2.0.3

2015-06-19

- ▶ Added CRC routines required for new E2E Profiles 4, 5, 6

Module version 2.0.2

2013-11-29

- ▶ Non-functional code improvements (Inspection findings, Consistent use of static qualifier).
- ▶ ASCSCRC-74 Fixed known issue: The SCrc module used a compiler abstraction macro of the Crc module.

Module version 2.0.1

2013-02-15

- ▶ Provide a Basic Software Module Description that specifies the Memory Mappings.

Module version 2.0.0

2012-06-22

- ▶ Update to ASR 4.0 Rev3 (New parameter isFirstCall in CalculateCRC APIs).

Module version 1.0.8

2011-09-16

- ▶ Non-functional code improvements.

Module version 1.0.7

2011-05-20

- ▶ Usage of unix line endings.

Module version 1.0.6

2011-04-20

- ▶ Correction of common published information.
- ▶ Correction of compiler abstraction.

Module version 1.0.5

2011-03-18

- ▶ Macro definitions for switching between Crc implementation of SCrc module or external Crc module.

Module version 1.0.4

2011-02-28

- ▶ The GetVersionInfoApi() removed from the SCrc module.

Module version 1.0.3

2011-02-14

- ▶ Elimination of misra violations.

Module version 1.0.2

2010-12-23

- ▶ Table-based 8-bit Crc routine according to SAE J1850 CRC.

Module version 1.0.1

2010-11-30

- ▶ Removed unintended header file in Crc.c.

Module version 1.0.0

2010-11-12

- ▶ Table-based 8-bit Crc routine with generator polynomial 0x2F.

2.3.3.2. New features

- ▶ No new features have been added since the last release.

2.3.3.3. EB-specific enhancements

This module is not part of the AUTOSAR specification.

2.3.3.4. Deviations

This module is not part of the AUTOSAR specification.



2.3.3.5. Limitations

This chapter lists the limitations of the module. Refer to the module references chapter *Integration notes*, subsection *Integration requirements* for requirements on integrating this module.

- For this module no limitations are known.

2.3.3.6. Open-source software

Open-source software information is not available for this module.

3. E2EPRN user's guide

3.1. Overview

This user's guide describes the E2EPRN module. From this user's guide you learn the basic functionality of the E2EPRN. You also learn which related modules are necessary to configure the E2EPRN module. The E2EPRN module reference provides further information on configuring the E2EPRN itself.

Note that this user's guide is intended for readers who have good knowledge of AUTOSAR and about the purpose of the E2EPRN. The information provided here helps you to integrate the E2EPRN in your AUTOSAR project.

- ▶ [Section 3.2, “Background information”](#) provides an overview of the basic functionality of the E2EPRN.
- ▶ [Section 3.3, “Configuring E2EPRN”](#) provides information on related modules that are needed in order to configure the E2EPRN.
- ▶ [Section 3.4, “E2EPRN integration notes”](#) provides notes for the integration of the E2EPRN module into your project.
- ▶ For details on how to configure the E2EPRN itself, see the parameter descriptions provided in the E2EPRN module reference [Chapter 4, “E2EPRN module references”](#) which is provided with the dependent modules E2E.

3.2. Background information

The general concept of end-to-end communication protection is described in the EB tresos E2E Protection Transformer documentation of the E2EXf module, based on the AUTOSAR E2E transformer specified in [\[2\]](#).

3.2.1. Functional overview

3.2.1.1. Safety mechanisms

This profile is based on E2E Profile RN specified by AUTOSAR, see [\[3\]](#). It is called from the virtual functional bus generated by the Rte module together with a previously called serializing transformer, e.g. ComXf, or

`SomeIpXf`) to add protection information to the serialized data stream for the following communication paradigms:

- ▶ Non-blocking queued sender-receiver communication

E2EPRN provides APIs to add protection information at the sender to the result of a serializing transformer, e.g. `ComXf` or `SomeIpXf`. It also provides APIs to cyclically check for communication errors by using this information at the receiver. Its API functions are called by the `E2EXf` module.

The E2EPRN module uses the following safety mechanisms:

- ▶ **Cyclic redundancy check (CRC):** An 8-bit CRC is explicitly sent with polynomial `0x1D` with an initial value `0xFF` and a final XOR-value `0xFF`. The bit-offset of the CRC value within a transmitted signal group is configurable but must be byte-aligned.
- ▶ **Sequence counter/alive counter:** A 4-bit sequence number with a counter that represents numbers from 0 to 14 is explicitly sent and incremented at every transmission request. The bit-offset of the sequence counter/alive counter value within a transmitted signal group is configurable but must be aligned with respect to nibbles.
- ▶ **Data ID:** A system-wide unique 16-bit of data ID which is equal to the 11bit CAN-ID and Data ID is not explicitly sent. Renault expects to include the Data ID MSB first and afterwards the LSB in the CRC calculation. i.e. The byte order for the Data ID is treated as big endian ((i.e. MSB first) for the CRC calculation)
- ▶ **Length:** A 32-bit number to support dynamic-size data.

The header of AUTOSAR E2E Profile RN can be placed at a specific location in the protected data, by configuring the offset of the entire E2E header. [Figure 3.1, "Header layout of AUTOSAR E2E Profile RN."](#) shows the header layout with a header offset equal to 0. The individual control data fields are encoded in Big Endian with the most significant byte first.

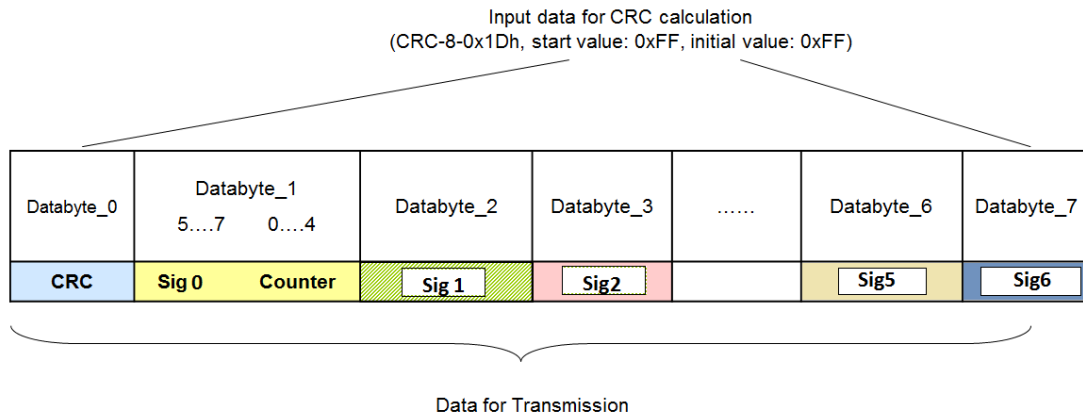


Figure 3.1. Header layout of AUTOSAR E2E Profile RN.

3.2.1.2. Failure modes and required safety mechanisms

The [Table 3.1, “Failure modes detection matrix for E2E Profile RN”](#) shows the failure modes and the required safety mechanisms of E2E Profile RN with the different data ID variants for detection of the failure mode.

NOTE



Different data ID inclusion modes

The different data ID inclusion modes only limits the applicable range of data IDs which can be used to detect masquerading.

An **x** specifies that the failure mode can be detected by the safety mechanism implemented in the E2E Profile.

An **(x)** specifies a safety mechanism which is only required to implement another safety mechanism.

An **A** specifies that the failure mode can be detected by a safety mechanism implemented in the data sink.

Failure mode/ safety mechanism	Sequence counter	CRC	Data ID	Timeout detection
Unintended mes- sage repetition	X			
Message loss	X			A
Insertion of mes- sage	X	(X)	X	
Resequencing	X			
Message corruption		X		
Delayed reception				A
Addressing faults	(X)	(X)	X	
Masquerading	(X)	(X)	X	

Table 3.1. Failure modes detection matrix for E2E Profile RN

3.3. Configuring E2EPRN

To configure the `E2EPRN` module, add the module to your project using EB tresos Studio. This module does not provide any configuration parameters except a common published information. You find this information in the module references section of this document. You also find these in the parameter description in EB tresos Studio.

To use the `E2EPRN` module, you must configure additional modules as outlined below:

- ▶ The `E2EPRN` module requires API functions and data types from the `E2E` library module. This module does not provide any configuration parameters.
- ▶ The `E2EPRN` module provides API functions and data types required from the `E2ESM` library module and from the `E2EXf` module. For more information on the `E2ESM` and `E2EXf` modules, see [1] and [2]).

3.4. E2EPRN integration notes

You find general integration information in the EB tresos AutoCore Generic documentation.

In addition, you find module-specific information about exclusive areas, production errors and memory mapping in the module-specific integration notes. You find the module-specific integration notes in the module references chapter of this document. See [Chapter 4, “E2EPRN module references”](#) sub-section `Integration notes` in each module.

4. E2EPRN module references

4.1. Overview

This chapter provides module references for the E2EPRN product modules. These include a detailed description of all configuration parameters. Furthermore this chapter lists the application programming interface with all data types, constants and functions.

The content of the sections is sorted alphabetically according the EB tresos AutoCore Generic module names.

For further information on the functional behavior of these modules, refer to the chapter E2EPRN user's guide.

4.1.1. Notation in EB module references

EB notation may differ from the AUTOSAR standard notation in the software specification documents (SWS). This section describes the notation of *default value* and *range* fields in the EB module references.

4.1.1.1. Default value of configuration parameters

If there is no default value specified for a parameter, the default value field is omitted to prevent ambiguity with parameters that have -- as default values.

Example: The parameter `BswMCompuConstText` of the `BswM` module of EB tresos AutoCore Generic 8 Mode Management has no default value field, therefore it is omitted.

4.1.1.2. Range information of configuration parameters

The range of a configuration parameter contains an upper and a lower boundary. However, in special cases the range of allowed values can be computed by means of an XPath function that is evaluated at configuration time. An XPath function can either be a standard `xpath:<function>()` or a custom `cxpath:<function>()` function. The range of a configuration parameter may be computed based on other configuration parameters that are referenced from the XPath function. For more information on custom XPath functions, see section *Custom XPath Functions API* of the EB tresos Studio developer's guide.

Example: The parameter `BswMCompuConstText` of the `BswM` module of EB tresos AutoCore Generic 8 Mode Management has the custom XPath function `cxpath:getCompuMethodsVT()` in the range field which provides the allowed values.

4.2. E2E

4.2.1. Configuration parameters

Containers included		
Container name	Multiplicity	Description
CommonPublishedInformation	1..1	Label: Common Published Information Common container, aggregated by all modules. It contains published information about vendor and versions.
PublishedInformation	1..1	Label: EB Published Information Additional published parameters not covered by Common-PublishedInformation container.

4.2.1.1. CommonPublishedInformation

Parameters included	
Parameter name	Multiplicity
ArMajorVersion	1..1
ArMinorVersion	1..1
ArPatchVersion	1..1
SwMajorVersion	1..1
SwMinorVersion	1..1
SwPatchVersion	1..1
ModuleId	1..1
VendorId	1..1
VendorApiInfix	1..1
Release	1..1

Parameter Name	ArMajorVersion
Label	AUTOSAR Major Version
Description	Major version number of AUTOSAR specification on which the appropriate implementation is based on.
Multiplicity	1..1

Type	INTEGER_LABEL
Default value	4
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	ArMinorVersion
Label	AUTOSAR Minor Version
Description	Minor version number of AUTOSAR specification on which the appropriate implementation is based on.
Multiplicity	1..1
Type	INTEGER_LABEL
Default value	2
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	ArPatchVersion
Label	AUTOSAR Patch Version
Description	Patch level version number of AUTOSAR specification on which the appropriate implementation is based on.
Multiplicity	1..1
Type	INTEGER_LABEL
Default value	1
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	SwMajorVersion
Label	Software Major Version
Description	Major version number of the vendor specific implementation of the module.
Multiplicity	1..1
Type	INTEGER_LABEL
Default value	2
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	SwMinorVersion
----------------	-----------------------

Label	Software Minor Version	
Description	Minor version number of the vendor specific implementation of the module. The numbering is vendor specific.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	SwPatchVersion	
Label	Software Patch Version	
Description	Patch level version number of the vendor specific implementation of the module. The numbering is vendor specific.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	16	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ModuleId	
Label	Numeric Module ID	
Description	Module ID of this module from Module List	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	207	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	VendorId	
Label	Vendor ID	
Description	Vendor ID of the dedicated implementation of this module according to the AUTOSAR vendor list	
Multiplicity	1..1	
Type	INTEGER_LABEL	

Default value	1
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	VendorApilInfix
Multiplicity	1..1
Type	STRING_LABEL

Parameter Name	Release
Label	Release Information
Multiplicity	1..1
Type	STRING_LABEL
Default value	
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

4.2.1.2. PublishedInformation

Parameters included	
Parameter name	Multiplicity
PbcfgMSupport	1..1

Parameter Name	PbcfgMSupport
Label	PbcfgM support
Description	Specifies whether or not the E2E can use the PbcfgM module for post-build support.
Multiplicity	1..1
Type	BOOLEAN
Default value	false
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

4.2.2. Application programming interface (API)

4.2.2.1. Type definitions

4.2.2.1.1. E2E_PCheckStatusType

Purpose	Status type for E2E State Machine return values.
Type	uint8

4.2.2.2. Macro constants

4.2.2.2.1. E2E_AR_MAJOR_VERSION

Purpose	AUTOSAR specification major version.
Value	4U

4.2.2.2.2. E2E_AR_MINOR_VERSION

Purpose	AUTOSAR specification minor version.
Value	2U

4.2.2.2.3. E2E_AR_PATCH_VERSION

Purpose	AUTOSAR specification patch version.
Value	1U

4.2.2.2.4. E2E_AR_RELEASE_MAJOR_VERSION

Purpose	AUTOSAR release major version.
Value	4U

4.2.2.2.5. E2E_AR_RELEASE_MINOR_VERSION

Purpose	AUTOSAR release minor version.
----------------	--------------------------------

Value	2U
--------------	----

4.2.2.2.6. E2E_AR_RELEASE_REVISION_VERSION

Purpose	AUTOSAR release revision version.
Value	1U

4.2.2.2.7. E2E_E_INPUTERR_NULL

Purpose	At least one pointer parameter is a NULL pointer.
Value	0x13U

4.2.2.2.8. E2E_E_INPUTERR_WRONG

Purpose	At least one input parameter is erroneous (e.g. out of range).
Value	0x17U

4.2.2.2.9. E2E_E_INTERR

Purpose	An internal library error has occurred.
Value	0x19U
Description	An internal library error has occurred. (e.g. error detected by program flow monitoring, violated invariant or postcondition)

4.2.2.2.10. E2E_E_INVALID

Purpose	Invalid value passed to function.
Value	0xFFU

4.2.2.2.11. E2E_E_OK

Purpose	Function completed successfully.
Value	0U

4.2.2.2.12. E2E_E_WRONGSTATE

Purpose	Function executed in wrong state.
Value	0x1AU

4.2.2.2.13. E2E_MODULE_ID

Purpose	AUTOSAR module identification.
Value	207U

4.2.2.2.14. E2E_P_ERROR

Purpose	Error not related to counters occurred (e.g. wrong crc, wrong length, wrong DataID) or the return of the check function was not OK.
Value	0x03U
Description	Note: related to E2E_PCheckStatusType

4.2.2.2.15. E2E_P_NONEWDATA

Purpose	No new Data is available since the last call of the check function.
Value	0x05U
Description	Note: related to E2E_PCheckStatusType

4.2.2.2.16. E2E_P_NOTAVAILABLE

Purpose	No value has been received yet. This is used as the initialization value for the buffer, it is not returned by any E2E profile.
Value	0x04U
Description	Note: related to E2E_PCheckStatusType

4.2.2.2.17. E2E_P_OK

Purpose	The checks of the Data in this cycle were successful (including counter check).
Value	0x00U

Description	Note: related to E2E_PCheckStatusType
--------------------	---------------------------------------

4.2.2.2.18. E2E_P_REPEATED

Purpose	Either no new data is available, or the new data has a repeated counter.
Value	0x01U
Description	Note: related to E2E_PCheckStatusType

4.2.2.2.19. E2E_P_WRONGSEQUENCE

Purpose	The checks of the Data in this cycle were successful, with the exception of counter jump, which changed more than allowed delta.
Value	0x02U
Description	Note: related to E2E_PCheckStatusType

4.2.2.2.20. E2E_SW_MAJOR_VERSION

Purpose	AUTOSAR module major version.
Value	2U

4.2.2.2.21. E2E_SW_MINOR_VERSION

Purpose	AUTOSAR module minor version.
Value	0U

4.2.2.2.22. E2E_SW_PATCH_VERSION

Purpose	AUTOSAR module patch version.
Value	16U

4.2.2.2.23. E2E_VENDOR_ID

Purpose	AUTOSAR vendor identification: Elektrobit Automotive GmbH.
Value	1U

4.2.2.3. Functions

4.2.2.3.1. E2E_GetVersionInfo

Purpose	Return the modules version information.	
Synopsis	<code>void E2E_GetVersionInfo (Std_VersionInfoType * VersionInfo);</code>	
Service ID	0x14	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (out)	VersionInfo	Pointer where to store the version information of this module
Description	<p>This service returns the version information of this module. The version information includes:</p> <ul style="list-style-type: none">▶ Module Id▶ Vendor Id▶ Vendor specific version numbers	

4.2.3. Integration notes

4.2.3.1. Exclusive areas

Exclusive areas are not used by the E2E module.

4.2.3.2. Production errors

Production errors are not reported by the E2E module.

4.2.3.3. Memory mapping

General information about memory mapping is provided in the EB tresos AutoCore Generic documentation. Refer to the section `Memory mapping and compiler abstraction` in the `Integration notes` section for details.

The following table provides the list of sections that may be mapped for this module:

Memory section
CODE
CONST_8
CONST_16
CONST_32
CONST_UNSPECIFIED

4.2.3.4. Integration requirements

WARNING



Integration requirements list is not exhaustive

The following list of integration requirements helps you to integrate your product. However, this list is not exhaustive. You also require information from the user guide, release notes, and EB tresos AutoCore known issues to successfully integrate your product.

Integration requirements are not listed for the E2E module.

4.3. E2EPRN

4.3.1. Configuration parameters

Containers included		
Container name	Multiplicity	Description
CommonPublishedInformation	1..1	Label: Common Published Information Common container, aggregated by all modules. It contains published information about vendor and versions.
PublishedInformation	1..1	Label: EB Published Information Additional published parameters not covered by Common-PublishedInformation container.

4.3.1.1. CommonPublishedInformation

Parameters included	
Parameter name	Multiplicity

Parameters included	
ArMajorVersion	1..1
ArMinorVersion	1..1
ArPatchVersion	1..1
SwMajorVersion	1..1
SwMinorVersion	1..1
SwPatchVersion	1..1
ModuleId	1..1
VendorId	1..1
VendorApilInfix	1..1
Release	1..1

Parameter Name	ArMajorVersion	
Label	AUTOSAR Major Version	
Description	Major version number of AUTOSAR specification on which the appropriate implementation is based on.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	2	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ArMinorVersion	
Label	AUTOSAR Minor Version	
Description	Minor version number of AUTOSAR specification on which the appropriate implementation is based on.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ArPatchVersion	
Label	AUTOSAR Patch Version	

Description	Patch level version number of AUTOSAR specification on which the appropriate implementation is based on.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	SwMajorVersion	
Label	Software Major Version	
Description	Major version number of the vendor specific implementation of the module.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	1	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	SwMinorVersion	
Label	Software Minor Version	
Description	Minor version number of the vendor specific implementation of the module. The numbering is vendor specific.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	SwPatchVersion	
Label	Software Patch Version	
Description	Patch level version number of the vendor specific implementation of the module. The numbering is vendor specific.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	10	

Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ModuleId	
Label	Numeric Module ID	
Description	Module ID of this module from Module List	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	VendorId	
Label	Vendor ID	
Description	Vendor ID of the dedicated implementation of this module according to the AUTOSAR vendor list	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	1	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	VendorApilInfix	
Multiplicity	1..1	
Type	STRING_LABEL	

Parameter Name	Release	
Label	Release Information	
Multiplicity	1..1	
Type	STRING_LABEL	
Default value		
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

4.3.1.2. PublishedInformation

Parameters included	
Parameter name	Multiplicity
PbcfgMSupport	1..1

Parameter Name	PbcfgMSupport
Label	PbcfgM support
Description	Specifies whether or not the E2EPRN can use the PbcfgM module for post-build support.
Multiplicity	1..1
Type	BOOLEAN
Default value	false
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

4.3.2. Application programming interface (API)

4.3.2.1. Type definitions

4.3.2.1.1. E2E_PRNCheckStateType

Purpose	Definition of E2E Profile PRN check state type.
Type	E2E_PRNReceiverStateType
Description	Type-definition for backward-compatibility due to type renaming done in AUTOSAR version 4.2.1.

4.3.2.1.2. E2E_PRNCheckStatusType

Purpose	Definition of E2E Profile PRN check status type.
Type	E2E_PRNReceiverStatusType
Description	Type-definition for backward-compatibility due to type renaming done in AUTOSAR version 4.2.1.

4.3.2.1.3. E2E_PRNConfigType

Purpose	Configuration of transmitted Data for E2E Profile PRN.	
Type	struct	
Members	uint16 CounterOffset	Bit offset of Counter (Least Significant Bit) from the beginning of the Byte-Array (bit numbering: bit 0 is the least important). The offset shall be a multiple of 4. For example, offset 8 means that the Counter will take the low nibble of the byte 1, i.e. bits 8..11.
	uint16 CRCOffset	Bit offset of CRC (Least Significant Bit) from the beginning of the Byte-Array (bit numbering: bit 0 is the least important). The offset shall be a multiple of 8. For example, offset 8 means that the CRC will take the byte 1, i.e. bits 8..15.
	uint16 DataID	A unique identifier for protection against masquerading.
	uint16 DataIDNibbleOffset	Bit offset of the low nibble (Least Significant Bit) of the high byte of Data ID from the beginning of the Byte-Array (bit numbering: bit 0 is the least important). The offset shall be a multiple of 4. For example, offset 8 means that the DataIDNibble will take the low nibble of the byte 1, i.e. bits 8..11.
	E2E_PRNDataIDMode DataIDMode	Inclusion mode of ID in CRC computation.
	uint16 DataLength	Length of the data in bits. The value shall be a multiple of 8 and shall be <= 2048.
	uint8 MaxDeltaCounterInit	Initial maximum allowed gap between two counter values of two consecutively received valid Data.
	uint8 MaxNoNewOrRepeatedData	Maximum amount of missing or repeated Data which the receiver does not expect to exceed under normal communication conditions.
	uint8 SyncCounterInit	Number of Data required for validating the consistency of the counter that must be received with a valid counter after the de-

		tection of an unexpected behavior of a received counter.
Description	Configuration of transmitted Data (Data Element or I-PDU), for E2E Profile PRN. For each transmitted Data, there is an instance of this typedef.	

4.3.2.1.4. E2E_PRNDataIDMode

Purpose	Inclusion modes of Data ID for E2E Profile PRN.	
Type	enum	
Constants	E2E_PRN_DATAID_BOTH	Two bytes are included in the CRC .
	E2E_PRN_DATAID_ALT	One of the two bytes is included, alternating high and low byte.
	E2E_PRN_DATAID_LOW	Only low byte is included, high byte is never used.
	E2E_PRN_DATAID_NIBBLE	The low byte is included in the implicit CRC calculation, the low nibble of the high byte is explicitly transmitted along with the data, the high nibble of the high byte is not used.
Description	The Data ID is two bytes long in E2E Profile PRN. There are three inclusion modes how the implicit two-byte Data ID is included in the one-byte CRC.	

4.3.2.1.5. E2E_PRNProtectStateType

Purpose	Definition of E2E Profile PRN protect state type.	
Type	E2E_PRNSenderStateType	
Description	Type-definition for backward-compatibility due to type renaming done in AUTOSAR version 4.2.1.	

4.3.2.1.6. E2E_PRNReceiverStateType

Purpose	Definition of E2E Profile PRN receiver state type.	
Type	struct	
Members	E2E_PRNReceiverStatusType Status	Result of the verification of the Data, determined by the Check function.
	uint8 LastValidCounter	Counter of last valid received message.

	<code>uint8 MaxDeltaCounter</code>	MaxDeltaCounter specifies the maximum allowed difference between two counter values of consecutively received valid messages.
	<code>boolean WaitForFirstData</code>	If true means that no correct data (with correct Data ID and CRC) has been yet received after the receiver (re-)initialization.
	<code>boolean NewDataAvailable</code>	Indicates to E2E Library that a new data is available for the Library to be checked. This attribute is set by the E2E Library caller and not by the E2E Library.
	<code>uint8 LostData</code>	Number of data (messages) lost since reception of last valid one.
	<code>uint8 NoNewOrRepeatedData-Counter</code>	Amount of consecutive reception cycles in which either (1) there was no new data, or (2) when the data was repeated.
	<code>uint8 SyncCounter</code>	Number of consecutively received valid Data required for determining the consistency of the counter.
Description	State of the sender for a Data protected with E2E Profile PRN.	

4.3.2.1.7. E2E_PRNReceiverStatusType

Purpose	Definition of E2E Profile PRN receiver status type.	
Type	enum	
Constants	<code>E2E_PRNSTATUS_OK</code>	New data has been correctly received.
	<code>E2E_PRNSTATUS_NONEWDATA</code>	The Check function has been invoked but new Data is not available since the last call.
	<code>E2E_PRNSTATUS_WRONGCRC</code>	The data has been received according to communication medium, but the CRC is incorrect.
	<code>E2E_PRNSTATUS_SYNC</code>	New data has been received after detection of an unexpected behavior of counter.
	<code>E2E_PRNSTATUS_INITIAL</code>	New data has been correctly received, but this is the first Data since the receiver's (re-)initialization.

	E2E_PRNSTATUS_REPEATED	New data has been correctly received, but the Counter is identical to the most recent Data received with Status _INITIAL, _OK, or _OKSOMELOST.
	E2E_PRNSTATUS_OKSOMELOST	New data has been correctly received, but some data in the sequence have been probably lost.
	E2E_PRNSTATUS_WRONGSEQUENCE	The new data has been correctly received, but the Counter Delta is too big (DeltaCounter > MaxDeltaCounter)
	E2E_PRNSTATUS_DATAINVALID	All bits in the received data except for byte 0 (CRC) are set to one.
Description	Result of the verification of the Data in E2E Profile PRN, determined by the Check function.	

4.3.2.1.8. E2E_PRNSenderStateType

Purpose	State of the sender for a Data protected with E2E Profile PRN.	
Type	struct	
Members	uint8 Counter	Counter to be used for protecting the Data. The counter is incremented modulo 15

4.3.2.2. Macro constants

4.3.2.2.1. E2EPRN_AR_MAJOR_VERSION

Purpose	AUTOSAR specification major version.
Value	2U

4.3.2.2.2. E2EPRN_AR_MINOR_VERSION

Purpose	AUTOSAR specification minor version.
Value	0U

4.3.2.2.3. E2EPRN_AR_PATCH_VERSION

Purpose	AUTOSAR specification patch version.
Value	0U

4.3.2.2.4. E2EPRN_AR_RELEASE_MAJOR_VERSION

Purpose	AUTOSAR release major version.
Value	4U

4.3.2.2.5. E2EPRN_AR_RELEASE_MINOR_VERSION

Purpose	AUTOSAR release minor version.
Value	0U

4.3.2.2.6. E2EPRN_AR_RELEASE_REVISION_VERSION

Purpose	AUTOSAR release revision version.
Value	3U

4.3.2.2.7. E2EPRN_SW_MAJOR_VERSION

Purpose	AUTOSAR module major version.
Value	1U

4.3.2.2.8. E2EPRN_SW_MINOR_VERSION

Purpose	AUTOSAR module minor version.
Value	0U

4.3.2.2.9. E2EPRN_SW_PATCH_VERSION

Purpose	AUTOSAR module patch version.
----------------	-------------------------------

Value	10U
--------------	-----

4.3.2.2.10. E2EPRN_VENDOR_ID

Purpose	AUTOSAR vendor identification: Elektrobit Automotive GmbH.
Value	1U

4.3.2.3. Functions

4.3.2.3.1. E2E_PRNCheck

Purpose	Check the received Data using the E2E Profile PRN.	
Synopsis	<pre>Std_ReturnType E2E_PRNCheck (const E2E_PRNConfigType * Config , E2E_PRNCheckStateType * State , const uint8 * Data);</pre>	
Service ID	0x02	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different communication data / states	
Parameters (in)	Config	Pointer to static configuration.
	Data	Pointer to received Data.
Parameters (in,out)	State	Pointer to port/data communication state.
Return Value	Function execution success status	
	E2E_E_INPUTERR_NULL	At least one pointer parameter is a NULL pointer.
	E2E_E_INPUTERR_WRONG	At least one input parameter is erroneous.
	E2E_E_OK	Function completed successfully.
Description	Checks the Data received using the E2E Profile PRN. This includes CRC calculation, handling of Counter and Data ID.	

4.3.2.3.2. E2E_PRNCheckInit

Purpose	Initializes the check state.
----------------	------------------------------

Synopsis	<pre>Std_ReturnType E2E_PRNCheckInit (E2E_ PRNCheckStateType * StatePtr);</pre>	
Service ID	0x1c	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different states	
Parameters (out)	StatePtr	Pointer to port/data communication state.
Return Value	Function execution success status	
	E2E_E_INPUTERR_NULL	NULL pointer passed.
	E2E_E_OK	Function completed successfully.
Description	Initializes the state structure by setting: LastValidCounter = 0 MaxDeltaCounter = 0 WaitForFirstData = FALSE NewDataAvailable = TRUE LostData = 0 Status = E2E_ - PRNSTATUS_NONEWDATA NoNewOrRepeatedDataCounter = 0 SyncCounter = 0.	

4.3.2.3.3. E2E_PRNMapStatusToSM

Purpose	Maps the check status of Profile PRN to a generic check status.	
Synopsis	<pre>E2E_PCheckStatusType E2E_PRNMapStatusToSM (Std_ReturnType CheckReturn , E2E_PRNCheckS- tatusType Status , boolean profileBehavior);</pre>	
Service ID	0x1d	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different status types	
Parameters (in)	CheckReturn	Return value of the E2E_PRNCheck function.
	Status	Status determined by E2E_PRNCheck function.
	profileBehavior	FALSE: check has the legacy behavior, before R4.2 TRUE: check behaves like new P4/P5/P6 profiles introduced in R4.2
Return Value	Profile-independent status of the reception on one single Data in one cycle.	
	E2E_P_OK	CheckReturn is E2E_E_OK and profileBehavior is TRUE and Status is E2E_PRNSTATUS_OK or E2E_PRNSTATUS_OKSOMELOST or E2E_PRNSTATUS_SYNC, or CheckReturn is E2E_ -

		E_OK and profileBehavior is FALSE and Status is E2E_PRNSTATUS_OK or E2E_PRNSTATUS_OKSOMELOST or E2E_PRNSTATUS_INITIAL.
	E2E_P_ERROR	CheckReturn is E2E_E_OK and Status is E2E_PRNSTATUS_WRONGCRC, or CheckReturn is E2E_E_OK and Status is a not defined status, or CheckReturn does not equal E2E_E_OK.
	E2E_P_REPEATED	CheckReturn is E2E_E_OK and Status is E2E_PRNSTATUS_REPEATED.
	E2E_P_NONEWDATA	CheckReturn is E2E_E_OK and Status is E2E_PRNSTATUS_NONEWDATA.
	E2E_P_WRONGSEQUENCE	CheckReturn is E2E_E_OK and profileBehavior is TRUE and Status is E2E_PRNSTATUS_WRONGSEQUENCE or E2E_PRNSTATUS_INITIAL, or CheckReturn is E2E_E_OK and profileBehavior is FALSE and Status is E2E_PRNSTATUS_WRONGSEQUENCE or E2E_PRNSTATUS_SYNC.
Description	The function maps the check status of Profile PRN to a generic check status, which can be used by E2E state machine check function. The E2E Profile PRN delivers a more fine-granular status, but this is not relevant for the E2E state machine.	

4.3.2.3.4. E2E_PRNProtect

Purpose	Protects the array/buffer to be transmitted using the E2E Profile PRN.	
Synopsis	<pre>Std_ReturnType E2E_PRNProtect (const E2E_PRNConfigType * Config , E2E_PRNProtectStateType * State , uint8 * Data);</pre>	
Service ID	0x01	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different communication data / states	
Parameters (in)	Config	Pointer to static configuration.
Parameters (in,out)	State	Pointer to port/data communication state.
	Data	Pointer to Data to be protected.
Return Value	Function execution success status	

	E2E_E_INPUTERR_NULL	At least one pointer parameter is a NULL pointer.
	E2E_E_INPUTERR_WRONG	At least one input parameter is erroneous.
	E2E_E_OK	Function completed successfully.
Description	Protects the array/buffer to be transmitted using the E2E Profile PRN. This includes checksum calculation, handling of counter and Data ID.	

4.3.2.3.5. E2E_PRNProtectInit

Purpose	Initializes the protection state.	
Synopsis	<pre>Std_ReturnType E2E_PRNProtectInit (E2E_ PRNProtectStateType * StatePtr);</pre>	
Service ID	0x1b	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different states	
Parameters (out)	StatePtr	Pointer to port/data communication state.
Return Value	Function execution success status	
	E2E_E_INPUTERR_NULL	NULL pointer passed.
	E2E_E_OK	Function completed successfully.
Description	Initializes the state structure by setting the Counter to 0.	

4.3.3. Integration notes

4.3.3.1. Exclusive areas

Exclusive areas are not used by the E2EPRN module.

4.3.3.2. Production errors

Production errors are not reported by the E2EPRN module.

4.3.3.3. Memory mapping

General information about memory mapping is provided in the EB tresos AutoCore Generic documentation. Refer to the section `Memory mapping and compiler abstraction` in the `Integration notes` section for details.

The following table provides the list of sections that may be mapped for this module:

Memory section
CODE

4.3.3.4. Integration requirements

WARNING



Integration requirements list is not exhaustive

The following list of integration requirements helps you to integrate your product. However, this list is not exhaustive. You also require information from the user guide, release notes, and EB tresos AutoCore known issues to successfully integrate your product.

Integration requirements are not listed for the E2EPRN module.

4.4. SCrc

4.4.1. Configuration parameters

Containers included		
Container name	Multiplicity	Description
CommonPublishedInformation	1..1	Label: Common Published Information Common container, aggregated by all modules. It contains published information about vendor and versions.
PublishedInformation	1..1	Label: EB Published Information Additional published parameters not covered by Common-PublishedInformation container.
SCrcPublishedInformation	1..1	Additional published parameters not covered by Common-PublishedInformation container.

Containers included		
		Note that these parameters do not have any configuration class setting, since they are published information.

Parameters included	
Parameter name	Multiplicity
IMPLEMENTATION_CONFIG_VARIANT	1..1

Parameter Name	IMPLEMENTATION_CONFIG_VARIANT
Label	Config Variant
Multiplicity	1..1
Type	ENUMERATION
Default value	VariantPreCompile
Range	VariantPreCompile

4.4.1.1. CommonPublishedInformation

Parameters included	
Parameter name	Multiplicity
ArMajorVersion	1..1
ArMinorVersion	1..1
ArPatchVersion	1..1
SwMajorVersion	1..1
SwMinorVersion	1..1
SwPatchVersion	1..1
ModuleId	1..1
VendorId	1..1
Release	1..1

Parameter Name	ArMajorVersion
Label	AUTOSAR Major Version
Description	Major version number of AUTOSAR specification on which the appropriate implementation is based on.
Multiplicity	1..1
Type	INTEGER_LABEL

Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ArMinorVersion	
Label	AUTOSAR Minor Version	
Description	Minor version number of AUTOSAR specification on which the appropriate implementation is based on.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ArPatchVersion	
Label	AUTOSAR Patch Version	
Description	Patch level version number of AUTOSAR specification on which the appropriate implementation is based on.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	SwMajorVersion	
Label	Software Major Version	
Description	Major version number of the vendor specific implementation of the module.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	2	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	SwMinorVersion	
-----------------------	-----------------------	--

Label	Software Minor Version	
Description	Minor version number of the vendor specific implementation of the module. The numbering is vendor specific.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	SwPatchVersion	
Label	Software Patch Version	
Description	Patch level version number of the vendor specific implementation of the module. The numbering is vendor specific.	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	10	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	ModuleId	
Label	Numeric Module ID	
Description	Module ID of this module from Module List	
Multiplicity	1..1	
Type	INTEGER_LABEL	
Default value	0	
Configuration class	PublishedInformation:	
Origin	Elektrobit Automotive GmbH	

Parameter Name	VendorId	
Label	Vendor ID	
Description	Vendor ID of the dedicated implementation of this module according to the AUTOSAR vendor list	
Multiplicity	1..1	
Type	INTEGER_LABEL	

Default value	1
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

Parameter Name	Release
Label	Release Information
Multiplicity	1..1
Type	STRING_LABEL
Default value	
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

4.4.1.2. PublishedInformation

Parameters included	
Parameter name	Multiplicity
PbcfgMSupport	1..1

Parameter Name	PbcfgMSupport
Label	PbcfgM support
Description	Specifies whether or not the SCrc can use the PbcfgM module for post-build support.
Multiplicity	1..1
Type	BOOLEAN
Default value	false
Configuration class	PublishedInformation:
Origin	Elektrobit Automotive GmbH

4.4.1.3. SCrcPublishedInformation

4.4.2. Application programming interface (API)

4.4.2.1. Macro constants

4.4.2.1.1. SCRC_FUNCENABLED_SCRC_CRC16

Purpose	Defines whether or not SCrc_CalculateCRC16 shall map to SCrc_CalculateCRC16() of this SCrc module (STD_ON) or shall map to an external function Crc_CalculateCRC16() declared in Crc.h (STD_OFF).
Value	STD_ON

4.4.2.1.2. SCRC_FUNCENABLED_SCRC_CRC32P4

Purpose	Defines whether or not SCrc_CalculateCRC32P4 shall map to SCrc_CalculateCRC32P4() of this SCrc module (STD_ON) or shall map to an external function Crc_CalculateCRC32P4() declared in Crc.h (STD_OFF).
Value	STD_ON

4.4.2.1.3. SCRC_FUNCENABLED_SCRC_CRC8

Purpose	Defines whether or not SCrc_CalculateCRC8 shall map to SCrc_CalculateCRC8() of this SCrc module (STD_ON) or shall map to an external function Crc_CalculateCRC8() declared in Crc.h (STD_OFF).
Value	STD_ON

4.4.2.1.4. SCRC_FUNCENABLED_SCRC_CRC8H2F

Purpose	Defines whether or not SCrc_CalculateCRC8H2F shall map to SCrc_CalculateCRC8H2F() of this SCrc module (STD_ON) or shall map to an external function Crc_CalculateCRC8H2F() declared in Crc.h (STD_OFF).
Value	STD_ON

4.4.2.1.5. SCRC_SW_MAJOR_VERSION

Purpose	AUTOSAR module major version.
----------------	-------------------------------

Value	2U
--------------	----

4.4.2.1.6. SCRC_SW_MINOR_VERSION

Purpose	AUTOSAR module minor version.
Value	0U

4.4.2.1.7. SCRC_SW_PATCH_VERSION

Purpose	AUTOSAR module patch version.
Value	10U

4.4.2.1.8. SCRC_VENDOR_ID

Purpose	AUTOSAR vendor identification: Elektrobit Automotive GmbH.
Value	1U

4.4.2.2. Functions

4.4.2.2.1. SCrc_CalculateCRC16

Purpose	Calculation of CRC16.	
Synopsis	<pre>uint16 SCrc_CalculateCRC16 (const uint8 * SCrc_ DataPtr , uint32 SCrc_Length , uint16 SCrc_ StartValue16 , boolean SCrc_IsFirstCall);</pre>	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	SCrc_DataPtr	Valid pointer to start address of data block
	SCrc_Length	Length of data block in bytes
	SCrc_StartValue16	Initial Value
	SCrc_IsFirstCall	TRUE: First call in a sequence or individual CRC calculation; start from initial

	value, ignore Crc_StartValue16. FALSE: Subsequent call in a call sequence; Crc_StartValue16 is interpreted to be the return value of the previous function call.
Return Value	calculated CRC16 value
Description	This function performs the calculation of a 16-bit CRC value over the memory block referenced by SCrc_DataPtr of byte length SCrc_Length.

4.4.2.2.2. SCrc_CalculateCRC32P4

Purpose	Calculation of CRC32P4.	
Synopsis	<pre>uint32 SCrc_CalculateCRC32P4 (const uint8 * SCrc_DataPtr , uint32 SCrc_Length , uint32 SCrc_StartValue32P4 , boolean SCrc_IsFirstCall);</pre>	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	SCrc_DataPtr	Valid pointer to start address of data block
	SCrc_Length	Length of data block in bytes
	SCrc_StartValue32P4	Initial Value
	SCrc_IsFirstCall	TRUE: First call in a sequence or individual CRC calculation; start from initial value, ignore Crc_StartValue8. FALSE: Subsequent call in a call sequence; Crc_StartValue32P4 is interpreted to be the return value of the previous function call.
Return Value	calculated CRC32 value	
Description	This function performs the calculation of a 32-bit CRC value for Ethernet over the memory block referenced by SCrc_DataPtr of byte length SCrc_Length.	

4.4.2.2.3. SCrc_CalculateCRC8

Purpose	Calculation of CRC8.	
Synopsis	<pre>uint8 SCrc_CalculateCRC8 (const uint8 * SCrc_DataPtr , uint32 SCrc_Length , uint8 SCrc_StartValue8 , boolean SCrc_IsFirstCall);</pre>	

Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	SCrc_DataPtr	Valid pointer to start address of data block
	SCrc_Length	Length of data block in bytes
	SCrc_StartValue8	Initial Value
	SCrc_IsFirstCall	TRUE: First call in a sequence or individual CRC calculation; start from initial value, ignore Crc_StartValue8. FALSE: Subsequent call in a call sequence; Crc_StartValue8 is interpreted to be the return value of the previous function call.
Return Value	calculated CRC8 value	
Description	This function performs the calculation of a 8-bit SAE J1850 CRC value over the memory block referenced by SCrc_DataPtr of byte length SCrc_Length.	

4.4.2.2.4. SCrc_CalculateCRC8H2F

Purpose	Calculation of CRC8 with the Polynomial 0x2F.	
Synopsis	<pre>uint8 SCrc_CalculateCRC8H2F (const uint8 * SCrc_DataPtr , uint32 SCrc_Length , uint8 SCrc_StartValue8H2F , boolean SCrc_IsFirstCall);</pre>	
Sync/Async	Synchronous	
Reentrancy	Reentrant	
Parameters (in)	SCrc_DataPtr	Valid pointer to start address of data block
	SCrc_Length	Length of data block in bytes
	SCrc_StartValue8	Initial Value
	SCrc_IsFirstCall	TRUE: First call in a sequence or individual CRC calculation; start from initial value, ignore Crc_StartValue8. FALSE: Subsequent call in a call sequence; Crc_StartValue8 is interpreted to be the return value of the previous function call.
Return Value	calculated CRC8 value	
Description	This function performs the calculation of a 8-bit CRC value with the Polynomial 0x2F over the memory block referenced by SCrc_DataPtr of byte length SCrc_Length.	

4.4.3. Integration notes

4.4.3.1. Exclusive areas

Exclusive areas are not used by the `SCrc` module.

4.4.3.2. Production errors

Production errors are not reported by the `SCrc` module.

4.4.3.3. Memory mapping

General information about memory mapping is provided in the EB tresos AutoCore Generic documentation. Refer to the section `Memory mapping and compiler abstraction` in the `Integration notes` section for details.

The following table provides the list of sections that may be mapped for this module:

Memory section
CODE
CONST_8
CONST_16
CONST_32

4.4.3.4. Integration requirements

WARNING



Integration requirements list is not exhaustive

The following list of integration requirements helps you to integrate your product. However, this list is not exhaustive. You also require information from the user guide, release notes, and EB tresos AutoCore known issues to successfully integrate your product.

Integration requirements are not listed for the `SCrc` module.

5. Bibliography

Bibliography

- [1] *AUTOSAR Specification of SW-C End-to-End Communication Protection Library*, Issue AUTOSAR Release 4.0.3, Publisher: AUTOSAR
- [2] *AUTOSAR Specification of Module E2E Transformer*, Issue AUTOSAR Release 4.0.3, Publisher: AUTOSAR
- [3] *AUTOSAR RENAULT CAN safety mechanism specification Version 1.1*, Issue , Publisher: AUTOSAR