



Elektrobit

EB tresos[®] E2E Profile 4 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 4 documentation	7
2. E2EP04 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. E2EP04 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	18
2.3.2.6. Open-source software	19
2.3.3. SCrc module release notes	19
2.3.3.1. Change log	19
2.3.3.2. New features	22
2.3.3.3. EB-specific enhancements	22
2.3.3.4. Deviations	22
2.3.3.5. Limitations	22
2.3.3.6. Open-source software	22
3. E2EP04 user's guide	23
3.1. Overview	23
3.2. Background information	23
3.2.1. Functional overview	23
3.2.1.1. Safety mechanisms	23
3.2.1.2. Failure modes and required safety mechanisms	24
3.3. Configuring E2EP04	25
3.4. E2EP04 integration notes	25
4. E2EP04 module references	27

4.1. Overview	27
4.1.1. Notation in EB module references	27
4.1.1.1. Default value of configuration parameters	27
4.1.1.2. Range information of configuration parameters	27
4.2. E2E	28
4.2.1. Configuration parameters	28
4.2.1.1. CommonPublishedInformation	28
4.2.1.2. PublishedInformation	31
4.2.2. Application programming interface (API)	32
4.2.2.1. Type definitions	32
4.2.2.1.1. E2E_PCCheckStatusType	32
4.2.2.2. Macro constants	32
4.2.2.2.1. E2E_AR_MAJOR_VERSION	32
4.2.2.2.2. E2E_AR_MINOR_VERSION	32
4.2.2.2.3. E2E_AR_PATCH_VERSION	32
4.2.2.2.4. E2E_AR_RELEASE_MAJOR_VERSION	32
4.2.2.2.5. E2E_AR_RELEASE_MINOR_VERSION	33
4.2.2.2.6. E2E_AR_RELEASE_REVISION_VERSION	33
4.2.2.2.7. E2E_E_INPUTERR_NULL	33
4.2.2.2.8. E2E_E_INPUTERR_WRONG	33
4.2.2.2.9. E2E_E_INTERR	33
4.2.2.2.10. E2E_E_INVALID	33
4.2.2.2.11. E2E_E_OK	34
4.2.2.2.12. E2E_E_WRONGSTATE	34
4.2.2.2.13. E2E_MODULE_ID	34
4.2.2.2.14. E2E_P_ERROR	34
4.2.2.2.15. E2E_P_NONEWDATA	34
4.2.2.2.16. E2E_P_NOTAVAILABLE	34
4.2.2.2.17. E2E_P_OK	35
4.2.2.2.18. E2E_P_REPEATED	35
4.2.2.2.19. E2E_P_WRONGSEQUENCE	35
4.2.2.2.20. E2E_SW_MAJOR_VERSION	35
4.2.2.2.21. E2E_SW_MINOR_VERSION	35
4.2.2.2.22. E2E_SW_PATCH_VERSION	35
4.2.2.2.23. E2E_VENDOR_ID	36
4.2.2.3. Functions	36
4.2.2.3.1. E2E_GetVersionInfo	36
4.2.3. Integration notes	36
4.2.3.1. Exclusive areas	36
4.2.3.2. Production errors	36
4.2.3.3. Memory mapping	37
4.2.3.4. Integration requirements	37

4.3. E2EP04	37
4.3.1. Configuration parameters	37
4.3.1.1. CommonPublishedInformation	38
4.3.1.2. PublishedInformation	41
4.3.2. Application programming interface (API)	41
4.3.2.1. Type definitions	41
4.3.2.1.1. E2E_P04CheckStateType	41
4.3.2.1.2. E2E_P04CheckStatusType	42
4.3.2.1.3. E2E_P04ConfigType	42
4.3.2.1.4. E2E_P04ProtectStateType	43
4.3.2.2. Macro constants	43
4.3.2.2.1. E2EP04_AR_RELEASE_MAJOR_VERSION	43
4.3.2.2.2. E2EP04_AR_RELEASE_MINOR_VERSION	43
4.3.2.2.3. E2EP04_AR_RELEASE_REVISION_VERSION	44
4.3.2.2.4. E2EP04_SW_MAJOR_VERSION	44
4.3.2.2.5. E2EP04_SW_MINOR_VERSION	44
4.3.2.2.6. E2EP04_SW_PATCH_VERSION	44
4.3.2.2.7. E2EP04_VENDOR_ID	44
4.3.2.3. Functions	44
4.3.2.3.1. E2E_P04Check	44
4.3.2.3.2. E2E_P04CheckInit	45
4.3.2.3.3. E2E_P04MapStatusToSM	45
4.3.2.3.4. E2E_P04Protect	46
4.3.2.3.5. E2E_P04ProtectInit	47
4.3.3. Integration notes	47
4.3.3.1. Exclusive areas	47
4.3.3.2. Production errors	48
4.3.3.3. Memory mapping	48
4.3.3.4. Integration requirements	48
4.4. SCrc	48
4.4.1. Configuration parameters	48
4.4.1.1. CommonPublishedInformation	49
4.4.1.2. PublishedInformation	52
4.4.1.3. SCrcPublishedInformation	53
4.4.2. Application programming interface (API)	53
4.4.2.1. Macro constants	53
4.4.2.1.1. SCRC_FUNCENABLED_SCRC_CRC16	53
4.4.2.1.2. SCRC_FUNCENABLED_SCRC_CRC32P4	53
4.4.2.1.3. SCRC_FUNCENABLED_SCRC_CRC8	53
4.4.2.1.4. SCRC_FUNCENABLED_SCRC_CRC8H2F	54
4.4.2.1.5. SCRC_SW_MAJOR_VERSION	54
4.4.2.1.6. SCRC_SW_MINOR_VERSION	54



- 4.4.2.1.7. SCRC_SW_PATCH_VERSION 54
 - 4.4.2.1.8. SCRC_VENDOR_ID 54
 - 4.4.2.2. Functions 54
 - 4.4.2.2.1. SCrc_CalculateCRC16 54
 - 4.4.2.2.2. SCrc_CalculateCRC32P4 55
 - 4.4.2.2.3. SCrc_CalculateCRC8 56
 - 4.4.2.2.4. SCrc_CalculateCRC8H2F 56
 - 4.4.3. Integration notes 57
 - 4.4.3.1. Exclusive areas 57
 - 4.4.3.2. Production errors 57
 - 4.4.3.3. Memory mapping 57
 - 4.4.3.4. Integration requirements 58
- 5. Bibliography 59



1. Overview of EB tresos E2E Profile 4 documentation

Welcome to the EB tresos E2E Profile 4 (E2EP04) product documentation.

This document provides:

- ▶ [Chapter 2, “E2EP04 release notes”](#): release notes for the E2EP04 modules
- ▶ [Chapter 3, “E2EP04 user's guide”](#): containing background information and instructions
- ▶ [Chapter 4, “E2EP04 module references”](#): information about configuration parameters and the application programming interface

2. E2EP04 release notes

2.1. Overview

This chapter provides the E2EP04 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 E2EP04 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
E2EP04	4.2.1 []	4.2.1 [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. E2EP04 module release notes

- ▶ AUTOSAR R4.2 Rev 1
- ▶ AUTOSAR SWS document version: 4.2.1
- ▶ 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

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

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

2018-05-29

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

Module version 1.0.3

2017-10-27

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

Module version 1.0.2

2017-09-22

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

Module version 1.0.1

2017-08-25

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

Module version 1.0.0

2015-06-19

- ▶ Initial release
- ▶ Implemented deterministic start-up behavior for E2E State Machine according to Bugzilla #67553

2.3.2.2. New features

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

2.3.2.3. EB-specific enhancements

This chapter lists the enhancements provided by the module.

- ▶ 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 if no new data is received in the actual receive cycle. For more information, see http://www.autosar.org/bugzilla/show_bug.cgi?id=67553.

2.3.2.4. Deviations

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

- ▶ [ASCE2E-8] Configuration pointer is a pointer to const

Description:

In contrast to `SWS_E2E_00338` and `SWS_E2E_00339`, the first argument of `E2E_P04Protect()`, and the first and third argument of `E2E_P04Check()` are pointers to const:

```
Std_ReturnType E2E_P04Protect(const E2E_P04ConfigType* Config, E2E_P04ProtectStateType* State, uint8* Data, uint16Length);
```

```
Std_ReturnType E2E_P04Check(const E2E_P04ConfigType* Config, E2E_P04CheckStateType* State, const uint8* Data, uint16Length);
```

For more information, see https://www.autosar.org/bugzilla/show_bug.cgi?id=68903.

Rationale:

The E2E configuration is always constant and no write access is performed on it. Also the data must not be modified by `E2E_P04Check()`, so no write access is performed on it.

Requirements:

`SWS_E2E_00338`, `SWS_E2E_00339`

- ▶ [ASCE2E-34] The E2E library uses the Safety CRC module `SCrc` instead of the AUTOSAR `Crc` module

Description:

Instead of the standard AUTOSAR `Crc` module, a Safety CRC module named `SCrc` is used. That is, instead of `Crc_CalculateCRC32P4()` the function `SCrc_CalculateCRC32P4()` of the `SCrc` module is called.

Rationale:

The implementation of the `SCrc` library complies with the requirements for the development of safety-related software for the automotive domain.

Requirements:

SWS_E2E_00114, SWS_E2E_00329

- Memory abstraction according to AUTOSAR 4.0.3

Description:

In contrast to AUTOSAR which specifies to include file `E2E_MemMap.h` for memory abstraction, E2E Profile 04 includes file `MemMap.h`.

Rationale:

This is done for compatibility reasons with AUTOSAR 4.0.3.

Requirements:

SWS_E2E_00114

- Clarification for initial counter value after call to `E2E_P04CheckInit()`

Description:

In contrast to AUTOSAR which specifies to initialize the counter to 0 in requirement SWS_E2E_00378, the counter is set to the maximum value. For more information, see https://www.autosar.org/bugzilla/show_bug.cgi?id=68745.

Requirements:

SWS_E2E_00378, SWS_E2E_00350

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.

For this module no constraints and limitations are known.

2.3.2.6. Open-source software

E2EP04 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. E2EP04 user's guide

3.1. Overview

This user's guide describes the E2EP04 module. From this user's guide you learn the basic functionality of the E2EP04. You also learn which related modules are necessary to configure the E2EP04 module. The E2EP04 module reference provides further information on configuring the E2EP04 itself.

Note that this user's guide is intended for readers who have good knowledge of AUTOSAR and about the purpose of the E2EP04. The information provided here helps you to integrate the E2EP04 in your AUTOSAR project.

- ▶ [Section 3.2, “Background information”](#) provides an overview of the basic functionality of the E2EP04.
- ▶ [Section 3.3, “Configuring E2EP04”](#) provides information on related modules that are needed in order to configure the E2EP04.
- ▶ [Section 3.4, “E2EP04 integration notes”](#) provides notes for the integration of the E2EP04 module into your project.
- ▶ For details on how to configure the E2EP04 itself, see the parameter descriptions provided in the E2EP04 module reference [Chapter 4, “E2EP04 module references”](#) which is provided together with the dependent modules E2E and SCrc.

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 4 specified by AUTOSAR, see [1]. 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

E2EP04 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 E2EP04 module uses the following safety mechanisms:

- ▶ **Cyclic redundancy check (CRC):** A 32-bit CRC is explicitly sent with polynomial in normal form `0x1F4ACFB13` with an initial value `0xFFFFFFFF` and a final XOR-value `0xFFFFFFFF`.
- ▶ **Sequence counter/alive counter:** A 16-bit sequence number is explicitly sent and incremented at every transmission request.
- ▶ **Data ID:** A system-wide unique 32-bit data ID is explicitly sent for every port data element.
- ▶ **Length:** A 16-bit number to support dynamic-size data.

The header of AUTOSAR E2E Profile 4 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 4.”](#) 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.

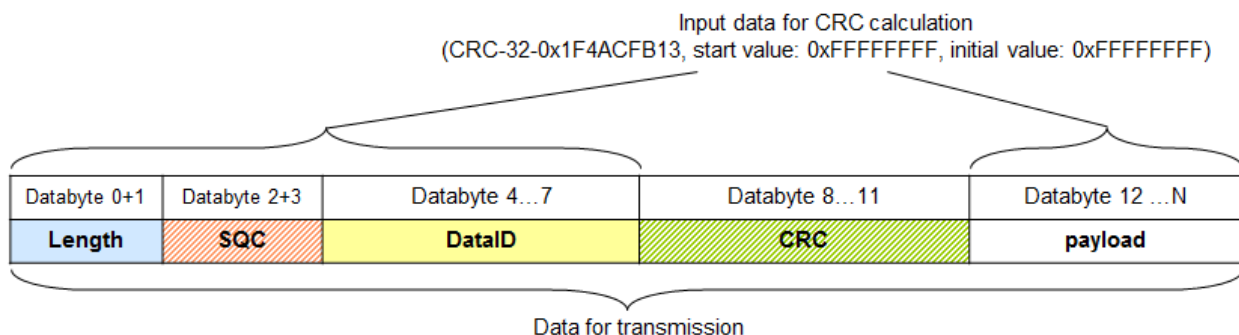


Figure 3.1. Header layout of AUTOSAR E2E Profile 4.

3.2.1.2. Failure modes and required safety mechanisms

The [Table 3.1, “Failure modes detection matrix for E2E Profile 4”](#) shows the failure modes and the required safety mechanisms of E2E Profile 4 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 message repetition	X			
Message loss	X			A
Insertion of message	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 4

3.3. Configuring E2EP04

To configure the `E2EP04` 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 `E2EP04` module, you must configure additional modules as outlined below:

- ▶ The `E2EP04` module requires API functions and data types from the `E2E` library module. This module does not provide any configuration parameters.
- ▶ The `E2EP04` module requires API functions and data types from the `SCrc` library module. This module does not provide any configuration parameters.
- ▶ The `E2EP04` 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. E2EP04 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, “E2EP04 module references”](#) sub-section `Integration notes` in each module.

4. E2EP04 module references

4.1. Overview

This chapter provides module references for the E2EP04 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 E2EP04 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	VendorApilnfix
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. E2EP04

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.

Containers included		
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
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	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	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	VendorApilnfix
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 E2EP04 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_P04CheckStateType

Purpose	Definition of E2E Profile 4 receiver state type.
Type	struct

Members	E2E_P04CheckStatusType Status	Result of the verification of the Data, determined by the Check function.
	uint16 Counter	Counter of last valid received message.
Description	State of the sender for a Data protected with E2E Profile 4.	

4.3.2.1.2. E2E_P04CheckStatusType

Purpose	Definition of E2E Profile 4 receiver status type.	
Type	enum	
Constants	E2E_P04STATUS_OK	New data has been correctly received.
	E2E_P04STATUS_NONEWDATA	The Check function has been invoked but new Data is not available since the last call.
	E2E_P04STATUS_ERROR	The data has been received according to communication medium, but the CRC is incorrect.
	E2E_P04STATUS_REPEATED	New data has been correctly received, but the Counter is identical to the most recent Data
	E2E_P04STATUS_OKSOMELOST	New data has been correctly received, but some data in the sequence have been probably lost.
	E2E_P04STATUS_WRONGSEQUENCE	The new data has been correctly received, but the Counter Delta is too big (DeltaCounter > MaxDeltaCounter)
Description	Result of the verification of the Data in E2E Profile 4, determined by the Check function.	

4.3.2.1.3. E2E_P04ConfigType

Purpose	Non-modifiable configuration of the data element sent over an RTE port, for E2E Profile.	
Type	struct	
Members	uint32 DataID	A system-unique identifier of the Data.
	uint16 Offset	Bit offset of the E2E header from the beginning of the Data Array. The

		offset shall be a multiple of 8 and $0 \leq \text{Offset} \leq \text{MaxDataLength} - (12 \times 8)$. Example: If Offset equals 8, then the high byte of the E2E Length (16 bit) is written to Byte 1, the low Byte is written to Byte 2. Additionally, $\text{Offset} + \text{size of header (96 bits)}$ shall be $\leq \text{Length} \times 8$
	uint16 MinDataLength	Minimum length of Data in bits. The value shall be $\leq 4096 \times 8$ (4kB) and shall be $\geq 12 \times 8$
	uint16 MaxDataLength	Maximum length of data in bits. The value shall be a multiple of 8 and $\geq \text{MinDataLength}$ and $\leq 4096 \times 8$ (4kB)
	uint16 MaxDeltaCounter	Maximum allowed gap between two counter values of two consecutively received valid Data.
Description	The position of the counter and CRC is not configurable in Profile 4.	

4.3.2.1.4. E2E_P04ProtectStateType

Purpose	State of the sender for a Data protected with E2E Profile 4.	
Type	struct	
Members	uint16 Counter	Counter to be used for protecting the Data.

4.3.2.2. Macro constants

4.3.2.2.1. E2EP04_AR_RELEASE_MAJOR_VERSION

Purpose	AUTOSAR release major version.
Value	4U

4.3.2.2.2. E2EP04_AR_RELEASE_MINOR_VERSION

Purpose	AUTOSAR release minor version.
Value	2U

4.3.2.2.3. E2EP04_AR_RELEASE_REVISION_VERSION

Purpose	AUTOSAR release revision version.
Value	1U

4.3.2.2.4. E2EP04_SW_MAJOR_VERSION

Purpose	AUTOSAR module major version.
Value	1U

4.3.2.2.5. E2EP04_SW_MINOR_VERSION

Purpose	AUTOSAR module minor version.
Value	0U

4.3.2.2.6. E2EP04_SW_PATCH_VERSION

Purpose	AUTOSAR module patch version.
Value	10U

4.3.2.2.7. E2EP04_VENDOR_ID

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

4.3.2.3. Functions

4.3.2.3.1. E2E_P04Check

Purpose	Check the received Data using the E2E Profile 4.
Synopsis	<pre>Std_ReturnType E2E_P04Check (const E2E_P04ConfigType * ConfigPtr , E2E_P04CheckStateType * StatePtr , const uint8 * DataPtr , uint16 Length);</pre>
Service ID	0x23

Sync/Async	Synchronous	
Reentrancy	Reentrant for different communication data / states	
Parameters (in)	ConfigPtr	Pointer to static configuration.
	DataPtr	Pointer to received Data.
	Length	Length of the Data.
Parameters (in,out)	StatePtr	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 4. This includes CRC calculation, handling of Sequence Counter and Data ID.	

4.3.2.3.2. E2E_P04CheckInit

Purpose	Initializes the check state.	
Synopsis	<pre>Std_ReturnType E2E_P04CheckInit (E2E_ P04CheckStateType * StatePtr);</pre>	
Service ID	0x24	
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 0xFFFF and the State to E2E_P04STATUS_ERROR.	

4.3.2.3.3. E2E_P04MapStatusToSM

Purpose	Maps the check status of Profile 4 to a generic check status.
----------------	---

Synopsis	<pre>E2E_PCheckStatusType E2E_P04MapStatusToSM (Std_ReturnType CheckReturn , E2E_P04CheckStatusType Status);</pre>	
Service ID	0x25	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different status types	
Parameters (in)	CheckReturn	Return value of the E2E_P04Check function.
	Status	Status determined by E2E_P04Check function.
Return Value	Profile-independent status of the reception on one single Data in one cycle.	
	E2E_P_OK	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_OK or E2E_P04STATUS_OKSOMELOST.
	E2E_P_ERROR	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_ERROR or CheckReturn is different than E2E_E_OK or Status is undefined.
	E2E_P_REPEATED	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_REPEATED
	E2E_P_NONEWDATA	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_NONEWDATA.
	E2E_P_WRONGSEQUENCE	CheckReturn is E2E_E_OK and Status is E2E_P04STATUS_WRONGSEQUENCE.
Description	The function maps the check status of Profile 4 to a generic check status, which can be used by E2E state machine check function. The E2E Profile 4 delivers a more fine-granular status, but this is not relevant for the E2E state machine.	

4.3.2.3.4. E2E_P04Protect

Purpose	Protects the array/buffer to be transmitted using the E2E Profile 4.	
Synopsis	<pre>Std_ReturnType E2E_P04Protect (const E2E_P04ConfigType * ConfigPtr , E2E_P04ProtectStateType * StatePtr , uint8 * DataPtr , uint16 Length);</pre>	
Service ID	0x21	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different communication data / states	

Parameters (in)	ConfigPtr	Pointer to static configuration.
	Length	Length of the Data.
Parameters (in,out)	StatePtr	Pointer to port/data communication state.
	DataPtr	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 4. This includes checksum calculation, handling of Sequence counter and Data ID.	

4.3.2.3.5. E2E_P04ProtectInit

Purpose	Initializes the protection state.	
Synopsis	<pre>Std_ReturnType E2E_P04ProtectInit (E2E_P04ProtectStateType * StatePtr);</pre>	
Service ID	0x22	
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 E2EP04 module.

4.3.3.2. Production errors

Production errors are not reported by the E2EP04 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 E2EP04 module.

4.4. SCrc

4.4.1. Configuration parameters

Containers included		
Container name	Multiplicity	Description
CommonPublishedInformation	1..1	Label: Common Published Information

Containers included		
		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. 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

Parameters included	
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 4.2.1, Publisher: AUTOSAR
- [2] *AUTOSAR Specification of Module E2E Transformer*, Issue AUTOSAR 4.2.1, Publisher: AUTOSAR