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| 2008-08-13 | 3.1.1 | AUTOSAR  Administration | * Legal disclaimer revised |
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# Introduction and functional overview

This specification describes the functionality, API and the configuration for the AUTOSAR Basic Software module CAN State Manager.

The AUTOSAR BSW stack specifies for each communication bus a bus specific state manager. This module shall implement the control flow for the respective bus. Like shown in the figure below, the CAN State Manager (CanSM) is a member of the Communication Service Layer. It interacts with the Communication Hardware Abstraction Layer and the System Service Layer.

System Services

EcuM

Dem

ComM

Communication Services

AUTOSAR COM

DCM

Diagnostic Com. Manager

IPDU

multi- plexer

PDU Router

Communication Hardware Abstraction

Driver for ext. CAN ASIC

CAN Transceiver Driver

CAN Interface

CAN NM

Generic NM Interface / NM GW

CAN

State Manager

CAN Transport Protocol

**Figure 1-1: Layered Software Architecture from CanSM point of view**

# Acronyms and abbreviations

|  |  |
| --- | --- |
| **Abbreviation / Acronym:** | **Description:** |
| API | Application Program Interface |
| BSW | Basic Software |
| CAN | Controller Area Network |
| CanIf | CAN Interface |
| CanSM | CAN State Manager |
| ComM | Communication Manager |
| DEM | Diagnostic Event Manager |
| DET | Default Error Tracer |
| EcuM | ECU State Manager |
| PDU | Protocol Data Unit |
| RX | Receive |
| TX | Transmit |
| SchM | BSW Scheduler |
| SWC | Software Component |
| BswM | Basic Software Mode Manager |

# Related documentation

## Input documents

1. List of Basic Software Modules AUTOSAR\_TR\_BSWModuleList.pdf
2. Layered Software Architecture AUTOSAR\_EXP\_LayeredSoftwareArchitecture.pdf
3. General Requirements on Basic Software Modules AUTOSAR\_SRS\_BSWGeneral.pdf
4. Specification of ECU Configuration AUTOSAR\_TPS\_ECUConfiguration.pdf
5. Specification of Standard Types AUTOSAR\_SWS\_StandardTypes.pdf
6. Specification of Communication Stack Types AUTOSAR\_SWS\_CommunicationStackTypes.pdf
7. Requirements on CAN AUTOSAR\_SRS\_CAN.pdf
8. Requirements on Mode Management AUTOSAR\_SRS\_ModeManagement.pdf
9. Specification of CAN Transceiver Driver AUTOSAR\_SWS\_CANTransceiverDriver.pdf
10. Specification of Communication Manager AUTOSAR\_SWS\_COMManager.pdf
11. Specification of ECU State Manager

AUTOSAR\_SWS\_ECUStateManager.pdf

1. Specification of Diagnostics Event Manager AUTOSAR\_SWS\_DiagnosticEventManager.pdf
2. Specification of CAN Interface AUTOSAR\_SWS\_CANInterface.pdf
3. Specification of BSW Scheduler AUTOSAR\_SWS\_BSW\_Scheduler.pdf
4. Specification of Default Error Tracer AUTOSAR\_SWS\_DefaultErrorTracer.pdf
5. Debugging Concept (internal)
6. Vehicle and Application Mode Management Concept (internal)
7. Specification of Basic Software Mode Manager AUTOSAR\_SWS\_BSWModeManager.pdf
8. Specification of CAN Network Management, AUTOSAR\_SWS\_Can\_NM.pdf
9. Specification of Diagnostic Communication Manager AUTOSAR\_SWS\_DiagnosticCommunicationManager.pdf
10. General Specification of Basic Software Modules AUTOSAR\_SWS\_BSWGeneral.pdf

## Related standards and norms

None

## Related specification

AUTOSAR provides a General Specification on Basic Software modules [[21]](#_bookmark13) (SWS BSW General), which is also valid for CAN State Manager.

Thus, the specification SWS BSW General shall be considered as additional and required specification for CAN State Manager.

# Constraints and assumptions

## Limitations

The CanSM module can be used for CAN communication only. Its task is to operate with the CanIf module to control one or multiple underlying CAN Controllers and CAN Transceiver Drivers. Other protocols than CAN (i.e. LIN or FlexRay) are not supported.

## Applicability to car domains

The CAN State Manager module can be used for all domain applications whenever the CAN protocol is used.

# Dependencies to other modules

The next sections give a brief description of configuration information and services the CanSM module requires from other modules.



«module» ComM



«module» EcuM

«realize»



ComM\_BusSM\_ModeIndication

«mandatory»

«use»



«module» SchM

«realize»



«module» BswM

«realize»



«module» Dem

«realize»



«module» Det

CanSM\_EcuMWakeUpValidation

Dem\_SetEventStatus

CanSM\_ComM

«mandatory»

«realize»

«realize»

CanSM\_Init

CanSM BswM\_CanSM\_CurrentState

«mandatory»

Det\_ReportError

«realize»

«realize»

«mandatory»

«optional»

«module» CanSM

«mandatory»

«realize»

«mandatory»

«realize»

CanSM\_Cbk

CanSM\_TxTimeoutException

CanIf\_CanSm

«optional»



«realize»

«module» CanIf

CanNm\_ConfirmPnAvailability

«realize» «optional»



«module» CanNm

**Figure 5-1: Module dependencies of the CanSM module**

## ECU State Manager (EcuM)

The EcuM module initializes the CanSM module and interacts with the CanSM module for the CAN wakeup validation (refer to [[11]](#_bookmark7) for a detailed specification of this module).

## BSW Scheduler (SchM)

The BSW Scheduler module calls the main function of the CanSM module, which is necessary for the cyclic processes of the CanSM module (refer to [[14]](#_bookmark10) for a detailed specification of this module).

## Communication Manager (ComM)

The ComM module uses the API of the CanSM module to request communication modes of CAN networks, which are identified with unique network handles (refer to [[10]](#_bookmark6) for a detailed specification of this module).

The CanSM module notifies the current communication mode of its CAN networks to the ComM module.

## CAN Interface (CanIf)

The CanSM module uses the API of the CanIf module to control the operating modes of the CAN controllers and CAN transceivers assigned to the CAN networks (refer to [[13]](#_bookmark9) for a detailed specification of this module).

The CanIf module notifies the CanSM module about peripheral events.

## Diagnostic Event Manager (DEM)

The CanSM module reports bus specific production errors to the DEM module (refer to [[12]](#_bookmark8) for a detailed specification of this module).

## Basic Software Mode Manager (BswM)

The CanSM need to notify bus specific mode changes to the BswM module (refer to [[18]](#_bookmark11) for a detailed specification of this module).

## CAN Network Management (CanNm)

The CanSM module needs to notify the partial network availability to the CanNm module and shall handle notified CanNm timeout exceptions in case of partial networking (ref. to [[19]](#_bookmark12) for a detailed specification of this module).

## Default Error Tracer (DET)

The CanSM module reports development and runtime errors to the DET module. Development Errors are only reported if development error handling is switched on by configuration (refer to [15] for a detailed specification of this module).

## File structure

### Code file structure

For details refer to the chapter 5.1.6 “Code file structure” in *SWS\_BSWGeneral*

### Header file structure

**[SWS\_CanSM\_00008] ⌈**The header file CanSM.h shall export CanSM module specific types and the APIs CanSM\_GetVersionInfo and CanSM\_Init.⌋(SRS\_BSW\_00447)

### Version check

For details refer to the chapter 5.1.8 “Version Check” in *SWS\_BSWGeneral.*

# Requirements traceability

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Description** | **Satisfied by** |
| SRS\_BSW\_00003 | All software modules shall provide version and identification information | SWS\_CanSM\_00024, SWS\_CanSM\_00374 |
| SRS\_BSW\_00101 | The Basic Software Module shall be able to initialize variables and hardware in a separate initialization function | SWS\_CanSM\_00023 |
| SRS\_BSW\_00333 | For each callback function it shall be specified if it is called from interrupt context or not | SWS\_CanSM\_00064, SWS\_CanSM\_00189, SWS\_CanSM\_00190, SWS\_CanSM\_00235 |
| SRS\_BSW\_00336 | Basic SW module shall be able to shutdown | SWS\_CanSM\_91001 |
| SRS\_BSW\_00337 | Classification of development errors | SWS\_CanSM\_00654 |
| SRS\_BSW\_00358 | The return type of init() functions implemented by AUTOSAR Basic Software Modules shall be void | SWS\_CanSM\_00023 |
| SRS\_BSW\_00359 | All AUTOSAR Basic Software Modules callback functions shall avoid return types other than void if possible | SWS\_CanSM\_00064, SWS\_CanSM\_00189, SWS\_CanSM\_00190, SWS\_CanSM\_00235 |
| SRS\_BSW\_00369 | All AUTOSAR Basic Software Modules shall not return specific development error codes via the API | SWS\_CanSM\_00660 |
| SRS\_BSW\_00400 | Parameter shall be selected from multiple sets of parameters after code has been loaded and started | SWS\_CanSM\_00023, SWS\_CanSM\_00597 |
| SRS\_BSW\_00404 | BSW Modules shall support post-build configuration | SWS\_CanSM\_00023 |
| SRS\_BSW\_00405 | BSW Modules shall support multiple configuration sets | SWS\_CanSM\_00023 |
| SRS\_BSW\_00406 | A static status variable denoting if a BSW module is initialized shall be initialized with value 0 before any APIs of the | SWS\_CanSM\_00023, SWS\_CanSM\_00184 |

|  |  |  |
| --- | --- | --- |
|  | BSW module is called |  |
| SRS\_BSW\_00407 | Each BSW module shall provide a function to read out the version information of a dedicated module implementation | SWS\_CanSM\_00024, SWS\_CanSM\_00374 |
| SRS\_BSW\_00414 | Init functions shall have a pointer to a configuration structure as single parameter | SWS\_CanSM\_00023 |
| SRS\_BSW\_00422 | Pre-de-bouncing of error status information is done within the Dem | SWS\_CanSM\_00498, SWS\_CanSM\_00522, SWS\_CanSM\_00605 |
| SRS\_BSW\_00424 | BSW module main processing functions shall not be allowed to enter a wait state | SWS\_CanSM\_00065, SWS\_CanSM\_00167 |
| SRS\_BSW\_00425 | The BSW module description template shall provide means to model the defined trigger conditions of schedulable objects | SWS\_CanSM\_00065, SWS\_CanSM\_00167 |
| SRS\_BSW\_00438 | Configuration data shall be defined in a structure | SWS\_CanSM\_00023, SWS\_CanSM\_00597 |
| SRS\_BSW\_00447 | Standardizing Include file structure of BSW Modules Implementing Autosar Service | SWS\_CanSM\_00008 |
| SRS\_BSW\_00466 | Classification of extended production errors | SWS\_CanSM\_00664 |
| SRS\_Can\_01142 | The CAN State Manager shall offer a network abstract API to upper layer | SWS\_CanSM\_00062, SWS\_CanSM\_00065, SWS\_CanSM\_00167, SWS\_CanSM\_00182, SWS\_CanSM\_00183, SWS\_CanSM\_00186, SWS\_CanSM\_00187, SWS\_CanSM\_00188, SWS\_CanSM\_00266, SWS\_CanSM\_00278, SWS\_CanSM\_00282, SWS\_CanSM\_00284, SWS\_CanSM\_00360, SWS\_CanSM\_00369, SWS\_CanSM\_00370, SWS\_CanSM\_00371, SWS\_CanSM\_00372, SWS\_CanSM\_00385, SWS\_CanSM\_00399, SWS\_CanSM\_00410, SWS\_CanSM\_00422, SWS\_CanSM\_00423, SWS\_CanSM\_00425, SWS\_CanSM\_00426, SWS\_CanSM\_00427, SWS\_CanSM\_00428, SWS\_CanSM\_00429, SWS\_CanSM\_00430, SWS\_CanSM\_00431, SWS\_CanSM\_00432, SWS\_CanSM\_00433, SWS\_CanSM\_00434, SWS\_CanSM\_00436, SWS\_CanSM\_00437, SWS\_CanSM\_00438, SWS\_CanSM\_00439, SWS\_CanSM\_00440, SWS\_CanSM\_00441, SWS\_CanSM\_00442, SWS\_CanSM\_00443, SWS\_CanSM\_00444, SWS\_CanSM\_00445, SWS\_CanSM\_00446, SWS\_CanSM\_00447, SWS\_CanSM\_00448, SWS\_CanSM\_00449, |

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| --- | --- | --- |
|  |  | SWS\_CanSM\_00450, SWS\_CanSM\_00451, SWS\_CanSM\_00452, SWS\_CanSM\_00453, SWS\_CanSM\_00454, SWS\_CanSM\_00455, SWS\_CanSM\_00456, SWS\_CanSM\_00457, SWS\_CanSM\_00458, SWS\_CanSM\_00459, SWS\_CanSM\_00460, SWS\_CanSM\_00461, SWS\_CanSM\_00462, SWS\_CanSM\_00464, SWS\_CanSM\_00465, SWS\_CanSM\_00466, SWS\_CanSM\_00467, SWS\_CanSM\_00468, SWS\_CanSM\_00469, SWS\_CanSM\_00470, SWS\_CanSM\_00471, SWS\_CanSM\_00472, SWS\_CanSM\_00473, SWS\_CanSM\_00474, SWS\_CanSM\_00475, SWS\_CanSM\_00476, SWS\_CanSM\_00477, SWS\_CanSM\_00478, SWS\_CanSM\_00479, SWS\_CanSM\_00483, SWS\_CanSM\_00484, SWS\_CanSM\_00485, SWS\_CanSM\_00486, SWS\_CanSM\_00487, SWS\_CanSM\_00488, SWS\_CanSM\_00489, SWS\_CanSM\_00490, SWS\_CanSM\_00491, SWS\_CanSM\_00492, SWS\_CanSM\_00493, SWS\_CanSM\_00494, SWS\_CanSM\_00496, SWS\_CanSM\_00497, SWS\_CanSM\_00499, SWS\_CanSM\_00500, SWS\_CanSM\_00502, SWS\_CanSM\_00503, SWS\_CanSM\_00504, SWS\_CanSM\_00505, SWS\_CanSM\_00506, SWS\_CanSM\_00507, SWS\_CanSM\_00508, SWS\_CanSM\_00509, SWS\_CanSM\_00510, SWS\_CanSM\_00511, SWS\_CanSM\_00512, SWS\_CanSM\_00514, SWS\_CanSM\_00515, SWS\_CanSM\_00517, SWS\_CanSM\_00518, SWS\_CanSM\_00521, SWS\_CanSM\_00524, SWS\_CanSM\_00525, SWS\_CanSM\_00526, SWS\_CanSM\_00527, SWS\_CanSM\_00528, SWS\_CanSM\_00529, SWS\_CanSM\_00530, SWS\_CanSM\_00531, SWS\_CanSM\_00532, SWS\_CanSM\_00533, SWS\_CanSM\_00534, SWS\_CanSM\_00535, SWS\_CanSM\_00538, SWS\_CanSM\_00540, SWS\_CanSM\_00541, SWS\_CanSM\_00542, SWS\_CanSM\_00543, SWS\_CanSM\_00550, SWS\_CanSM\_00555, SWS\_CanSM\_00556, SWS\_CanSM\_00557, SWS\_CanSM\_00558, SWS\_CanSM\_00561, SWS\_CanSM\_00569, SWS\_CanSM\_00576, SWS\_CanSM\_00577, SWS\_CanSM\_00578, SWS\_CanSM\_00579, SWS\_CanSM\_00580, SWS\_CanSM\_00581, SWS\_CanSM\_00582, SWS\_CanSM\_00584, SWS\_CanSM\_00600, SWS\_CanSM\_00602, SWS\_CanSM\_00603, SWS\_CanSM\_00604, SWS\_CanSM\_00607, SWS\_CanSM\_00608, SWS\_CanSM\_00623, SWS\_CanSM\_00624, SWS\_CanSM\_00625, SWS\_CanSM\_00626, SWS\_CanSM\_00627, SWS\_CanSM\_00628, SWS\_CanSM\_00629, SWS\_CanSM\_00630, SWS\_CanSM\_00631, SWS\_CanSM\_00632, SWS\_CanSM\_00633, SWS\_CanSM\_00634, SWS\_CanSM\_00635, SWS\_CanSM\_00636, SWS\_CanSM\_00639, SWS\_CanSM\_00641, SWS\_CanSM\_00642, SWS\_CanSM\_00651, SWS\_CanSM\_00653 |

|  |  |  |
| --- | --- | --- |
| SRS\_Can\_01144 | The CAN State Manager shall implement an interface for initialization. | SWS\_CanSM\_00600, SWS\_CanSM\_00602, SWS\_CanSM\_00603, SWS\_CanSM\_00604, SWS\_CanSM\_00606, SWS\_CanSM\_00637 |
| SRS\_Can\_01145 | The CAN State Manager shall control the assigned CAN Devices | SWS\_CanSM\_00062, SWS\_CanSM\_00065, SWS\_CanSM\_00167, SWS\_CanSM\_00182, SWS\_CanSM\_00183, SWS\_CanSM\_00369, SWS\_CanSM\_00370, SWS\_CanSM\_00396, SWS\_CanSM\_00397, SWS\_CanSM\_00398, SWS\_CanSM\_00399, SWS\_CanSM\_00400, SWS\_CanSM\_00401, SWS\_CanSM\_00410, SWS\_CanSM\_00411, SWS\_CanSM\_00412, SWS\_CanSM\_00413, SWS\_CanSM\_00414, SWS\_CanSM\_00415, SWS\_CanSM\_00416, SWS\_CanSM\_00417, SWS\_CanSM\_00418, SWS\_CanSM\_00419, SWS\_CanSM\_00420, SWS\_CanSM\_00421, SWS\_CanSM\_00423, SWS\_CanSM\_00425, SWS\_CanSM\_00426, SWS\_CanSM\_00427, SWS\_CanSM\_00428, SWS\_CanSM\_00429, SWS\_CanSM\_00430, SWS\_CanSM\_00431, SWS\_CanSM\_00432, SWS\_CanSM\_00433, SWS\_CanSM\_00434, SWS\_CanSM\_00436, SWS\_CanSM\_00437, SWS\_CanSM\_00438, SWS\_CanSM\_00439, SWS\_CanSM\_00440, SWS\_CanSM\_00441, SWS\_CanSM\_00442, SWS\_CanSM\_00443, SWS\_CanSM\_00444, SWS\_CanSM\_00445, SWS\_CanSM\_00446, SWS\_CanSM\_00447, SWS\_CanSM\_00448, SWS\_CanSM\_00449, SWS\_CanSM\_00450, SWS\_CanSM\_00451, SWS\_CanSM\_00452, SWS\_CanSM\_00453, SWS\_CanSM\_00454, SWS\_CanSM\_00455, SWS\_CanSM\_00456, SWS\_CanSM\_00457, SWS\_CanSM\_00458, SWS\_CanSM\_00459, SWS\_CanSM\_00460, SWS\_CanSM\_00461, SWS\_CanSM\_00462, SWS\_CanSM\_00464, SWS\_CanSM\_00465, SWS\_CanSM\_00466, SWS\_CanSM\_00467, SWS\_CanSM\_00468, SWS\_CanSM\_00469, SWS\_CanSM\_00470, SWS\_CanSM\_00471, SWS\_CanSM\_00472, SWS\_CanSM\_00473, SWS\_CanSM\_00474, SWS\_CanSM\_00475, SWS\_CanSM\_00476, SWS\_CanSM\_00477, SWS\_CanSM\_00478, SWS\_CanSM\_00479, SWS\_CanSM\_00483, SWS\_CanSM\_00484, SWS\_CanSM\_00485, SWS\_CanSM\_00486, SWS\_CanSM\_00487, SWS\_CanSM\_00488, SWS\_CanSM\_00489, SWS\_CanSM\_00490, SWS\_CanSM\_00491, SWS\_CanSM\_00492, SWS\_CanSM\_00493, SWS\_CanSM\_00494, SWS\_CanSM\_00496, SWS\_CanSM\_00497, SWS\_CanSM\_00499, SWS\_CanSM\_00500, SWS\_CanSM\_00507, SWS\_CanSM\_00508, SWS\_CanSM\_00509, SWS\_CanSM\_00510, SWS\_CanSM\_00511, SWS\_CanSM\_00512, SWS\_CanSM\_00514, SWS\_CanSM\_00515, SWS\_CanSM\_00517, SWS\_CanSM\_00518, SWS\_CanSM\_00521, SWS\_CanSM\_00524, SWS\_CanSM\_00525, SWS\_CanSM\_00526, SWS\_CanSM\_00527, SWS\_CanSM\_00528, SWS\_CanSM\_00529, |

|  |  |  |
| --- | --- | --- |
|  |  | SWS\_CanSM\_00531, SWS\_CanSM\_00532, SWS\_CanSM\_00533, SWS\_CanSM\_00534, SWS\_CanSM\_00535, SWS\_CanSM\_00538, SWS\_CanSM\_00540, SWS\_CanSM\_00541, SWS\_CanSM\_00542, SWS\_CanSM\_00543, SWS\_CanSM\_00546, SWS\_CanSM\_00550, SWS\_CanSM\_00555, SWS\_CanSM\_00556, SWS\_CanSM\_00557, SWS\_CanSM\_00558, SWS\_CanSM\_00560, SWS\_CanSM\_00576, SWS\_CanSM\_00577, SWS\_CanSM\_00578, SWS\_CanSM\_00579, SWS\_CanSM\_00580, SWS\_CanSM\_00581, SWS\_CanSM\_00582, SWS\_CanSM\_00584, SWS\_CanSM\_00600, SWS\_CanSM\_00602, SWS\_CanSM\_00603, SWS\_CanSM\_00604, SWS\_CanSM\_00607, SWS\_CanSM\_00608, SWS\_CanSM\_00609, SWS\_CanSM\_00610, SWS\_CanSM\_00611, SWS\_CanSM\_00612, SWS\_CanSM\_00613, SWS\_CanSM\_00616, SWS\_CanSM\_00617, SWS\_CanSM\_00618, SWS\_CanSM\_00619, SWS\_CanSM\_00620, SWS\_CanSM\_00621, SWS\_CanSM\_00622, SWS\_CanSM\_00623, SWS\_CanSM\_00624, SWS\_CanSM\_00625, SWS\_CanSM\_00626, SWS\_CanSM\_00627, SWS\_CanSM\_00628, SWS\_CanSM\_00629, SWS\_CanSM\_00630, SWS\_CanSM\_00631, SWS\_CanSM\_00632, SWS\_CanSM\_00633, SWS\_CanSM\_00634, SWS\_CanSM\_00636, SWS\_CanSM\_00638, SWS\_CanSM\_00639, SWS\_CanSM\_00641, SWS\_CanSM\_00642, SWS\_CanSM\_00651, SWS\_CanSM\_00653 |
| SRS\_Can\_01146 | The CAN State Manager shall contain a CAN BusOff recovery algorithm for each used CAN Controller | SWS\_CanSM\_00600, SWS\_CanSM\_00602, SWS\_CanSM\_00603, SWS\_CanSM\_00604, SWS\_CanSM\_00606, SWS\_CanSM\_00637 |
| SRS\_Can\_01158 | The CAN stack shall provide a TX offline active mode for ECU passive mode | SWS\_CanSM\_00435, SWS\_CanSM\_00516, SWS\_CanSM\_00539, SWS\_CanSM\_00644, SWS\_CanSM\_00645, SWS\_CanSM\_00646, SWS\_CanSM\_00647, SWS\_CanSM\_00649, SWS\_CanSM\_00650, SWS\_CanSM\_00656 |
| SRS\_Can\_01164 | - | SWS\_CanSM\_00658, SWS\_CanSM\_91001 |
| SRS\_ModeMgm\_09084 | The Communication Manager shall provide an API which allows application to query the current communication mode | SWS\_CanSM\_00063 |
| SRS\_ModeMgm\_09251 | PNC communication state shall be forwarded to the BswM | SWS\_CanSM\_00598 |

# Functional specification

This chapter specifies the different functions of the CanSM module in the AUTOSAR BSW architecture.

An ECU can have different communication networks. Each network has to be identified with an unique network handle. The ComM module requests communication modes from the networks. It knows by its configuration, which handle is assigned to what kind of network. In case of CAN, it uses the CanSM module.

The CanSM module is responsible for the control flow abstraction of CAN networks:

It changes the communication modes of the configured CAN networks depending on the mode requests from the ComM module.

Therefore the CanSM module uses the API of the CanIf module. The CanIf module is responsible for the control flow abstraction of the configured CAN Controllers and CAN Transceivers (the data flow abstraction of the CanIf module is not relevant for the CanSM module). Any change of the CAN Controller modes and CAN Transceiver modes will be notified by the CanIf module to the CanSM module. Depending on this notifications and state of the CAN network state machine, which the CanSM module shall implement for each configured CAN network, the CanSM module notifies the ComM and the BswM (ref. to chapter [7.2](#_bookmark40) for details).

Note:

CanSM module will not notify ComM about its communication mode after initialization, unless a communication mode has explicitly been requested by ComM.

## General requirements

CANSM\_BSM\_S\_FULLCOM



ExitPoint CHANGE\_BR

/E\_FULL\_COM

T\_NO\_COM\_MODE\_REQUEST

/E\_PRE\_NOCOM

[G\_FULL\_COM\_MODE\_REQUESTED]

/E\_BR\_END\_FULL\_COM

T\_SILENT\_COM\_MODE\_REQUEST

/E\_FULL\_TO\_SILENT\_COM

CANSM\_BSM\_S\_PRE\_FULLCOM

ExitPoint To FULLCOM

CANSM\_BSM\_S\_CHANGE\_BAUDRATE

T\_FULL\_COM\_MODE\_REQUEST

/E\_SILENT\_TO\_FULL\_COM

ExitPoint FULL\_OR\_SILENT\_COM

ExitPoint NO\_COM

[G\_SILENT\_COM\_MODE\_REQUESTED]

/E\_BR\_END\_SILENT\_COM

T\_FULL\_COM\_MODE\_REQUEST

CANSM\_BSM\_S\_SILENTCOM

T\_FULL\_COM\_MODE\_REQUEST

CANSM\_BSM\_WUVALIDATION

/E\_PRE\_NOCOM

T\_BUS\_OFF

CANSM\_BSM\_S\_SILENTCOM\_BOR

T\_STOP\_WAKEUP\_SOURCE

T\_NO\_COM\_MODE\_REQUEST

/E\_PRE\_NOCOM

T\_NO\_COM\_MODE\_REQUEST

/E\_PRE\_NO\_COM

CANSM\_BSM\_S\_PRE\_NOCOM

T\_START\_WAKEUP\_SOURCE

T\_START\_WAKEUP\_SOURCE

CanSM\_Init

CANSM\_BSM\_S\_NOCOM

/E\_NOCOM

CanSM\_DeInit

CANSM\_BSM\_S\_NOT\_INITIALIZED

PowerOn

PowerOff

**Figure 7-1 : CANSM\_BSM, state machine diagram for one CAN network**

**[SWS\_CanSM\_00266]** ⌈The CanSM module shall store the current network mode for each configured CAN network internally (ref. to to [ECUC\_CanSM\_00126](#_bookmark197)).⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00284]** ⌈The internally stored network modes of the CanSM module can have the values COMM\_NO\_COMMUNICATION, COMM\_SILENT\_COMMUNICATION, COMM\_FULL\_COMMUNICATION.⌋(SRS\_Can\_01142)

[SWS\_CanSM\_00428] ⌈All effects of the CanSM state machine CANSM\_BSM (ref. to [Figure 7-1](#_bookmark35)) shall be operated in the context of the CanSM main function (ref. to SWS\_CanSM\_00065).⌋(SRS\_Can\_01142, SRS\_Can\_01145)

**[SWS\_CanSM\_00278]** ⌈If the CanSM state machine CANSM\_BSM (ref. to [Figure 7-1](#_bookmark35)) is in the state CANSM\_BSM\_S\_NOT\_INITIALIZED, it shall deny network mode requests from the ComM module (ref. to SWS\_CanSM\_00062).⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00385]** ⌈If CanSM has repeated one of the CanIf API calls CanIf\_SetControllerMode, CanIf\_SetTrcvMode, CanIf\_ClearTrcvWufFlag or CanIf\_CheckTrcvWakeFlag more often than CanSMModeRequestRepetitionMax (ref. to [ECUC\_CanSM\_00335](#_bookmark191)) without getting the return value E\_OK or without getting the corresponding mode indication callbacks CanSM\_ControllerModeIndication, CanSM\_TransceiverModeIndication, CanSM\_ClearTrcvWufFlagIndication or CanSM\_CheckTransceiverWakeFlagIndication, CanSM shall call the function Det\_ReportRuntimeError with ErrorId parameter

CANSM\_E\_MODE\_REQUEST\_TIMEOUT.⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00422] ⌈**If the CanIf module notifies PN availability for a configured CAN Transceiver to the CanSM module with the callback function [CanSM\_ConfirmPnAvailability](#_bookmark176) (ref. to SWS\_CanSM\_00419), then the CanSM module shall call the API CanNm\_ConfirmPnAvailability (ref. to chapter [8.5.1](#_bookmark180)) with the related CAN network as channel to confirm the PN availability to the CanNm module.⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00560]** ⌈If no CanSMTransceiverId (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) is configured for a CAN Network, then the CanSM module shall bypass all specified CanIf\_SetTrcvMode (e. g. [SWS\_CanSM\_00446](#_bookmark87)) calls for the CAN Network and proceed in the different state transitions as if it has got the supposed CanSM\_TransceiverModeIndication already (e. g.

[SWS\_CanSM\_00448](#_bookmark88)).⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00635**]⌈ The CanSM module shall store for each configured CAN network (ref. to [ECUC\_CanSM\_00126](#_bookmark197)) the latest communication mode request, which has been accepted by returning E\_OK in the API request CanSM\_RequestComMode (ref. to SWS\_CANSM\_00062, [SWS\_CANSM\_00182](#_bookmark157)) and use it as trigger for the state machine of the related CAN network (ref. to [Figure 7-1](#_bookmark35)), [SWS\_CanSM\_00427](#_bookmark57), [SWS\_CanSM\_00429](#_bookmark59), [SWS\_CanSM\_00499](#_bookmark52), [SWS\_CanSM\_00542](#_bookmark136), [SWS\_CanSM\_00543](#_bookmark137), [SWS\_CANSM\_00425](#_bookmark50), [SWS\_CANSM\_00426](#_bookmark54), SWS\_CANSM\_00554).⌋(SRS\_Can\_01142)

[**SWS\_CanSM\_00638**]⌈The CanSM module shall store after every successful CAN controller mode change (ref. to SWS\_CANSM\_00396) or bus-off conditioned change to CAN\_CS\_STOPPED (ref. to SWS\_CANSM\_00064), the changed mode internally for each CAN controller.⌋(SRS\_Can\_01145)

## State machine for each CAN network

The diagram (ref. to [Figure 7-1](#_bookmark35)) specifies the behavioral state machine of the CanSM module, which shall be implemented for each configured CAN network (ref. to [ECUC\_CanSM\_00126](#_bookmark197))

### Trigger: PowerOn

**[SWS\_CanSM\_00424]** ⌈After PowerOn the CanSM state machines (ref. to [Figure](#_bookmark35) [7-1](#_bookmark35)) shall be in the state CANSM\_BSM\_NOT\_INITIALIZED.⌋

### Trigger: CanSM\_Init

**[SWS\_CanSM\_00423]** ⌈If the CanSM module is requested with the function CanSM\_Init (ref. to chapter [8.3.1](#_bookmark154)), this shall trigger the CanSM state machines (ref. to [Figure 7-1](#_bookmark35)) for all configured CAN Networks (ref. to [ECUC\_CanSM\_00126](#_bookmark197)) with

the trigger CanSM\_Init.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Trigger: CanSM\_DeInit

[SWS\_CanSM\_00658]⌈ If the CanSM module is requested with the function CanSM\_DeInit, this shall trigger the CanSM state machines (ref. to Figure 7-1) for all configured CAN Networks (ref. to ECUC\_CanSM\_00126) with the trigger

CanSM\_DeInit.⌋(SRS\_Can\_01164)

Note: Caller of the CanSM\_DeInit function has to ensure all CAN networks are in the sate CANSM\_NO\_COMMUNICATION

### Trigger: T\_START\_WAKEUP\_SOURCE

[**SWS\_CanSM\_00607**]⌈If the API request CanSM\_StartWakeUpSource (ref. to SWS\_CanSM\_00609) returns E\_OK (ref. to [SWS\_CanSM\_00616](#_bookmark161)), it shall trigger the state machine (ref. to [Figure 7-1](#_bookmark35)) with T\_START\_WAKEUP\_SOURCE.⌋ (SRS\_Can\_01142, SRS\_Can\_01145)

### Trigger: T\_STOP\_WAKEUP\_SOURCE

[**SWS\_CanSM\_00608**]⌈ If the API request CanSM\_StopWakeUpSource (ref. to SWS\_CanSM\_00610) returns E\_OK (ref. to[SWS\_CanSM\_00622](#_bookmark163)), it shall trigger the state machine (ref. to [Figure 7-1](#_bookmark35)) with T\_STOP\_WAKEUP\_SOURCE.⌋ (SRS\_Can\_01142, SRS\_Can\_01145)

### Trigger: T\_FULL\_COM\_MODE\_REQUEST

**[SWS\_CanSM\_00425]** ⌈The API request CanSM\_RequestComMode (ref. to [SWS\_CanSM\_00635](#_bookmark38)) with the parameter ComM\_Mode equal to COMM\_FULL\_COMMUNICATION shall trigger the state machine with T\_FULL\_COM\_MODE\_REQUEST, if the function parameter network matches the configuration parameter CANSM\_NETWORK\_HANDLE (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Trigger: T\_SILENT\_COM\_MODE\_REQUEST

**[SWS\_CanSM\_00499]** ⌈The API request CanSM\_RequestComMode (ref. to [SWS\_CanSM\_00635](#_bookmark38)) with the parameter ComM\_Mode equal to COMM\_SILENT\_COMMUNICATION shall trigger the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-1](#_bookmark35)) with T\_SILENT\_COM\_MODE\_REQUEST, which corresponds to the function parameter network and the configuration parameter CANSM\_NETWORK\_HANDLE (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

Rationale: Regular use case for the transition of the CanNm Network mode to the CanNm Prepare Bus-Sleep mode.

### Trigger: T\_NO\_COM\_MODE\_REQUEST

**[SWS\_CanSM\_00426]** ⌈The API request CanSM\_RequestComMode (ref. to [SWS\_CanSM\_00635](#_bookmark38)) with the parameter ComM\_Mode equal to COMM\_NO\_COMMUNICATION shall trigger the state machine with T\_NO\_COM\_MODE\_REQUEST, if the function parameter network matches the configuration parameter CANSM\_NETWORK\_HANDLE (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01142, SRS\_Can\_01145)

*Remark: Depending on the ComM configuration, the ComM module will request COMM\_SILENT\_COMMUNICATION first and then COMM\_NO\_COMMUNICATION or COMM\_NO\_COMMUNICATION directly (ComMNmVariant=LIGHT)”.*

### Trigger: T\_BUS\_OFF

[**SWS\_CanSM\_00606**]⌈ The callback function CanSM\_ControllerBusOff (ref. to SWS\_CanSM\_00064) shall trigger the state machine CANSM\_BSM (ref. to [Figure](#_bookmark35)

[7-1](#_bookmark35)) for the CAN network with T\_BUS\_OFF, if one of its configured CAN controllers matches to the function parameter ControllerId of the callback function CanSM\_ControllerBusOff.⌋(SRS\_Can\_01144, SRS\_Can\_01146)

### Guarding condition: G\_FULL\_COM\_MODE\_REQUESTED

**[SWS\_CanSM\_00427]** ⌈The guarding condition G\_FULL\_COM\_MODE\_REQUESTED of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall evaluate, if the latest accepted communication mode request with CanSM\_RequestComMode (ref. to [SWS\_CanSM\_00635](#_bookmark38)) for the respective network handle of the state machine has been with the parameter ComM\_Mode equal to COMM\_FULL\_COMMUNICATION.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + 1. **Guarding condition: G\_SILENT\_COM\_MODE\_REQUESTED** **[SWS\_CanSM\_00429]** ⌈The guarding condition G\_SILENT\_COM\_MODE\_REQUESTED

of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall evaluate, if the latest accepted communication mode request with CanSM\_RequestComMode (ref. to [SWS\_CanSM\_00635](#_bookmark38)) for the respective network handle of the state machine has been with the parameter ComM\_Mode equal to COMM\_SILENT\_COMMUNICATION.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Effect: E\_PRE\_NOCOM

**[SWS\_CanSM\_00431]** ⌈The effect E\_PRE\_NOCOM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall call for the corresponding CAN network the API BswM\_CanSM\_CurrentState with the parameters Network := CanSMComMNetworkHandleRef and CurrentState := CANSM\_BSWM\_NO\_COMMUNICATION.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Effect: E\_NOCOM

**[SWS\_CanSM\_00430]** ⌈The effect E\_NOCOM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall change the internally stored network mode (ref. to [SWS\_CanSM\_00266](#_bookmark36)) of the addressed CAN network to COMM\_NO\_COMMUNICATION. ⌋(SRS\_Can\_01142, SRS\_Can\_01145)

[**SWS\_CanSM\_00651**]⌈ If a communication mode request for the network is present already (ref. to [SWS\_CanSM\_00635](#_bookmark38)) and the stored communication mode request is COMM\_NO\_COMMUNICATION, then the effect E\_NOCOM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall call the API ComM\_BusSM\_ModeIndication with the parameters Channel := CanSMComMNetworkHandleRef (ref. to [ECUC\_CanSM\_00161](#_bookmark203)) and ComMode := COMM\_NO\_COMMUNICATION.⌋ (SRS\_Can\_01142, SRS\_Can\_01145)

### Effect: E\_FULL\_COM

**[SWS\_CanSM\_00539]** ⌈If ECU passive is FALSE (ref. to [SWS\_CanSM\_00646](#_bookmark146)), then the effect E\_FULL\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall call at 1st place for each configured CAN controller of the CAN network the API CanIf\_SetPduMode with the parameters ControllerId := CanSMControllerId (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) and PduModeRequest := CANIF\_ONLINE.⌋(SRS\_Can\_01158)

[**SWS\_CanSM\_00647**] ⌈ If ECU passive is TRUE (ref. to [SWS\_CanSM\_00646](#_bookmark146)), then the effect E\_FULL\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall call at 1st place for each configured CAN controller of the CAN network the API CanIf\_SetPduMode with the parameters ControllerId := CanSMControllerId (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) and PduModeRequest := CANIF\_TX\_OFFLINE\_ACTIVE.⌋(SRS\_Can\_01158)

**[SWS\_CanSM\_00435]** ⌈After considering [SWS\_CANSM\_00539](#_bookmark64) and [SWS\_CanSM\_00647](#_bookmark65) in context of the effect E\_FULL\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)), the CanSM module shall call the API ComM\_BusSM\_ModeIndication for the corresponding CAN network with the parameters Channel := CanSMComMNetworkHandleRef (ref. to [ECUC\_CanSM\_00161](#_bookmark203)) and ComMode := COMM\_FULL\_COMMUNICATION.

⌋(SRS\_Can\_01158)

**[SWS\_CanSM\_00540]** ⌈After considering [SWS\_CANSM\_00435](#_bookmark66) in context of the effect E\_FULL\_COM of the CanSM\_BSM state machine (ref. to Figure 7 1), the CanSM module shall call the API BswM\_CanSM\_CurrentState for the corresponding CAN network with the parameters Network := CanSMComMNetworkHandleRef and CurrentState := CANSM\_BSWM\_FULL\_COMMUNICATION.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Effect: E\_FULL\_TO\_SILENT\_COM

**[SWS\_CanSM\_00434]** ⌈The effect E\_FULL\_TO\_SILENT\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall call at 1st place for the corresponding CAN network the API BswM\_CanSM\_CurrentState with the parameters Network := CanSMComMNetworkHandleRef and CurrentState := CANSM\_BSWM\_SILENT\_COMMUNICATION.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

**[SWS\_CanSM\_00541] ⌈**The effect E\_FULL\_TO\_SILENT\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall call at 2nd place for each configured CAN controller of the CAN network the API CanIf\_SetPduMode with the parameters ControllerId := CanSMControllerId (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) and PduModeRequest := CANIF\_TX\_OFFLINE⌋(SRS\_Can\_01142, SRS\_Can\_01145)

**[SWS\_CanSM\_00538]** ⌈The effect E\_FULL\_TO\_SILENT\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall call at 3th place for the corresponding CAN network the API ComM\_BusSM\_ModeIndication with the parameters Channel := CanSMComMNetworkHandleRef (ref. to [ECUC\_CanSM\_00161](#_bookmark203)) and ComMode := COMM\_SILENT\_COMMUNICATION.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Effect: E\_BR\_END\_FULL\_COM

**[SWS\_CanSM\_00432]** ⌈The effect E\_BR\_END\_FULL\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall be the same as E\_FULL\_COM (ref. to chapter [7.2.14](#_bookmark63)).⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Effect: E\_BR\_END\_SILENT\_COM

**[SWS\_CanSM\_00433]** ⌈The effect E\_BR\_END\_SILENT\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall be the same as E\_FULL\_TO\_SILENT\_COM (ref. to chapter [7.2.15](#_bookmark67)).⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Effect: E\_SILENT\_TO\_FULL\_COM

**[SWS\_CanSM\_00550]** ⌈The effect E\_SILENT\_TO\_FULL\_COM of the CanSM\_BSM state machine (ref. to [Figure 7-1](#_bookmark35)) shall be the same as E\_FULL\_COM (ref. to chapter [7.2.14](#_bookmark63)).⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Sub state machine CANSM\_BSM\_WUVALIDATION



stm CANSM\_BSM\_WUVALIDATION

S\_TRCV\_NORMAL

[G\_TRCV\_NORMAL\_E\_OK]

do / DO\_SET\_TRCV\_MODE\_NORMAL

EntryPoint

S\_TRCV\_NORMAL\_WAIT

T\_TRCV\_NORMAL\_TIMEOUT

T\_TRCV\_NORMAL\_INDICATED

S\_CC\_STOPPED

T\_TRCV\_NORMAL\_INDICATED

[G\_CC\_STOPPED\_E\_OK]

do / DO\_SET\_CC\_MODE\_STOPPED

S\_CC\_STOPPED\_WAIT

T\_CC\_STOPPED\_INDICATED

T\_CC\_STOPPED\_TIMEOUT

T\_CC\_STOPPED\_INDICATED

S\_CC\_STARTED

do / DO\_SET\_CC\_MODE\_STARTED

[G\_CC\_STARTED\_E\_OK]

T\_CC\_STARTED\_INDICATED

T\_CC\_STARTED\_TIMEOUT

S\_CC\_STARTED\_WAIT

WAIT\_WUVALIDATION\_LEAVE

T\_CC\_STARTED\_INDICATED

**Figure 7-2: CANSM\_BSM\_WUVALIDATION, sub state machine of CANSM\_BSM**

* + - 1. **State operation to do in: S\_TRCV\_NORMAL**

[**SWS\_CanSM\_00623**]⌈ If for the CAN network a CAN Transceiver is configured (ref. to [ECUC\_CanSM\_00137](#_bookmark204)), then as long the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) is in the state S\_TRCV\_NORMAL, the CanSM module shall operate the do action DO\_SET\_TRCV\_MODE\_NORMAL and therefore repeat for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) the API request CanIf\_SetTrcvMode (ref. to chapter [8.5.1](#_bookmark180)) with TransceiverMode equal to CANTRCV\_TRCVMODE\_NORMAL.⌋ (SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Guarding condition G\_TRCV\_NORMAL\_E\_OK** [**SWS\_CanSM\_00624**]⌈ The guarding condition G\_TRCV\_NORMAL\_E\_OK of the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) shall be passed, if

the API call of [SWS\_CanSM\_00483](#_bookmark111) has returned E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Trigger: T\_TRCV\_NORMAL\_INDICATED**

[**SWS\_CanSM\_00625**]⌈ If CanSM module has got the CANTRCV\_TRCVMODE\_NORMAL mode indication (ref. to SWS\_CanSM\_00399) for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) after the respective request (ref. to [SWS\_CanSM\_00623](#_bookmark73)), this shall trigger the sub state machine machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) of the CAN network with T\_TRCV\_NORMAL\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Trigger: T\_TRCV\_NORMAL\_TIMEOUT**

[**SWS\_CanSM\_00626**]⌈ After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for the supposed transceiver normal indication (ref. to [SWS\_CanSM\_00625](#_bookmark74)), this condition shall trigger the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) of the respective network with T\_TRCV\_NORMAL\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **State operation to do in: S\_CC\_STOPPED**

[**SWS\_CanSM\_00627**]⌈ As long the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) is in the state S\_CC\_STOPPED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STOPPED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STOPPED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Guarding condition: G\_CC\_STOPPED\_OK**

[**SWS\_CanSM\_00628**]⌈ The guarding condition G\_CC\_STOPPED\_OK of the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) shall be passed, if all API calls of [SWS\_CanSM\_00627](#_bookmark75) have returned E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Trigger: T\_CC\_STOPPED\_INDICATED**

[**SWS\_CanSM\_00629**]⌈ If the CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to stop the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00627](#_bookmark75)), this shall trigger the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) of the CAN network with T\_CC\_STOPPED\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Trigger: T\_CC\_STOPPED\_TIMEOUT**

[**SWS\_CanSM\_00630**]⌈ After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller stopped mode indications (ref. to[SWS\_CanSM\_00629](#_bookmark76)), this condition shall trigger the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) of the respective network with T\_CC\_STOPPED\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **State operation to do in: S\_CC\_STARTED**

[**SWS\_CanSM\_00631**]⌈ As long the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) is in the state S\_CC\_STARTED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STARTED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STARTED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Guarding condition: G\_CC\_STARTED\_E\_OK** [**SWS\_CanSM\_00632**]⌈ The guarding condition G\_CC\_STARTED\_OK of the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) shall be passed, if all API calls of [SWS\_CanSM\_00631](#_bookmark77) have returned E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)
      2. **Trigger: T\_CC\_STARTED\_INDICATED**

[**SWS\_CanSM\_00633**]⌈ If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to start the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00631](#_bookmark77)), this shall trigger the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) of the CAN network with T\_CC\_STARTED\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Trigger: T\_CC\_STARTED\_TIMEOUT**

[**SWS\_CanSM\_00634**]⌈ After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller started mode indications (ref. to[SWS\_CanSM\_00633](#_bookmark78)), this condition shall trigger the sub state machine CANSM\_BSM\_WUVALIDATION (ref. to [Figure 7-2](#_bookmark72)) of the respective network with T\_CC\_STARTED\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Sub state machine: CANSM\_BSM\_S\_PRE\_NOCOM



stm CANSM\_BSM\_S\_PRE\_NOCOM

EntryPoint

[CANSM\_BSM\_G\_PN\_NOT\_SUPPORTED]

[CANSM\_BSM\_G\_PN\_SUPPORTED]

CANSM\_BSM\_DeinitPnNotSupported

CANSM\_BSM\_DeinitPnSupported

ExitPoint

**Figure 7-3: CANSM\_BSM\_S\_PRE\_NOCOM, sub state machine of CANSM\_BSM**

* + - 1. **Guarding condition: CANSM\_BSM\_G\_PN\_NOT\_SUPPORTED**

**[SWS\_CanSM\_00436]** ⌈The guarding condition CANSM\_BSM\_G\_PN\_NOT\_SUPPORTED of the sub state machine CANSM\_BSM\_S\_PRE\_NO\_COM (ref. to [Figure 7-3](#_bookmark80)) shall evaluate, if the configuration parameter CanTrcvPnEnabled (ref. to [[9]](#_bookmark5), ECUC\_CanTrcv\_00172) is FALSE, which is available via the reference CanSMTransceiverId (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) or if no CanSMTransceiverId is configured at all.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Guarding condition: CANSM\_BSM\_G\_PN\_SUPPORTED**

**[SWS\_CanSM\_00437]** ⌈The guarding condition CANSM\_BSM\_G\_PN\_SUPPORTED of the sub state machine CANSM\_BSM\_S\_PRE\_NO\_COM (ref. to [Figure 7-3](#_bookmark80)) shall evaluate, if a CanSMTransceiverId (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) is configured and if the configuration parameter CanTrcvPnEnabled (ref. to [[9]](#_bookmark5), ECUC\_CanTrcv\_00172) is TRUE, which is available via the reference

CanSMTransceiverId (ref. to [ECUC\_CanSM\_00137](#_bookmark204)).⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Sub state machine: CANSM\_BSM\_DeInitPnSupported**



stm CANSM\_BSM\_DeinitPnSupported

CANSM\_BSM\_DeinitPnSupportedProceed

S\_PN\_CLEAR\_WUF

do / DO\_CLEAR\_TRCV\_WUF

[G\_PN\_CLEAR\_WUF\_E\_OK] T\_CLEAR\_WUF\_INDICATED

T\_CLEAR\_WUF\_TIMEOUT

S\_PN\_CLEAR\_WUF\_WAIT T\_CLEAR\_WUF\_INDICATED

S\_CC\_STOPPED

do / DO\_SET\_CC\_MODE\_STOPPED

T\_CC\_STOPPED\_INDICATED

[G\_CC\_STOPPED\_E\_OK]

T\_CC\_STOPPED\_TIMEOUT

S\_CC\_STOPPED\_WAIT T\_CC\_STOPPED\_INDICATED

S\_TRCV\_NORMAL

do / DO\_SET\_TRCV\_MODE\_NORMAL

T\_TRCV\_NORMAL\_INDICATED

[G\_TRCV\_NORMAL\_E\_OK]

T\_TRCV\_NORMAL\_TIMEOUT

S\_TRCV\_NORMAL\_WAIT

T\_TRCV\_NORMAL\_INDICATED

S\_TRCV\_STANDBY do / DO\_SET\_TRCV\_MODE\_STANDBY

T\_TRCV\_STANDBY\_TIMOUT

T\_TRCV\_STANDBY\_INDICATED

[G\_TRCV\_STANDBY\_E\_OK]

S\_TRCV\_STANDBY\_WAIT

T\_TRCV\_STANDBY\_INDICATED S\_CC\_SLEEP

do / DO\_SET\_CC\_MODE\_SLEEP

[G\_CC\_SLEEP\_E\_OK]

T\_CHECK\_WFLAG\_INDICATED

T\_CC\_SLEEP\_INDICATED

S\_CC\_SLEEP\_WAIT

CANSM\_BSM\_T\_CC\_SLEEP\_TIMEOUT

T\_CC\_SLEEP\_INDICATED

S\_CHECK\_WFLAG\_IN\_NOT\_CC\_SLEEP

S\_CHECK\_WFLAG\_IN\_CC\_SLEEP

do / DO\_CHECK\_WFLAG

do / DO\_CHECK\_WFLAG

[G\_CHECK\_WFLAG\_E\_OK]

[G\_CHECK\_WFLAG\_E\_OK]

T\_CHECK\_WFLAG\_TIMEOUT

S\_CHECK\_WUF\_IN\_NOT\_CC\_SLEEP\_WAIT

T\_CHECK\_WFLAG\_INDICATED

T\_CHECK\_WFLAG\_TIMEOUT

T\_CHECK\_WFLAG\_INDICATED

S\_CHECK\_WUF\_IN\_CC\_SLEEP\_WAIT

Junction

T\_CHECK\_WFLAG\_INDICATED

ExitPoint

**Figure 7-4: CANSM\_BSM\_DeinitPnSupported, sub state machine of CANSM\_BSM\_S\_PRE\_NOCOM**

* + - * 1. **State operation to do in: S\_PN\_CLEAR\_WUF**

**[SWS\_CanSM\_00438]** ⌈As long the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) is in the state S\_PN\_CLEAR\_WUF, the CanSM module operate the do action DO\_CLEAR\_TRCV\_WUF and therefore repeat the API request CanIf\_ClrTrcvWufFlag (ref. to chapter [8.5.1](#_bookmark180)) and use the configured Transceiver

(ref. to [ECUC\_CanSM\_00137](#_bookmark204)) as API function parameter.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_PN\_CLEAR\_WUF\_E\_OK**

**[SWS\_CanSM\_00439]** ⌈The guarding condition G\_PN\_CLEAR\_WUF\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) shall be passed, if the API call of [SWS\_CanSM\_00438](#_bookmark82) has returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CLEAR\_WUF\_INDICATED**

**[SWS\_CanSM\_00440]** ⌈The callback function CanSM\_ClearTrcvWufFlagIndication (ref. to SWS\_CanSM\_00413) shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the CAN network with T\_CLEAR\_WUF\_INDICATED, if the function parameter Transceiver of CanSM\_ClearTrcvWufFlagIndication matches to the configured CAN Transceiver (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) of the CAN

network.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CLEAR\_WUF\_TIMEOUT**

**[SWS\_CanSM\_00443]** ⌈After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for the callback function CanSM\_ClearTrcvWufFlagIndication (ref. to [SWS\_CanSM\_00440](#_bookmark83)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the respective network with

T\_CLEAR\_WUF\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_CC\_STOPPED**

**[SWS\_CanSM\_00441]** ⌈As long the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) is in the state S\_CC\_STOPPED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STOPPED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal

to CAN\_CS\_STOPPED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_CC\_STOPPED\_E\_OK**

**[SWS\_CanSM\_00442]** ⌈The guarding condition G\_CC\_STOPPED\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) shall be passed, if all API calls of [SWS\_CanSM\_00441](#_bookmark84) have returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CC\_STOPPED\_INDICATED**

**[SWS\_CanSM\_00444]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to stop the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00442](#_bookmark85)), this shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the CAN network with T\_CC\_STOPPED\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CC\_STOPPED\_TIMEOUT**

**[SWS\_CanSM\_00445] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller stopped mode indications (ref. to [SWS\_CanSM\_00444](#_bookmark86)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the respective network with T\_CC\_STOPPED\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_TRCV\_NORMAL**

**[SWS\_CanSM\_00446] ⌈**As long the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) is in the state S\_TRCV\_NORMAL, the CanSM module shall operate the do action

DO\_SET\_TRCV\_MODE\_NORMAL and therefore repeat for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) the API request

CanIf\_SetTrcvMode (ref. to chapter [8.5.1](#_bookmark180)) with TransceiverMode equal to

CANTRCV\_TRCVMODE\_NORMAL.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_TRCV\_NORMAL\_E\_OK**

**[SWS\_CanSM\_00447] ⌈**The guarding condition G\_TRCV\_NORMAL\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) shall be passed, if the API call of [SWS\_CanSM\_00446](#_bookmark87) has returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_TRCV\_NORMAL\_INDICATED**

**[SWS\_CanSM\_00448]** ⌈If CanSM module has got the CANTRCV\_TRCVMODE\_NORMAL mode indication (ref. to SWS\_CanSM\_00399) for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) after the respective request (ref. to [SWS\_CanSM\_00446](#_bookmark87)), this shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the CAN network with T\_TRCV\_NORMAL\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_TRCV\_NORMAL\_TIMEOUT**

**[SWS\_CanSM\_00449] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for the supposed transceiver normal indication (ref. to [SWS\_CanSM\_00448](#_bookmark88)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the respective network with T\_TRCV\_NORMAL\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_TRCV\_STANDBY**

**[SWS\_CanSM\_00450]** ⌈As long the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) is in the state S\_TRCV\_STANDBY, the CanSM module shall operate the do action DO\_SET\_TRCV\_STANDBY and therefore repeat for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) the API request CanIf\_SetTrcvMode (ref. to chapter [8.5.1](#_bookmark180)) with TransceiverMode equal to CANTRCV\_TRCVMODE\_STANDBY.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_TRCV\_STANDBY\_E\_OK**

**[SWS\_CanSM\_00451]** ⌈The guarding condition G\_TRCV\_STANDBY\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) shall be passed, if the API call of [SWS\_CanSM\_00450](#_bookmark89) has returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_TRCV\_STANDBY\_INDICATED**

**[SWS\_CanSM\_00452]** ⌈If the CanSM module has got the CANTRCV\_TRCVMODE\_STANDBY mode indication (ref. to SWS\_CanSM\_00399) for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) after the respective request (ref. to [SWS\_CanSM\_00450](#_bookmark89)), this shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the CAN network with T\_TRCV\_STANDBY\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_TRCV\_STANDBY\_TIMEOUT**

**[SWS\_CanSM\_00454]** ⌈After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for the supposed transceiver standby indication (ref. to [SWS\_CanSM\_00452](#_bookmark90)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the respective network with T\_TRCV\_STANDBY\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_CC\_SLEEP**

**[SWS\_CanSM\_00453]** ⌈As long the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) is in the state S\_CC\_SLEEP, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_SLEEP and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_SLEEP, if the current CAN

controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_CC\_SLEEP\_E\_OK**

**[SWS\_CanSM\_00455]** ⌈The guarding condition G\_CC\_SLEEP\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) shall be passed, if all API calls of [SWS\_CanSM\_00453](#_bookmark91) have returned E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CC\_SLEEP\_INDICATED**

**[SWS\_CanSM\_00456]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to set the CAN controllers of the CAN network to sleep mode (ref. to [SWS\_CanSM\_00453](#_bookmark91)), this shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the CAN network with T\_CC\_SLEEP\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: CANSM\_BSM\_T\_CC\_SLEEP\_TIMEOUT**

**[SWS\_CanSM\_00457]** ⌈After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller sleep mode indications (ref. to [SWS\_CanSM\_00456](#_bookmark92)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4Figure 7-4](#_bookmark81)) of the respective

network with CANSM\_BSM\_T\_CC\_SLEEP\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_CHECK\_WFLAG\_IN\_CC\_SLEEP**

**[SWS\_CanSM\_00458]** ⌈As long the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) is in the state S\_CHECK\_WFLAG\_IN\_CC\_SLEEP, the CanSM module operate the do action DO\_CHECK\_WFLAG and therefore repeat the API request CanIf\_CheckTrcvWakeFlag (ref. to chapter [8.5.1](#_bookmark180)) and use the configured CAN Transceiver of the related Network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) as Transceiver

parameter.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_CHECK\_WFLAG\_E\_OK**

**[SWS\_CanSM\_00459]** ⌈The guarding condition G\_CHECK\_WFLAG\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) shall be passed, if the API call of [SWS\_CanSM\_00458](#_bookmark93) or [SWS\_CanSM\_00462](#_bookmark95) has returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CHECK\_WFLAG\_INDICATED**

**[SWS\_CanSM\_00460] ⌈**The callback function CanSM\_CheckTransceiverWakeFlagIndication (ref. to SWS\_CanSM\_00416) shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to

[Figure 7-4](#_bookmark81)) of the CAN network with T\_CHECK\_WFLAG\_INDICATED, if the function

parameter Transceiver of CanSM\_CheckTransceiverWakeFlagIndication matches to the configured CAN Transceiver (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) of the CAN network.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CHECK\_WFLAG\_TIMEOUT**

**[SWS\_CanSM\_00461]** ⌈After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for the callback function CanSM\_CheckTransceiver- WakeFlagIndication (ref. to [SWS\_CanSM\_00460](#_bookmark94)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) of the respective network with T\_CHECK\_WFLAG\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_CHECK\_WFLAG\_IN\_NOT\_CC\_SLEEP**

**[SWS\_CanSM\_00462]** ⌈As long the sub state machine CANSM\_BSM\_DeinitPnSupported (ref. to [Figure 7-4](#_bookmark81)) is in the state S\_CHECK\_WFLAG\_IN\_NOT\_CC\_SLEEP, the CanSM module operate the do action DO\_CHECK\_WFLAG and therefore repeat the API request CanIf\_CheckTrcvWakeFlag (ref. to chapter [8.5.1](#_bookmark180)) and use the configured CAN

Transceiver of the related Network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) as Transceiver parameter.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - 1. **Sub state machine: CANSM\_BSM\_DeInitPnNotSupported**



stm CANSM\_BSM\_DeinitPnNotSupported

CANSM\_BSM\_DeinitPnNotSupportedProceed

S\_CC\_STOPPED

do / DO\_SET\_CC\_MODE\_STOPPED

[CANSM\_BSM\_G\_CC\_STOPPED\_E\_OK]

T\_CC\_STOPPED\_INDICATED

T\_CC\_STOPPED\_TIMEOUT

S\_CC\_STOPPED\_WAIT

T\_CC\_STOPPED\_INDICATED S\_CC\_SLEEP

do / DO\_SET\_CC\_MODE\_SLEEP

T\_CC\_SLEEP\_INDICATED

[G\_CC\_SLEEP\_E\_OK]

T\_CC\_SLEEP\_TIMEOUT S\_CC\_SLEEP\_WAIT

T\_CC\_SLEEP\_INDICATED

S\_TRCV\_NORMAL do / DO\_SET\_TRCV\_MODE\_NORMAL

[G\_TRCV\_NORMAL\_E\_OK]

T\_TRCV\_NORMAL\_INDICATED

T\_TRCV\_NORMAL\_TIMEOUT S\_TRCV\_NORMAL\_WAIT

T\_TRCV\_NORMAL\_INDICATED

S\_TRCV\_STANDBY do / DO\_SET\_TRCV\_MODE\_STANDBY

[G\_TRCV\_STANDBY\_E\_OK]

CANSM\_BSM\_T\_TRCV\_STANDBY\_TIMOUT

T\_TRCV\_STANDBY\_INDICATED

S\_TRCV\_STANDBY\_WAIT

T\_TRCV\_STANDBY\_INDICATED

ExitPoint

**Figure 7-5: CANSM\_BSM\_DeinitPnNotSupported, sub state machine of CANSM\_BSM\_S\_PRE\_NOCOM**

* + - * 1. **State operation to do in: S\_CC\_STOPPED**

**[SWS\_CanSM\_00464]** ⌈As long the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) is in the state S\_CC\_STOPPED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STOPPED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STOPPED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: CANSM\_BSM\_G\_CC\_STOPPED\_OK**

**[SWS\_CanSM\_00465]** ⌈The guarding condition CANSM\_BSM\_G\_CC\_STOPPED\_OK of the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) shall be passed, if all API calls of [SWS\_CanSM\_00464](#_bookmark97) have returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CC\_STOPPED\_INDICATED**

**[SWS\_CanSM\_00466]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to stop the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00464](#_bookmark97)), this shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the CAN network with T\_CC\_STOPPED\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CC\_STOPPED\_TIMEOUT**

**[SWS\_CanSM\_00467] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller stopped mode indications (ref. to [SWS\_CanSM\_00466](#_bookmark98)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the respective network with T\_CC\_STOPPED\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_CC\_SLEEP**

**[SWS\_CanSM\_00468]** ⌈As long the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) is in the state S\_CC\_SLEEP, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_SLEEP and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal

to CAN\_CS\_SLEEP, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_CC\_SLEEP\_E\_OK**

**[SWS\_CanSM\_00469]** ⌈The guarding condition G\_CC\_SLEEP\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) shall be passed, if all API calls of [SWS\_CanSM\_00468](#_bookmark99) have returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CC\_SLEEP\_INDICATED**

**[SWS\_CanSM\_00470]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to set the CAN controllers of the CAN network to sleep mode (ref. to [SWS\_CanSM\_00468](#_bookmark99)), this shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the CAN network with T\_CC\_SLEEP\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_CC\_SLEEP\_TIMEOUT**

**[SWS\_CanSM\_00471] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller sleep mode indications (ref. to [SWS\_CanSM\_00470](#_bookmark100)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the respective network with T\_CC\_SLEEP\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_TRCV\_NORMAL**

**[SWS\_CanSM\_00472]** ⌈If for the CAN network a CAN Transceiver is configured (ref. to [ECUC\_CanSM\_00137](#_bookmark204)), then as long the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) is in the state S\_TRCV\_NORMAL, the CanSM module shall operate the do action DO\_SET\_TRCV\_MODE\_NORMAL and therefore repeat for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) the API request CanIf\_SetTrcvMode (ref. to chapter [8.5.1](#_bookmark180)) with TransceiverMode equal to CANTRCV\_TRCVMODE\_NORMAL.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_TRCV\_NORMAL\_E\_OK**

**[SWS\_CanSM\_00473] ⌈**The guarding condition G\_TRCV\_NORMAL\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) shall be passed, if the API call of [SWS\_CanSM\_00472](#_bookmark101) has returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_TRCV\_NORMAL\_INDICATED**

**[SWS\_CanSM\_00474]** ⌈If CanSM module has got the CANTRCV\_TRCVMODE\_NORMAL mode indication (ref. to SWS\_CanSM\_00399) for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) after the respective request (ref. to [SWS\_CanSM\_00472](#_bookmark101)), this shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the CAN network with T\_TRCV\_NORMAL\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

**[SWS\_CanSM\_00556]** ⌈If no CAN Transceiver is configured for the CAN network, then this shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the CAN network in the state S\_TRCV\_NORMAL with T\_TRCV\_NORMAL\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_TRCV\_NORMAL\_TIMEOUT**

**[SWS\_CanSM\_00475] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for the supposed transceiver normal indication (ref. to [SWS\_CanSM\_00474](#_bookmark102)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the respective network with T\_TRCV\_NORMAL\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **State operation to do in: S\_TRCV\_STANDBY**

**[SWS\_CanSM\_00476]** ⌈If for the CAN network a CAN Transceiver is configured (ref. to [ECUC\_CanSM\_00137](#_bookmark204)), then as long the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) is in the state S\_TRCV\_STANDBY, the CanSM module shall operate the do action DO\_SET\_TRCV\_MODE\_STANDBY and therefore repeat for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) the API request CanIf\_SetTrcvMode (ref. to chapter [8.5.1](#_bookmark180)) with TransceiverMode equal to CANTRCV\_TRCVMODE\_STANDBY.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Guarding condition: G\_TRCV\_STANDBY\_E\_OK**

**[SWS\_CanSM\_00477]** ⌈The guarding condition G\_TRCV\_STANDBY\_E\_OK of the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) shall be passed, if the API call of [SWS\_CanSM\_00476](#_bookmark103) has returned

E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: T\_TRCV\_STANDBY\_INDICATED**

**[SWS\_CanSM\_00478]** ⌈If CanSM module has got the

CANTRCV\_TRCVMODE\_STANDBY mode indication (ref. to SWS\_CanSM\_00399) for

the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) after the respective request (ref. to [SWS\_CanSM\_00476](#_bookmark103)), this shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the CAN network with T\_TRCV\_STANDBY\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

**[SWS\_CanSM\_00557]** ⌈If no CAN Transceiver is configured for the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)), then this shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the CAN network in the state S\_TRCV\_STANDBY with T\_TRCV\_STANDBY\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

* + - * 1. **Trigger: CANSM\_BSM\_T\_TRCV\_STANDBY\_TIMEOUT**

**[SWS\_CanSM\_00479] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for the supposed transceiver standby indication (ref. to [SWS\_CanSM\_00478](#_bookmark104)), this condition shall trigger the sub state machine CANSM\_BSM\_DeinitPnNotSupported (ref. to [Figure 7-5](#_bookmark96)) of the respective network with CANSM\_BSM\_T\_TRCV\_STANDBY\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145)

### Sub state machine: CANSM\_BSM\_S\_SILENTCOM\_BOR



stm CANSM\_BSM\_S\_SILENTCOM\_BOR

S\_RESTART\_CC

/E\_BUS\_OFF

do / DO\_SET\_CC\_MODE\_STARTED

EntryPoint

[G\_RESTART\_CC\_E\_OK]

T\_RESTART\_CC\_TIMEOUT

T\_RESTART\_CC\_INDICATED /E\_TX\_OFF

CANSM\_BSM\_S\_RESTART\_CC\_WAIT

T\_RESTART\_CC\_INDICATED /E\_TX\_OFF

ExitPoint

**Figure 7-6: CANSM\_BSM\_S\_SILENTCOM\_BOR, sub state machine of CANSM\_BSM**

* + - 1. **Effect: E\_BUS\_OFF**

[**SWS\_CanSM\_00605**]⌈The effect E\_BUS\_OFF of the sub state machine

CANSM\_BSM\_S\_FULLCOM CANSM\_BSM\_S\_SILENTCOM\_BOR (ref. to [Figure 7-6](#_bookmark106))

shall invocate Dem\_SetEventStatus (ref. to chapter [8.5.1](#_bookmark180)) with the parameters EventId := CANSM\_E\_BUS\_OFF (ref. to [ECUC\_CanSM\_00070](#_bookmark208)) and EventStatus := DEM\_EVENT\_STATUS\_PRE\_FAILED.⌋(SRS\_BSW\_00422)

* + - 1. **State operation: S\_RESTART\_CC**

[**SWS\_CanSM\_00604**]⌈As long the sub state machine CANSM\_BSM\_S\_SILENTCOM\_BOR (ref. to [Figure 7-6](#_bookmark106)) is in the state S\_RESTART\_CC, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STARTED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STARTED, if the current

CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01142, SRS\_Can\_01145, SRS\_Can\_01144, SRS\_Can\_01146)

* + - 1. **G\_RESTART\_CC\_E\_OK**

[**SWS\_CanSM\_00603**]⌈ The guarding condition G\_RESTART\_CC\_OK of the sub state machine CANSM\_BSM\_S\_SILENTCOM\_BOR (ref. to [Figure 7-6](#_bookmark106)) shall be passed, if all API calls of [SWS\_CanSM\_00604](#_bookmark107) have returned E\_OK.⌋(SRS\_Can\_01142, SRS\_Can\_01145, SRS\_Can\_01144, SRS\_Can\_01146)

* + - 1. **Trigger: T\_RESTART\_CC\_INDICATED**

[**SWS\_CanSM\_00600**]⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to start the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00604](#_bookmark107)), this shall trigger the sub state CANSM\_BSM\_S\_SILENTCOM\_BOR (ref. to [Figure 7-6](#_bookmark106)) of the CAN network with

T\_RESTART\_CC\_INDICATED.⌋(SRS\_Can\_01142, SRS\_Can\_01145, SRS\_Can\_01144, SRS\_Can\_01146)

* + - 1. **T\_RESTART\_CC\_TIMEOUT**

[**SWS\_CanSM\_00602**]⌈ After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller started mode indications (ref. to [SWS\_CanSM\_00600](#_bookmark108)), this condition shall trigger the sub state machine CANSM\_BSM\_S\_SILENTCOM\_BOR (ref. to [Figure 7-6](#_bookmark106)) of the respective network with

T\_RESTART\_CC\_TIMEOUT.⌋(SRS\_Can\_01142, SRS\_Can\_01145, SRS\_Can\_01144, SRS\_Can\_01146)

* + - 1. **Effect: E\_TX\_OFF**

The effect E\_TX\_OFF shall do nothing (default PDU mode after restart of CAN controller is already TX OFF, ref. to CanIf SWS).

### Sub state machine: CANSM\_BSM\_S\_PRE\_FULLCOM



stm CANSM\_BSM\_S\_PRE\_FULLCOM

EntryPoint

S\_TRCV\_NORMAL

[G\_TRCV\_NORMAL\_E\_OK]

do / DO\_SET\_TRCV\_MODE\_NORMAL

T\_TRCV\_NORMAL\_TIMEOUT

T\_TRCV\_NORMAL\_INDICATED

S\_TRCV\_NORMAL\_WAIT

T\_TRCV\_NORMAL\_INDICATED

S\_CC\_STOPPED

do / DO\_SET\_CC\_MODE\_STOPPED

[G\_CC\_STOPPED\_E\_OK]

T\_CC\_STOPPED\_INDICATED

T\_CC\_STOPPED\_TIMEOUT

S\_CC\_STOPPED\_WAIT

T\_CC\_STOPPED\_INDICATED

S\_CC\_STARTED

[G\_CC\_STARTED\_E\_OK]

do / DO\_SET\_CC\_MODE\_STARTED

T\_CC\_STARTED\_TIMEOUT

S\_CC\_STARTED\_WAIT

T\_CC\_STARTED\_INDICATED

T\_CC\_STARTED\_INDICATED

ExitPoint To FULLCOM

**Figure 7-7: CANSM\_BSM\_S\_PRE\_FULLCOM, sub state machine of CANSM\_BSM**

* + - 1. **State operation to do in: S\_TRCV\_NORMAL**

**[SWS\_CanSM\_00483]** ⌈If for the CAN network a CAN Transceiver is configured (ref. to [ECUC\_CanSM\_00137](#_bookmark204)), then as long the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) is in the state S\_TRCV\_NORMAL, the CanSM module shall operate the do action DO\_SET\_TRCV\_MODE\_NORMAL and therefore repeat for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) the API request CanIf\_SetTrcvMode (ref. to chapter [8.5.1](#_bookmark180)) with TransceiverMode equal to CANTRCV\_TRCVMODE\_NORMAL.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_TRCV\_NORMAL\_E\_OK**

**[SWS\_CanSM\_00484] ⌈**The guarding condition G\_TRCV\_NORMAL\_E\_OK of the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) shall be passed, if

the API call of [SWS\_CanSM\_00483](#_bookmark111) has returned E\_OK.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_TRCV\_NORMAL\_INDICATED**

**[SWS\_CanSM\_00485]** ⌈If CanSM module has got the CANTRCV\_TRCVMODE\_NORMAL mode indication (ref. to SWS\_CanSM\_00399) for the configured CAN Transceiver of the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) after the respective request (ref. to [SWS\_CanSM\_00483](#_bookmark111)), this shall trigger the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) of the CAN network with T\_TRCV\_NORMAL\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00558]** ⌈If no CAN Transceiver is configured for the CAN network (ref. to [ECUC\_CanSM\_00137](#_bookmark204)), then this shall trigger the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) of the CAN network in the state S\_TRCV\_NORMAL with T\_TRCV\_NORMAL\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_TRCV\_NORMAL\_TIMEOUT**

**[SWS\_CanSM\_00486]** ⌈After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for the supposed transceiver normal indication (ref. to [SWS\_CanSM\_00485](#_bookmark112)), this condition shall trigger the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) of the respective network with T\_TRCV\_NORMAL\_TIMEOUT.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **State operation to do in: S\_CC\_STOPPED**

**[SWS\_CanSM\_00487]** ⌈As long the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) is in the state S\_CC\_STOPPED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STOPPED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STOPPED, if the current

CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_CC\_STOPPED\_OK**

**[SWS\_CanSM\_00488]** ⌈The guarding condition G\_CC\_STOPPED\_OK of the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) shall be passed, if all API calls of [SWS\_CanSM\_00487](#_bookmark113) have returned E\_OK.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_CC\_STOPPED\_INDICATED**

**[SWS\_CanSM\_00489]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to stop the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00487](#_bookmark113)), this shall trigger the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) of the CAN network with T\_CC\_STOPPED\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_CC\_STOPPED\_TIMEOUT**

**[SWS\_CanSM\_00490] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller stopped mode indications (ref. to [SWS\_CanSM\_00489](#_bookmark114)), this condition shall trigger the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) of the respective network with T\_CC\_STOPPED\_TIMEOUT.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **State operation to do in: S\_CC\_STARTED**

**[SWS\_CanSM\_00491]** ⌈As long the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) is in the state S\_CC\_STARTED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STARTED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STARTED, if the current

CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_CC\_STARTED\_OK**

**[SWS\_CanSM\_00492]** ⌈The guarding condition G\_CC\_STARTED\_OK of the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) shall be passed, if all API calls of [SWS\_CanSM\_00491](#_bookmark115) have returned E\_OK.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_CC\_STARTED\_INDICATED**

**[SWS\_CanSM\_00493]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to start the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00491](#_bookmark115)), this shall trigger the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) of the CAN network with T\_CC\_STARTED\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_CC\_STARTED\_TIMEOUT**

**[SWS\_CanSM\_00494] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller started mode indications (ref. to [SWS\_CanSM\_00493](#_bookmark116)), this condition shall trigger the sub state machine CANSM\_BSM\_S\_PRE\_FULLCOM (ref. to [Figure 7-7](#_bookmark110)) of the respective network with T\_CC\_STARTED\_TIMEOUT.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

### Sub state machine CANSM\_BSM\_S\_FULLCOM



stm CANSM\_BSM\_S\_FULLCOM

S\_BUS\_OFF\_CHECK

EntryPoint

[G\_TX\_ON] /E\_TX\_ON

[G\_BUS\_OFF\_PASSIVE]

/E\_BUS\_OFF\_PASSIVE

T\_BUS\_OFF /E\_BUS\_OFF

S\_NO\_BUS\_OFF

S\_TX\_OFF

T\_CHANGE\_BR\_REQUEST

/E\_CHANGE\_BR\_BSWM\_MODE

T\_TX\_TIMEOUT\_EXCEPTION

T\_RESTART\_CC\_INDICATED /E\_TX\_OFF

CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION

T\_RESTART\_CC\_INDICATED /E\_TX\_OFF

CANSM\_BSM\_S\_RESTART\_CC\_WAIT

ExitPoint TxTimeout

T\_BUS\_OFF /E\_BUS\_OFF

T\_RESTART\_CC\_TIMEOUT

[G\_RESTART\_CC\_E\_OK]

S\_RESTART\_CC

do / DO\_SET\_CC\_MODE\_STARTED

ExitPoint CHANGE\_BR

**Figure 7-8: CANSM\_BSM\_S\_FULLCOM, sub state machine of CANSM\_BSM**

* + - 1. **Guarding condition: G\_BUS\_OFF\_PASSIVE**

**[SWS\_CanSM\_00496]** ⌈The guarding condition G\_BUS\_OFF\_PASSIVE of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall be passed, if CANSM\_BOR\_TX\_CONFIRMATION\_POLLING is disabled (ref. to [ECUC\_CanSM\_00339](#_bookmark202)) and the time duration since the effect E\_TX\_ON is greater or equal the configuration parameter CANSM\_BOR\_TIME\_TX\_ENSURED (ref. to [ECUC\_CanSM\_00130](#_bookmark201)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00497]** ⌈The guarding condition G\_BUS\_OFF\_PASSIVE of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall be passed, if CANSM\_BOR\_TX\_CONFIRMATION\_POLLING is enabled (ref. to [ECUC\_CanSM\_00339](#_bookmark202)) and the API CanIf\_GetTxConfirmationState (ref. to chapter [8.5.1](#_bookmark180)) returns CANIF\_TX\_RX\_NOTIFICATION for all configured CAN

controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Effect: E\_BUS\_OFF\_PASSIVE**

**[SWS\_CanSM\_00498]** ⌈The effect E\_BUS\_OFF\_PASSIVE of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall invocate Dem\_SetEventStatus (ref. to chapter [8.5.1](#_bookmark180)) with the parameters EventId := CANSM\_E\_BUS\_OFF (ref. to [ECUC\_CanSM\_00070](#_bookmark208)) and EventStatus := DEM\_EVENT\_STATUS\_PASSED.⌋(SRS\_BSW\_00422)

* + - 1. **Trigger: T\_CHANGE\_BR\_REQUEST**

**[SWS\_CanSM\_00507]** ⌈If no condition is present to deny the CanSM\_SetBaudrate request (ref. to [SWS\_CANSM\_00503](#_bookmark168)), this shall trigger the state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) and respectively the parent state machine CANSM\_BSM (ref. to [Figure 7-1](#_bookmark35)) with T\_CHANGE\_BR\_REQUEST (causes either a direct baud rate change if possible via CanIf\_SetBaudrate or the start of the required asynchronous process to do that⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Effect: E\_CHANGE\_BR\_BSWM\_MODE**

**[SWS\_CanSM\_00528]** ⌈The effect E\_CHANGE\_BR\_BSWM\_MODE of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall call for the corresponding CAN network the API BswM\_CanSM\_CurrentState with the parameters Network := CanSMComMNetworkHandleRef and CurrentState

:= CANSM\_BSWM\_CHANGE\_BAUDRATE.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_BUS\_OFF**

**[SWS\_CanSM\_00500]** ⌈The callback function CanSM\_ControllerBusOff (ref. to SWS\_CanSM\_00064) shall trigger the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) for the CAN network with T\_BUS\_OFF, if one of its configured CAN controllers matches to the function parameter ControllerId of the callback function CanSM\_ControllerBusOff.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

[**SWS\_CanSM\_00653**]⌈If more than one CAN controller belongs to one CAN network and for one of its controllers a bus-off is indicated with CanSM\_ControllerBusOff, then the CanSM shall stop in context of the effect E\_BUS\_OFF the other CAN contoller(s) of the CAN network, too.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Effect: E\_BUS\_OFF**

**[SWS\_CanSM\_00508]** ⌈The effect E\_BUS\_OFF of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall call at 1st place for the corresponding CAN network the API BswM\_CanSM\_CurrentState with the parameters Network := CanSMComMNetworkHandleRef and CurrentState

:= CANSM\_BSWM\_BUS\_OFF.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00521]** ⌈The effect E\_BUS\_OFF of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall call at 2nd place for the corresponding CAN network the API ComM\_BusSM\_ModeIndication with the parameters Channel := CanSMComMNetworkHandleRef (ref. to [ECUC\_CanSM\_00161](#_bookmark203)) and ComMode := COMM\_SILENT\_COMMUNICATION.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00522]** ⌈The effect E\_BUS\_OFF of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall invocate Dem\_SetEventStatus (ref. to chapter [8.5.1](#_bookmark180)) with the parameters EventId := CANSM\_E\_BUS\_OFF (ref. to [ECUC\_CanSM\_00070](#_bookmark208)) and EventStatus := DEM\_EVENT\_STATUS\_PRE\_FAILED.⌋(SRS\_BSW\_00422)

* + - 1. **State operation to do in: S\_RESTART\_CC**

**[SWS\_CanSM\_00509]** ⌈As long the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) is in the state S\_RESTART\_CC, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STARTED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STARTED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_RESTART\_CC\_OK**

**[SWS\_CanSM\_00510]** ⌈The guarding condition G\_RESTART\_CC\_OK of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall be passed, if all API calls of [SWS\_CanSM\_00509](#_bookmark121) have returned E\_OK.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_RESTART\_CC\_INDICATED**

**[SWS\_CanSM\_00511]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to start the CAN controllers of

the CAN network (ref. to [SWS\_CanSM\_00509](#_bookmark121)), this shall trigger the sub state CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) of the CAN network with T\_RESTART\_CC\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_RESTART\_CC\_TIMEOUT**

**[SWS\_CanSM\_00512] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller started mode indications (ref. to [SWS\_CanSM\_00511](#_bookmark122)), this condition shall trigger the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) of the respective network with T\_RESTART\_CC\_TIMEOUT.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Effect: E\_TX\_OFF**

The effect E\_TX\_OFF shall do nothing.

* + - 1. **Guarding condition: G\_TX\_ON**

**[SWS\_CanSM\_00514]** ⌈If CanSMEnableBusOffDelay is FALSE, then guarding condition G\_TX\_ON of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall be passed after a time duration of CanSMBorTimeL1 (ref. to [ECUC\_CanSM\_00128](#_bookmark199)) related to the last T\_BUS\_OFF, if the count of bus-off recovery retries with E\_BUS\_OFF without passing the guarding condition G\_BUS\_OFF\_PASSIVE is lower than CanSMBorCounterL1ToL2 (ref. to [ECUC\_CanSM\_00131](#_bookmark198)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00515]** ⌈If CanSMEnableBusOffDelay is FALSE, then the guarding condition G\_TX\_ON of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall be passed after a time duration of CanSMBorTimeL2 (ref. to [ECUC\_CanSM\_00129](#_bookmark200)) related to the last T\_BUS\_OFF, if the count of bus-off recovery retries with E\_BUS\_OFF without passing the guarding condition G\_BUS\_OFF\_PASSIVE is greater than or equal to CanSMBorCounterL1ToL2 (ref. to [ECUC\_CanSM\_00131](#_bookmark198)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00636]** ⌈If CanSMEnableBusOffDelay is TRUE, then the guarding conditions of [SWS\_CANSM\_00514](#_bookmark123) and [SWS\_CANSM\_00515](#_bookmark124) shall be passed after the specified time duration in each case plus the additional random delay value, which shall be requested after the bus-off event with the configured call back function

<User\_GetBusOffDelay>.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Effect: E\_TX\_ON**

**[SWS\_CanSM\_00516]** ⌈If ECU passive is FALSE (ref. to [SWS\_CanSM\_00646](#_bookmark146)), then the effect E\_TX\_ON of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall call at 1st place for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API function CanIf\_SetPduMode (ref. to chapter [8.5.1](#_bookmark180)) with the parameters ControllerId := CanSMControllerId (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) and PduModeRequest := CANIF\_ONLINE.⌋(SRS\_Can\_01158)

[**SWS\_CanSM\_00648**] If ECU passive is TRUE (ref. to [SWS\_CanSM\_00646](#_bookmark146)), then the effect E\_TX\_ON of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall call at 1st place for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API function CanIf\_SetPduMode (ref. to chapter [8.5.1](#_bookmark180)) with the parameters ControllerId := CanSMControllerId (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) and PduModeRequest := CANIF\_TX\_OFFLINE\_ACTIVE.⌋(SRS\_Can\_01158)

**[SWS\_CanSM\_00517] ⌈**The effect E\_TX\_ON of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall call at 2nd place for the corresponding CAN network the API BswM\_CanSM\_CurrentState with the

parameters Network := CanSMComMNetworkHandleRef and CurrentState

:= CANSM\_BSWM\_FULL\_COMMUNICATION.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00518] ⌈**The effect E\_TX\_ON of the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) shall call at 3rd place the API ComM\_BusSM\_ModeIndication with the parameters Channel :=

CanSMComMNetworkHandleRef (ref. to [ECUC\_CanSM\_00161](#_bookmark203)) and ComMode :=

COMM\_FULL\_COMMUNICATION.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_TX\_TIMEOUT\_EXCEPTION**

[**SWS\_CanSM\_00584**] ⌈The callback function CanSM\_TxTimeoutException (ref. to SWS\_CANSM\_00410) shall trigger the sub state machine CANSM\_BSM\_S\_FULLCOM (ref. to [Figure 7-8](#_bookmark118)) with T\_TX\_TIMEOUT\_EXCEPTION.⌋

(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Notes**

In the state S\_NO\_BUS\_OFF no state operation is required for the CanSM module.

* + - 1. **Sub state machine: CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION**



stm CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION

EntryPoint

S\_TX\_TIMEOUT\_EXCEPTION\_PROCEED

S\_CC\_STOPPED

T\_CC\_STOPPED\_TIMEOUT

S\_CC\_STOPPED\_WAIT

do / DO\_SET\_CC\_MODE\_STOPPED()

[G\_CC\_STOPPED\_E\_OK]

T\_CC\_STOPPED\_INDICATED

T\_CC\_STOPPED\_INDICATED

S\_CC\_STARTED

do / DO\_SET\_CC\_MODE\_STARTED()

[G\_CC\_STARTED\_E\_OK]

T\_CC\_STARTED\_TIMEOUT

T\_CC\_STARTED\_INDICATED

S\_CC\_STARTED\_WAIT

T\_CC\_STARTED\_INDICATED

ExitPoint TxTimeout

**Figure 7-9: CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION, sub state machine of CANSM\_BSM\_S\_FULLCOM**

* + - * 1. **Trigger: T\_CC\_STOPPED\_TIMEOUT**

[**SWS\_CanSM\_00576**]⌈After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller stopped mode indications (ref. to [SWS\_CanSM\_00579](#_bookmark127)), this condition shall trigger the sub state machine CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION (ref. to [Figure 7-9](#_bookmark125)) of the respective network with T\_CC\_STOPPED\_TIMEOUT.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - * 1. **Guarding condition: G\_CC\_STOPPED\_E\_OK**

[**SWS\_CanSM\_00577**] ⌈ The guarding condition G\_CC\_STOPPED\_E\_OK of the sub state machine CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION (ref. to [Figure 7-9](#_bookmark125)) shall be passed, if all API calls of [SWS\_CanSM\_00578](#_bookmark126) have returned E\_OK.⌋ (SRS\_Can\_01145, SRS\_Can\_01142)

* + - * 1. **State operation: DO\_SET\_CC\_MODE\_STOPPED()**

[**SWS\_CanSM\_00578**] ⌈As long the sub state machine CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION (ref. to [Figure 7-9](#_bookmark125)) is in the state S\_CC\_STOPPED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STOPPED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STOPPED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - * 1. **Trigger: T\_CC\_STOPPED\_INDICATED**

[**SWS\_CanSM\_00579**] ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to stop the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00524](#_bookmark132)), this shall trigger the sub state machine CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION (ref. to [Figure 7-9](#_bookmark125)) of the CAN network with T\_CC\_STOPPED\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - * 1. **Trigger: T\_CC\_STARTED\_INDICATED**

[**SWS\_CanSM\_00580**] ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to start the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00582](#_bookmark128)), this shall trigger the sub state machine CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION (ref. to [Figure 7-9](#_bookmark125)) of the CAN network with T\_CC\_STARTED\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - * 1. **Guarding condition: G\_CC\_STARTED\_E\_OK**

[**SWS\_CanSM\_00581**]⌈ The guarding condition G\_CC\_STARTED\_E\_OK of the sub state machine CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION (ref. to [Figure 7-9](#_bookmark125)) shall be passed, if all API calls of [SWS\_CanSM\_00582](#_bookmark128) have returned

E\_OK.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - * 1. **State operation: DO\_SET\_CC\_MODE\_STARTED**

[**SWS\_CanSM\_00582**] ⌈As long the sub state machine CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION (ref. to [Figure 7-9](#_bookmark125)) is in the state S\_CC\_STARTED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STARTED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal

to CAN\_CS\_STARTED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - * 1. **ExitPoint: TxTimeout**

**[SWS\_CanSM\_00655]**⌈ If the sub state machine CANSM\_BSM\_S\_TX\_TIMEOUT\_EXCEPTION (ref. to Figure 7-9) is triggered with T\_CC\_STARTED\_INDICATED, the API CanIf\_SetPduMode() shall be called with CANIF\_ONLINE⌋()

### Sub state machine: CANSM\_BSM\_S\_CHANGE\_BAUDRATE



stm CANSM\_BSM\_S\_CHANGE\_BAUDRATE

CANSM\_BSM\_CHANGE\_BR\_SYNC

EntryPoint

entry / DO\_SET\_BAUDRATE\_DIRECT

[G\_SET\_BAUDRATE\_DIRECT\_OK G\_NO\_COM\_MODE\_REQUESTED]

[G\_SET\_BAUDRATE\_DIRECT\_NOT\_OK]

[G\_SET\_BAUDRATE\_DIRECT\_OK G\_NO\_COM\_MODE\_NOT\_REQUESTED]

CANSM\_BSM\_S\_CHANGE\_BAUDRATE\_PROCEED

S\_CC\_STOPPED

T\_CC\_STOPPED\_TIMEOUT

S\_CC\_STOPPED\_WAIT

do / DO\_SET\_CC\_MODE\_STOPPED

[G\_CC\_STOPPED\_E\_OK]

T\_CC\_STOPPED\_INDICATED

/E\_CHANGE\_BAUDRATE

T\_CC\_STOPPED\_INDICATED

/E\_CHANGE\_BAUDRATE

S\_CC\_STARTED

do / DO\_SET\_CC\_MODE\_STARTED

T\_CC\_STARTED\_INDICATED [G\_NO\_COM\_MODE\_REQUESTED]

T\_CC\_STARTED\_INDICATED [G\_NO\_COM\_MODE\_NOT\_REQUESTED]

[G\_CC\_STARTED\_E\_OK] T\_CC\_STARTED\_TIMEOUT

S\_CC\_STARTED\_WAIT

T\_CC\_STARTED\_INDICATED T\_CC\_STARTED\_INDICATED [G\_NO\_COM\_MODE\_REQUESTED] [G\_NO\_COM\_MODE\_NOT\_REQUESTED]

ExitPoint NO\_COM

ExitPoint FULL\_OR\_SILENT\_COM

**Figure 7-10: CANSM\_BSM\_S\_CHANGE\_BAUDRATE, sub state machine of CANSM\_BSM**

* + - 1. **State operation to do on entry: DO\_SET\_BAUDRATE\_DIRECT**

[**SWS\_CanSM\_00639**]⌈The state operation DO\_SET\_BAUDRATE\_DIRECT (ref. to [Figure 7-10](#_bookmark130)) shall call the API request CanIf\_SetBaudrate (ref. to chapter [8.5.2](#_bookmark181)) for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206) with the respective ControllerId parameter. It shall use as BaudRateConfigID parameter the respective function parameter BaudRateConfigID from the call CanSM\_SetBaudrate ().⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_SET\_BAUDRATE\_DIRECT\_OK** [**SWS\_CanSM\_00641**]⌈If all CanIf\_SetBaudrate (ref. to [SWS\_CanSM\_00639](#_bookmark131)) requests returned with E\_OK, the guarding condition G\_SET\_BAUDRATE\_DIRECT\_OK shall be passed.⌋(SRS\_Can\_01145, SRS\_Can\_01142)
      2. **Guarding conditions: G\_SET\_BAUDRATE\_DIRECT\_NOT\_OK**

[**SWS\_CanSM\_00642**]⌈If any of the CanIf\_SetBaudrate (ref. to [SWS\_CanSM\_00639](#_bookmark131)) requests did return with E\_NOT\_OK, the guarding condition G\_SET\_BAUDRATE\_NOT\_OK of the state CANSM\_BSM\_CHANGE\_BR\_SYNC (ref. to [Figure 7-10](#_bookmark130)) shall be passed.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **State operation to do in: S\_CC\_STOPPED**

**[SWS\_CanSM\_00524]** ⌈As long the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) is in the state S\_CC\_STOPPED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STOPPED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STOPPED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_CC\_STOPPED\_OK**

**[SWS\_CanSM\_00525]** ⌈The guarding condition G\_CC\_STOPPED\_OK of the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) shall be passed, if all API calls of [SWS\_CanSM\_00524](#_bookmark132) have returned

E\_OK.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_CC\_STOPPED\_INDICATED**

**[SWS\_CanSM\_00526]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to stop the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00524](#_bookmark132)), this shall trigger the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) of the CAN network with T\_CC\_STOPPED\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_CC\_STOPPED\_TIMEOUT**

**[SWS\_CanSM\_00527] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller stopped mode indications (ref. to [SWS\_CanSM\_00526](#_bookmark133)), this condition shall trigger the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) of the respective network with T\_CC\_STOPPED\_TIMEOUT.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Effect: E\_CHANGE\_BAUDRATE**

**[SWS\_CanSM\_00529]** ⌈The effect E\_CHANGE\_BAUDRATE of the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) shall call at 1st place for the corresponding CAN network the API ComM\_BusSM\_ModeIndication with the parameters Channel := CanSMComMNetworkHandleRef (ref. to [ECUC\_CanSM\_00161](#_bookmark203)) and ComMode := COMM\_NO\_COMMUNICATION.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00531]** ⌈The effect E\_CHANGE\_BAUDRATE of the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) shall call at 2nd place for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetBaudrate (ref. to chapter [8.5.2](#_bookmark181)) with the respective ControllerId parameter and shall use as BaudRateConfigID parameter the remembered BaudRateConfigID from the call CanSM\_SetBaudrate ()⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **State operation to do in: S\_CC\_STARTED**

**[SWS\_CanSM\_00532]** ⌈As long the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) is in the state S\_CC\_STARTED, the CanSM module shall operate the do action DO\_SET\_CC\_MODE\_STARTED and therefore repeat for all configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) the API request CanIf\_SetControllerMode (ref. to chapter [8.5.1](#_bookmark180)) with ControllerMode equal to CAN\_CS\_STARTED, if the current CAN controller mode (ref. to [SWS\_CanSM\_00638](#_bookmark39)) is different.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_CC\_STARTED\_OK**

**[SWS\_CanSM\_00533]** ⌈The guarding condition G\_CC\_STARTED\_OK of the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) shall be passed, if all API calls of [SWS\_CanSM\_00532](#_bookmark134) have returned

E\_OK.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_CC\_STARTED\_INDICATED**

**[SWS\_CanSM\_00534]** ⌈If CanSM module has got all mode indications (ref. to SWS\_CanSM\_00396) for the configured CAN controllers of the CAN network (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) after the respective requests to start the CAN controllers of the CAN network (ref. to [SWS\_CanSM\_00532](#_bookmark134)), this shall trigger the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) of the CAN network with T\_CC\_STARTED\_INDICATED.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Trigger: T\_CC\_STARTED\_TIMEOUT**

**[SWS\_CanSM\_00535] ⌈**After a timeout of CANSM\_MODEREQ\_REPEAT\_TIME (ref. to [ECUC\_CanSM\_00336](#_bookmark192)) for all supposed controller started mode indications (ref. to[SWS\_CanSM\_00534](#_bookmark135)), this condition shall trigger the sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) of the respective network with T\_CC\_STARTED\_TIMEOUT.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_NO\_COM\_MODE\_REQUESTED**

**[SWS\_CanSM\_00542]** ⌈The sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) shall pass the guarding condition G\_NO\_COM\_MODE\_REQUESTED, if the latest accepted communication mode request with CanSM\_RequestComMode (ref. to [SWS\_CanSM\_00635](#_bookmark38)) for the respective network handle of the state machine has been with the parameter ComM\_Mode equal to COMM\_NO\_COMMUNICATION.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

* + - 1. **Guarding condition: G\_NO\_COM\_MODE\_NOT\_REQUESTED**

**[SWS\_CanSM\_00543]** ⌈The sub state machine CANSM\_BSM\_S\_CHANGE\_BAUDRATE (ref. to [Figure 7-10](#_bookmark130)) shall pass the guarding condition G\_NO\_COM\_MODE\_NOT\_REQUESTED, if the latest accepted communication mode request with CanSM\_RequestComMode (ref. to [SWS\_CanSM\_00635](#_bookmark38)) for the respective network handle of the state machine has been with the parameter ComM\_Mode equal to COMM\_SILENT\_COMMUNICATION or COMM\_FULL\_COMMUNICATION.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

## Error classification

Section 7.x "Error Handling" of the document "General Specification of Basic Software Modules" describes the error handling of the Basic Software in detail. Above all, it constitutes a classification scheme consisting of five error types, which may occur in BSW modules.

Based on this foundation, the following section specifies particular errors arranged in the respective subsections below.

* + 1. **Development Errors [SWS\_CanSM\_00654]**⌈

|  |  |  |
| --- | --- | --- |
| ***Type of error*** | ***Related error code*** | ***Error value*** |
| API service used without module initialization | CANSM\_E\_UNINIT | 0x01 |
| API service called with wrong pointer | CANSM\_E\_PARAM\_ POINTER | 0x02 |
| API service called with wrong parameter | CANSM\_E\_INVALID\_ NETWORK\_HANDLE | 0x03 |
| API service called with wrong parameter | CANSM\_E\_PARAM\_ CONTROLLER | 0x04 |
| API service called with wrong parameter | CANSM\_E\_PARAM\_ TRANSCEIVER | 0x05 |
| DeInit API service called when not all CAN networks are in state CANSM\_NO\_COMMUNICATION | CANSM\_E\_NOT\_IN\_NO\_ COM | 0x0B |

⌋(SRS\_BSW\_00337)

* + 1. **Runtime Errors [SWS\_CanSM\_00664]**⌈

|  |  |  |
| --- | --- | --- |
| ***Type of error*** | ***Related error code*** | ***Error value*** |
| Mode request for a network failed more often than allowed by configuration | CANSM\_E\_MODE\_REQUEST\_ TIMEOUT | 0x0A |

⌋(SRS\_BSW\_00466)

### Transient Faults

There are no transient faults.

### Production Errors

There are no production errors.

### Extended Production Errors

* + - 1. **CANSM\_E\_BUS\_OFF**

[SWS\_CanSM\_00666]⌈

|  |  |  |
| --- | --- | --- |
| ***Error Name:*** | CANSM\_E\_BUS\_OFF (ref. to [ECUC\_CanSM\_00070](#_bookmark208)) | |
| ***Short Description:*** | Bus-off detection | |
| ***Long Description:*** | The bus-off recovery state machine of a CAN network has detected a  certain amount of sequential bus-offs without successful recovery | |
| ***Recommended DTC:*** | Assigned by DEM | |
| ***Detection Criteria:*** | Fail | PRE\_FAILED when CanSM\_ControllerBusOff is called (T\_BUS\_OFF/E\_BUS\_OFF),  debouncing to be defined by OEM in DEM |
| Pass | After successful transmission of a CAN frame  (G\_BUS\_OFF\_PASSIVE/E\_BUS\_OFF\_PASSIVE) |
| ***Secondary Parameters:*** | None | |
| ***Time Required:*** | PRE\_FAILED immediately (in error interrupt context),  FAILED depending on debounce configuration of DEM | |
| ***Monitor Frequency*** | Continuous | |
| ***MIL illumniation:*** | Assigned by DEM | |

⌋()

## ECU online active / passive mode

[**SWS\_CanSM\_00646**]⌈ The CanSM state manager shall store the state of the requested ECU passive mode (ref. to chapter 8: SWS\_CanSM\_00644).⌋ (SRS\_Can\_01158)

[**SWS\_CanSM\_00649**]⌈ When CanSM\_SetEcuPassive is called with CanSM\_Passive=true then the CanSM shall change all PDU modes of the configured CAN controllers, which are CANIF\_ONLINE at the moment to CANIF\_TX\_OFFLINE\_ACTIVE by calling the API CanIf\_SetPduMode (ref. to chapter [8.5.1](#_bookmark180)) with the parameters ControllerId := CanSMControllerId (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) and PduModeRequest := CANIF\_TX\_OFFLINE\_ACTIVE.⌋(SRS\_Can\_01158)

[**SWS\_CanSM\_00650**]⌈ If CanSM\_SetEcuPassive called with CanSM\_Passive=false; (ref. to chapter 8: SWS\_CanSM\_00644), then the CanSM shall change all PDU modes of the configured CAN controllers, which are CANIF\_TX\_OFFLINE\_ACTIVE

at the moment to CANIF\_ONLINE by calling the API CanIf\_SetPduMode (ref. to chapter [8.5.1](#_bookmark180)) with the parameters ControllerId := CanSMControllerId (ref. to [ECUC\_CanSM\_00141](#_bookmark206)) and PduModeRequest := CANIF\_ONLINE.⌋ (SRS\_Can\_01158)

**[SWS\_CanSM\_00656]**⌈ If the CanSM needs informations about the actual PduMode, the CanSM shall call the API CanIf\_GetPduMode to get the current Pdu Mode of the CanIf.⌋( SRS\_Can\_01158)

## Non-functional design rules

The CanSM shall cover the software module design requirements of the SRS General [[3]](#_bookmark4).

# API specification

## Imported types

In this chapter all types included from the following modules are listed:

**[SWS\_CanSM\_00243]**⌈

|  |  |  |
| --- | --- | --- |
| ***Module*** | ***Header File*** | ***Imported Type*** |
| Can | Can\_GeneralTypes.h | Can\_ControllerStateType |
| CanIf | CanIf.h | CanIf\_NotifStatusType |
| CanIf.h | CanIf\_PduModeType |
| CanTrcv | Can\_GeneralTypes.h | CanTrcv\_TrcvModeType |
| ComM | Rte\_ComM\_Type.h | ComM\_ModeType |
| ComStack\_Types | ComStack\_Types.h | NetworkHandleType |
| Dem | Rte\_Dem\_Type.h | Dem\_EventIdType |
| Rte\_Dem\_Type.h | Dem\_EventStatusType |
| Std | Std\_Types.h | Std\_ReturnType |
| Std\_Types.h | Std\_VersionInfoType |

⌋()

## Type definitions

The following tables contain the type definitions of the CanSM module.

* + 1. **CanSM\_ConfigType [SWS\_CanSM\_00597]**⌈

|  |  |  |
| --- | --- | --- |
| ***Name*** | CanSM\_ConfigType | |
| ***Kind*** | Structure | |
| ***Elements*** | -- | |
| ***Type*** | -- |
| ***Comment*** | -- |
| ***Description*** | This type defines a data structure for the post build parameters of the CanSM. At initialization the CanSM gets a pointer to a structure of this type to get access to its configuration data, which is necessary for initialization. | |
| ***Available*** | CanSM.h | |

***via***

⌋(SRS\_BSW\_00400, SRS\_BSW\_00438)

* + 1. **CanSM\_BswMCurrentStateType [SWS\_CanSM\_00598]**⌈

|  |  |  |  |
| --- | --- | --- | --- |
| ***Name*** | CanSM\_BswMCurrentStateType | | |
| ***Kind*** | Enumeration | | |
| ***Range*** | CANSM\_BSWM\_NO\_COMMUNICATION | -- | -- |
| CANSM\_BSWM\_SILENT\_COMMUNICATION | -- | -- |
| CANSM\_BSWM\_FULL\_COMMUNICATION | -- | -- |
| CANSM\_BSWM\_BUS\_OFF | -- | -- |
| CANSM\_BSWM\_CHANGE\_BAUDRATE | -- | -- |
| ***Description*** | Can specific communication modes / states notified to the BswM module | | |
| ***Available via*** | CanSM.h | | |

⌋(SRS\_ModeMgm\_09251)

## Function definitions

The following sections specify the provided API functions of the CanSM module.

* + 1. **CanSM\_Init [SWS\_CanSM\_00023]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_Init | |
| ***Syntax*** | void CanSM\_Init (  const CanSM\_ConfigType\* ConfigPtr  ) | |
| ***Service ID [hex]*** | 0x00 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Non Reentrant | |
| ***Parameters (in)*** | ConfigPtr | Pointer to init structure for the post build parameters of the CanSM |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | None | |
| ***Description*** | This service initializes the CanSM module | |
| ***Available via*** | CanSM.h | |

⌋(SRS\_BSW\_00405, SRS\_BSW\_00101, SRS\_BSW\_00406, SRS\_BSW\_00358, SRS\_BSW\_00414, SRS\_BSW\_00404, SRS\_BSW\_00400, SRS\_BSW\_00438)

* + 1. **CanSM\_DeInit [SWS\_CanSM\_91001]**⌈

|  |  |
| --- | --- |
| ***Service Name*** | CanSM\_DeInit |
| ***Syntax*** | void CanSM\_DeInit ( void  ) |
| ***Service ID [hex]*** | 0x14 |
| ***Sync/Async*** | Synchronous |
| ***Reentrancy*** | Non Reentrant |
| ***Parameters (in)*** | None |
| ***Parameters (inout)*** | None |

|  |  |
| --- | --- |
| ***Parameters (out)*** | None |
| ***Return value*** | None |
| ***Description*** | This service de-initializes the CanSM module. |
| ***Available via*** | CanSM.h |

⌋(SRS\_Can\_01164, SRS\_BSW\_00336)

Note: General behavior and constraints on de-initialization functions are specified by [SWS\_BSW\_00152], [SWS\_BSW\_00072], [SWS\_BSW\_00232], [SWS\_BSW\_00233].

Caveat: Caller of the CanSM\_DeInit function has to ensure all CAN networks are in the sate CANSM\_NO\_COMMUNICATION.

[SWS\_CanSM\_00660]⌈ If development error detection for the CanSM module is enabled: The function CanSM\_DeInit shall raise the error CANSM\_E\_NOT\_IN\_NO\_COM if not all CAN networks are in state

CANSM\_NO\_COMMUNICATION. ⌋(SRS\_BSW\_00369)

* + 1. **CanSM\_RequestComMode [SWS\_CanSM\_00062]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_RequestComMode | |
| ***Syntax*** | Std\_ReturnType CanSM\_RequestComMode ( NetworkHandleType network, ComM\_ModeType ComM\_Mode  ) | |
| ***Service ID [hex]*** | 0x02 | |
| ***Sync/Async*** | Asynchronous | |
| ***Reentrancy*** | Reentrant (only for different network handles) | |
| ***Parameters (in)*** | network | Handle of destined communication network for request |
| ComM\_Mode | Requested communication mode |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | Std\_ReturnType | E\_OK: Service accepted E\_NOT\_OK: Service denied |
| ***Description*** | This service shall change the communication mode of a CAN network to the requested one. | |

|  |  |
| --- | --- |
| ***Available via*** | CanSM.h |

⌋(SRS\_Can\_01145, SRS\_Can\_01142)

Remark: Please refer to [[10]](#_bookmark6) for a detailed description of the communication modes.

**[SWS\_CanSM\_00369]** ⌈The function CanSM\_RequestComMode shall accept its request, if the NetworkHandle parameter of the request is a handle contained in the configuration of the CanSM module (ref. to

[ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00370]** ⌈The function CanSM\_RequestComMode shall deny its request, if the NetworkHandle parameter of the request is not a handle contained in the configuration of the CanSM module (ref. to

[ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00555]** ⌈The CanSM module shall deny the API request CanSM\_RequestComMode, if the initial transition for the requested CAN network is not finished yet after the CanSM\_Init request (ref. to [SWS\_CanSM\_00423](#_bookmark43), [SWS\_CanSM\_00430](#_bookmark62)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00183]** ⌈The function CanSM\_RequestComMode shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_INVALID\_NETWORK\_HANDLE, if it does not accept the network handle of the request.⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00182]** ⌈If the function CanSM\_RequestComMode accepts the request, the request shall be considered by the CanSM state machine (ref. to [SWS\_CanSM\_00635](#_bookmark38)).⌋(SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00184] ⌈**If the CanSM module is not initialized, when the function CanSM\_RequestComMode is called, then this function shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_UNINIT.⌋(SRS\_BSW\_00406)

* + 1. **CanSM\_GetCurrentComMode [SWS\_CanSM\_00063]**⌈

|  |  |
| --- | --- |
| ***Service Name*** | CanSM\_GetCurrentComMode |
| ***Syntax*** | Std\_ReturnType CanSM\_GetCurrentComMode ( |

|  |  |  |
| --- | --- | --- |
|  | NetworkHandleType network, ComM\_ModeType\* ComM\_ModePtr  ) | |
| ***Service ID [hex]*** | 0x03 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant | |
| ***Parameters (in)*** | network | Network handle, whose current communication mode shall be put out |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | ComM\_Mode Ptr | Pointer, where to put out the current communication mode |
| ***Return value*** | Std\_Return- Type | E\_OK: Service accepted E\_NOT\_OK: Service denied |
| ***Description*** | This service shall put out the current communication mode of a CAN network. | |
| ***Available via*** | CanSM.h | |

⌋(SRS\_ModeMgm\_09084)

**[SWS\_CanSM\_00282]** ⌈The CanSM module shall return E\_NOT\_OK for the API request CanSM\_GetCurrentComMode until the call of the provided API CanSM\_Init (ref. to SWS\_CANSM\_00023).⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00371]** ⌈The function CanSM\_GetCurrentComMode shall accept its request, if the NetworkHandle parameter of the request is a handle contained in the configuration of the CanSM module (ref. to

[ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00372]** ⌈The function CanSM\_GetCurrentComMode shall deny its request, if the NetworkHandle parameter of the request is not a handle contained in the configuration of the CanSM module (ref. to

[ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00187] ⌈**The function CanSM\_GetCurrentComMode shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_INVALID\_NETWORK\_HANDLE, if it does not accept the network handle of the request.⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00186]** ⌈The function CanSM\_GetCurrentComMode shall put out the current communication mode for the network handle (ref. to

[SWS\_CanSM\_00266](#_bookmark36)) to the designated pointer of type ComM\_ModeType, if it accepts the request.⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00188]** ⌈If the CanSM module is not initialized (ref. to [SWS\_CANSM\_00282](#_bookmark159)), when the function CanSM\_GetCurrentComMode is called, then this function shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_UNINIT.⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00360]** ⌈The function CanSM\_GetCurrentComMode shall report the development error CANSM\_E\_PARAM\_POINTER to the DET, if the user of this function hands over a NULL-pointer as ComM\_ModePtr.⌋(SRS\_Can\_01142)

* + 1. **CanSM\_StartWakeupSource [SWS\_CanSM\_00609]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_StartWakeupSource | |
| ***Syntax*** | Std\_ReturnType CanSM\_StartWakeupSource ( NetworkHandleType network  ) | |
| ***Service ID [hex]*** | 0x11 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Non Reentrant | |
| ***Parameters (in)*** | network | Affected CAN network |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | Std\_ReturnType | E\_OK: Request accepted E\_NOT\_OK: Request denied |
| ***Description*** | This function shall be called by EcuM when a wakeup source shall be started. | |
| ***Available via*** | CanSM.h | |

⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00611**]⌈ The API function CanSM\_StartWakeupSource shall return E\_NOT\_OK, if the CanSM module is not initialized yet with CanSM\_Init (ref. to SWS\_CANSM\_00023).⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00617**]⌈ The function CanSM\_StartWakeupSource shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_UNINIT, if the CanSM module is not initialized yet with CanSM\_Init (ref. to SWS\_CANSM\_00023).

⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00612**]⌈ The function CanSM\_StartWakeupSource shall return E\_NOT\_OK, if the CanSM module is initialized and the network parameter of the request is not a handle contained in the configuration of the CanSM module (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00613**]⌈ The function CanSM\_StartWakeupSource shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_INVALID\_NETWORK\_HANDLE, if the CanSM module is initialized and the requested handle is invalid concerning the CanSM configuration (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00616**]⌈ The function CanSM\_StartWakeupSource shall return E\_OK and it shall be considered as trigger (ref. to [SWS\_CanSM\_00607](#_bookmark46)) for the state machine of the related network, if the CanSM module is initialized and the requested handle is valid concerning the CanSM configuration (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋ (SRS\_Can\_01145)

* + 1. **CanSM\_StopWakeupSource [SWS\_CanSM\_00610]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_StopWakeupSource | |
| ***Syntax*** | Std\_ReturnType CanSM\_StopWakeupSource ( NetworkHandleType network  ) | |
| ***Service ID [hex]*** | 0x12 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Non Reentrant | |
| ***Parameters (in)*** | network | Affected CAN network |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | Std\_ReturnType | E\_OK: Request accepted |

|  |  |  |
| --- | --- | --- |
|  |  | E\_NOT\_OK: Request denied |
| ***Description*** | This function shall be called by EcuM when a wakeup source shall be stopped. | |
| ***Available via*** | CanSM.h | |

⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00618**]⌈ The API function CanSM\_StopWakeupSource shall return E\_NOT\_OK, if the CanSM module is not initialized yet with CanSM\_Init (ref. to SWS\_CANSM\_00023).⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00619**]⌈ The function CanSM\_StopWakeupSource shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_UNINIT, if the CanSM module is not initialized yet with CanSM\_Init (ref. to SWS\_CANSM\_00023).

⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00620**]⌈ The function CanSM\_StopWakeupSource shall return E\_NOT\_OK, if the CanSM module is initialized and the network parameter of the request is not a handle contained in the configuration of the CanSM module (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00621**]⌈ The function CanSM\_StopWakeupSource shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_INVALID\_NETWORK\_HANDLE, if the CanSM module is initialized and the requested handle is invalid concerning the CanSM configuration (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01145)

[**SWS\_CanSM\_00622**]⌈ The function CanSM\_StopWakeupSource shall return E\_OK and it shall be considered as trigger (ref. to [SWS\_CanSM\_00608](#_bookmark48)) for the state machine of the related network, if the CanSM module is initialized and the requested handle is valid concerning the CanSM configuration (ref. to [ECUC\_CanSM\_00161](#_bookmark203)).⌋ (SRS\_Can\_01145)

### Optional

* + - 1. **CanSM\_GetVersionInfo [SWS\_CanSM\_00024]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_GetVersionInfo | |
| ***Syntax*** | void CanSM\_GetVersionInfo ( Std\_VersionInfoType\* VersionInfo  ) | |
| ***Service ID [hex]*** | 0x01 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant | |
| ***Parameters (in)*** | None | |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | VersionInfo | Pointer to where to store the version information of this module. |
| ***Return value*** | None | |
| ***Description*** | This service puts out the version information of this module (module ID, vendor ID, vendor specific version numbers related to BSW00407) | |
| ***Available via*** | CanSM.h | |

⌋(SRS\_BSW\_00407, SRS\_BSW\_00003)

**[SWS\_CanSM\_00374]** ⌈The function CanSM\_GetVersionInfo shall report the development error CANSM\_E\_PARAM\_POINTER to the DET, if the user of this function hands over a NULL-pointer as VersionInfo.⌋(SRS\_BSW\_00407, SRS\_BSW\_00003)

* + - 1. **CanSM\_SetBaudrate [SWS\_CanSM\_00561]**⌈

|  |  |
| --- | --- |
| ***Service Name*** | CanSM\_SetBaudrate |
| ***Syntax*** | Std\_ReturnType CanSM\_SetBaudrate ( NetworkHandleType Network, uint16 BaudRateConfigID  ) |
| ***Service ID [hex]*** | 0x0d |
| ***Sync/Async*** | Synchronous |

|  |  |  |
| --- | --- | --- |
| ***Reentrancy*** | Reentrant for different Networks. Non reentrant for the same Network. | |
| ***Parameters (in)*** | Network | Handle of the addressed CAN network for the baud rate change |
| BaudRateConfigID | references a baud rate configuration by ID (see CanController BaudRateConfigID) |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | Std\_ReturnType | E\_OK: Service request accepted, setting of (new) baud rate started  E\_NOT\_OK: Service request not accepted |
| ***Description*** | This service shall start an asynchronous process to change the baud rate for the configured CAN controllers of a certain CAN network. Depending on necessary baud rate modifications the controllers might have to reset. | |
| ***Available via*** | CanSM.h | |

⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00569]** ⌈The CanSM module shall provide the API function CanSM\_SetBaudrate, if the CANSM\_SET\_BAUDRATE\_API parameter (ref. to [ECUC\_CanSM\_00343](#_bookmark194)) is configured with the value TRUE. ⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00570]** The CanSM module shall not provide the API function CanSM\_SetBaudrate, if the CANSM\_SET\_BAUDRATE\_API parameter (ref. to [ECUC\_CanSM\_00343](#_bookmark194)) is configured with the value FALSE. ⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00502]** ⌈The CanSM module shall deny the CanSM\_SetBaudrate API request, if the NetworkHandle parameter does not match to the configured Network handles of the CanSM module (ref. to

[ECUC\_CanSM\_00161](#_bookmark203)).⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00504]** ⌈The function CanSM\_SetBaudrate shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_INVALID\_NETWORK\_HANDLE (ref. to chapter [7.3](#_bookmark138)), if it does not accept the network handle of the request.⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00505]** ⌈The function CanSM\_SetBaudrate shall deny its request, if the requested CAN network is not in the communication mode COMM\_FULL\_COMMUNICATION.⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00530]** ⌈The CanSM module shall deny the CanSM\_SetBaudrate

API request, if the CanSM module is not initialized.⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00506] ⌈**If the function CanSM\_SetBaudrate is called and the CanSM module is not initialized, then this function shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_UNINIT (ref. to chapter [7.3](#_bookmark138)).⌋(SRS\_Can\_01142)

**[SWS\_CanSM\_00503]** ⌈IIf no condition is present to deny the CanSM\_SetBaudrate request according to [SWS\_CANSM\_00502](#_bookmark165) and [SWS\_CANSM\_00505](#_bookmark166), [SWS\_CANSM\_00530](#_bookmark167), then the CanSM module shall return E\_OK and operate the process for the requested baud rate change as specified with

[SWS\_CANSM\_00507](#_bookmark119).⌋(SRS\_Can\_01142)

* + - 1. **CanSM\_SetEcuPassive [SWS\_CanSM\_00644]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_SetEcuPassive | |
| ***Syntax*** | Std\_ReturnType CanSM\_SetEcuPassive ( boolean CanSM\_Passive  ) | |
| ***Service ID [hex]*** | 0x13 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Non Reentrant | |
| ***Parameters (in)*** | CanSM\_ Passive | TRUE: set all CanSM channels to passive, i.e. receive only FALSE: set all CanSM channels back to non-passive |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | Std\_Return- | E\_OK: Request accepted |

|  |  |  |
| --- | --- | --- |
|  | Type | E\_NOT\_OK: Request not accepted |
| ***Description*** | This function can be used to set all CanSM channels of the ECU to a receive only mode. | |
| ***Available via*** | CanSM.h | |

⌋(SRS\_Can\_01158)

[**SWS\_CanSM\_00645**]⌈The CanSM module shall provide the API function CanSM\_SetEcuPassive, if the CanSMTxOfflineActiveSupport parameter (ref. to [ECUC\_CanSM\_00349](#_bookmark195)) is configured with the value TRUE.⌋(SRS\_Can\_01158)

### Call-back notifications

This is a list of functions provided for other modules.

* + 1. **CanSM\_ControllerBusOff [SWS\_CanSM\_00064]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_ControllerBusOff | |
| ***Syntax*** | void CanSM\_ControllerBusOff ( uint8 ControllerId  ) | |
| ***Service ID [hex]*** | 0x04 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant (only for different CanControllers) | |
| ***Parameters (in)*** | ControllerId | CAN controller, which detected a bus-off event |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | None | |
| ***Description*** | This callback function notifies the CanSM about a bus-off event on a certain CAN controller, which needs to be considered with the specified bus-off recovery handling for the impacted CAN network. | |
| ***Available via*** | CanSM\_CanIf.h | |

⌋(SRS\_BSW\_00359, SRS\_BSW\_00333)

**[SWS\_CanSM\_00189] ⌈**If the function CanSM\_ControllerBusOff gets a Controller, which is not configured as CanSMControllerId in the configuration of the CanSM module, it shall call the function Det\_ReportError with ErrorId

parameter CANSM\_E\_PARAM\_CONTROLLER.⌋(SRS\_BSW\_00359, SRS\_BSW\_00333)

**[SWS\_CanSM\_00190] ⌈**If the CanSM module is not initialized, when the function CanSM\_ControllerBusOff is called, then the function CanSM\_ControllerBusOff shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_UNINIT.⌋(SRS\_BSW\_00359, SRS\_BSW\_00333)

**[SWS\_CanSM\_00235]** ⌈If the CanSM module is initialized and the input parameter Controller is one of the CAN controllers configured with the parameter CanSMControllerId, this bus-off event shall be considered by the CAN Network

state machine (ref. to [SWS\_CanSM\_00500](#_bookmark120)).⌋(SRS\_BSW\_00359, SRS\_BSW\_00333)

Additional remarks:

1. The call context is either on interrupt level (interrupt mode) or on task level (polling mode).
2. Reentrancy is necessary for multiple CAN controller usage.
   * 1. **CanSM\_ControllerModeIndication [SWS\_CanSM\_00396]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_ControllerModeIndication | |
| ***Syntax*** | void CanSM\_ControllerModeIndication ( uint8 ControllerId, Can\_ControllerStateType ControllerMode  ) | |
| ***Service ID [hex]*** | 0x07 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant (only for different CAN controllers) | |
| ***Parameters (in)*** | ControllerId | CAN controller, whose mode has changed |
| ControllerMode | Notified CAN controller mode |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | None | |
| ***Description*** | This callback shall notify the CanSM module about a CAN controller mode change. | |
| ***Available via*** | CanSM\_CanIf.h | |

⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00397]** ⌈If the function CanSM\_ControllerModeIndication gets a ControllerId, which is not configured as CanSMControllerId in the configuration of the CanSM module, it shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_PARAM\_CONTROLLER.⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00398]** ⌈If the CanSM module is not initialized, when the function

CanSM\_ControllerModeIndication is called, then the function

CanSM\_ControllerModeIndication shall call the function Det\_ReportError

with ErrorId parameter CANSM\_E\_UNINIT.⌋(SRS\_Can\_01145)

* + 1. **CanSM\_TransceiverModeIndication [SWS\_CanSM\_00399]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_TransceiverModeIndication | |
| ***Syntax*** | void CanSM\_TransceiverModeIndication ( uint8 TransceiverId, CanTrcv\_TrcvModeType TransceiverMode  ) | |
| ***Service ID [hex]*** | 0x09 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant for different CAN Transceivers | |
| ***Parameters (in)*** | TransceiverId | CAN transceiver, whose mode has changed |
| TransceiverMode | Notified CAN transceiver mode |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | None | |
| ***Description*** | This callback shall notify the CanSM module about a CAN transceiver mode change. | |
| ***Available via*** | CanSM\_CanIf.h | |

⌋(SRS\_Can\_01145, SRS\_Can\_01142)

Note: CANTRCV\_TRCVMODE\_SLEEP state can be requested to CanTrcv module only by integration code and not by CanSM module. Hence when CanSM\_TransceiverModeIndication() is invoked for CANTRCV\_TRCVMODE\_SLEEP, CanSM module should ignore this request.

**[SWS\_CanSM\_00400]** ⌈If the function CanSM\_TransceiverModeIndication gets a TransceiverId, which is not configured as CanSMTransceiverId in the configuration of the CanSM module, it shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_PARAM\_TRANSCEIVER.⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00401]** ⌈If the CanSM module is not initialized, when the function CanSM\_TransceiverModeIndication is called, then the function CanSM\_TransceiverModeIndication shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_UNINIT.⌋(SRS\_Can\_01145)

* + 1. **CanSM\_TxTimeoutException [SWS\_CanSM\_00410]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_TxTimeoutException | |
| ***Syntax*** | void CanSM\_TxTimeoutException ( NetworkHandleType Channel  ) | |
| ***Service ID [hex]*** | 0x0b | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant | |
| ***Parameters (in)*** | Channel | Affected CAN network |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | None | |
| ***Description*** | This function shall notify the CanSM module, that the CanNm has detected for the affected partial CAN network a tx timeout exception, which shall be recovered within the respective network state machine of the CanSM module. | |
| ***Available via*** | CanSM\_CanIf.h | |

⌋(SRS\_Can\_01142, SRS\_Can\_01145)

**[SWS\_CanSM\_00411] ⌈**The function CanSM\_TxTimeoutException shall report

CANSM\_E\_UNINIT to the DET, if the CanSM is not initialized yet.⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00412] ⌈**If the function CanSM\_TxTimeoutException is referenced with a Channel, which is not configured as CanSMNetworkHandle in the CanSM configuration, it shall report CANSM\_E\_INVALID\_NETWORK\_HANDLE to the DET.⌋(SRS\_Can\_01145)

Remarks: Reentrancy is necessary for different Channels.

* + 1. **CanSM\_ClearTrcvWufFlagIndication [SWS\_CanSM\_00413]**⌈

|  |  |
| --- | --- |
| ***Service Name*** | CanSM\_ClearTrcvWufFlagIndication |
| ***Syntax*** | void CanSM\_ClearTrcvWufFlagIndication ( uint8 Transceiver |

|  |  |  |
| --- | --- | --- |
|  | ) | |
| ***Service ID [hex]*** | 0x08 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant for different CAN Transceivers | |
| ***Parameters (in)*** | Transceiver | Requested Transceiver |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | None | |
| ***Description*** | This callback function shall indicate the CanIf\_ClearTrcvWufFlag API process end for the notified CAN Transceiver. | |
| ***Available via*** | CanSM\_CanIf.h | |

⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00414] ⌈**The function CanSM\_ClearTrcvWufFlagIndication shall report CANSM\_E\_UNINIT to the DET, if the CanSM is not initialized yet.⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00415] ⌈**If the function CanSM\_ClearTrcvWufFlagIndication gets a TransceiverId, which is not configured (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) in the configuration of the CanSM module, it shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_PARAM\_TRANSCEIVER.⌋(SRS\_Can\_01145)

* + 1. **CanSM\_CheckTransceiverWakeFlagIndication [SWS\_CanSM\_00416]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_CheckTransceiverWakeFlagIndication | |
| ***Syntax*** | void CanSM\_CheckTransceiverWakeFlagIndication ( uint8 Transceiver  ) | |
| ***Service ID [hex]*** | 0x0a | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant for different CAN Transceivers | |
| ***Parameters (in)*** | Transceiver | Requested Transceiver |
| ***Parameters (inout)*** | None | |

|  |  |
| --- | --- |
| ***Parameters (out)*** | None |
| ***Return value*** | None |
| ***Description*** | This callback function indicates the CanIf\_CheckTrcvWakeFlag API process end for the notified CAN Transceiver. |
| ***Available via*** | CanSM\_CanIf.h |

⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00417] ⌈**The function CanSM\_CheckTransceiverWakeFlagIndication shall report CANSM\_E\_UNINIT to the DET, if the CanSM module is not initialized yet.⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00418] ⌈**If the function CanSM\_CheckTransceiverWakeFlagIndication gets a TransceiverId, which is not configured (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) in the configuration of the

CanSM module, it shall call the function Det\_ReportError with ErrorId

parameter CANSM\_E\_PARAM\_TRANSCEIVER.⌋(SRS\_Can\_01145)

* + 1. **CanSM\_ConfirmPnAvailability [SWS\_CanSM\_00419]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | CanSM\_ConfirmPnAvailability | |
| ***Syntax*** | void CanSM\_ConfirmPnAvailability ( uint8 TransceiverId  ) | |
| ***Service ID [hex]*** | 0x06 | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant | |
| ***Parameters (in)*** | TransceiverId | CAN transceiver, which was checked for PN availability |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | None | |
| ***Return value*** | None | |
| ***Description*** | This callback function indicates that the transceiver is running in PN communication mode. | |
| ***Available via*** | CanSM\_CanIf.h | |

⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00546]** ⌈The function CanSM\_ConfirmPnAvailability shall notify the CanNm module (ref. to [SWS\_CanSM\_00422](#_bookmark37)), if it is called with a configured Transceiver as input parameter (ref. to

[ECUC\_CanSM\_00137](#_bookmark204)).⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00420] ⌈**

The function CanSM\_ConfirmPnAvailability shall report CANSM\_E\_UNINIT to the DET, if the CanSM module is not initialized yet.⌋(SRS\_Can\_01145)

**[SWS\_CanSM\_00421] ⌈**

If the function CanSM\_ConfirmPnAvailability gets a TransceiverId, which is not configured (ref. to [ECUC\_CanSM\_00137](#_bookmark204)) in the configuration of the CanSM module, it shall call the function Det\_ReportError with ErrorId parameter CANSM\_E\_PARAM\_TRANSCEIVER.⌋(SRS\_Can\_01145)

## Scheduled functions

For details refer to the chapter 8.5 “Scheduled functions” in *SWS\_BSWGeneral.*

* + 1. **CanSM\_MainFunction [SWS\_CanSM\_00065]**⌈

|  |  |
| --- | --- |
| ***Service Name*** | CanSM\_MainFunction |
| ***Syntax*** | void CanSM\_MainFunction ( void  ) |
| ***Service ID [hex]*** | 0x05 |
| ***Description*** | Scheduled function of the CanSM |
| ***Available via*** | SchM\_CanSM.h |

⌋(SRS\_BSW\_00424, SRS\_BSW\_00425, SRS\_Can\_01145, SRS\_Can\_01142)

**[SWS\_CanSM\_00167] ⌈**The main function of the CanSM module shall operate the effects of the CanSM state machine (ref. to chapter [7.2](#_bookmark40)), which the CanSM module

shall implement for each configured CAN Network.⌋(SRS\_BSW\_00424, SRS\_BSW\_00425, SRS\_Can\_01145, SRS\_Can\_01142)

## Expected Interfaces

In this chapter all interfaces required from other modules are listed.

### Mandatory Interfaces

This chapter defines all interfaces, which are required to fulfill the core functionality of the module.**[]**⌈

|  |  |  |
| --- | --- | --- |
| ***API Function*** | ***Header File*** | ***Description*** |
| BswM\_CanSM\_- CurrentState | BswM\_ CanSM.h | Function called by CanSM to indicate its current state. |
| CanIf\_Check- TrcvWakeFlag | CanIf.h | Requests the CanIf module to check the Wake flag of the designated CAN transceiver. |
| CanIf\_Clear- TrcvWufFlag | CanIf.h | Requests the CanIf module to clear the WUF flag of the designated CAN transceiver. |
| CanIf\_GetPdu- Mode | CanIf.h | This service reports the current mode of a requested PDU channel. |
| CanIf\_GetTx- Confirmation- State | CanIf.h | This service reports, if any TX confirmation has been done for the whole CAN controller since the last CAN controller start. |
| CanIf\_Set- ControllerMode | CanIf.h | This service calls the corresponding CAN Driver service for changing of the CAN controller mode. |
| CanIf\_SetPdu- Mode | CanIf.h | This service sets the requested mode at the L-PDUs of a predefined logical PDU channel. |
| CanIf\_SetTrcv- Mode | CanIf.h | This service changes the operation mode of the tansceiver TransceiverId, via calling the corresponding CAN Transceiver Driver service. |
| CanNm\_- ConfirmPn- Availability | Can Nm.h | Enables the PN filter functionality on the indicated NM channel. Availability: The API is only available if CanNmGlobalPnSupport is TRUE. |
| ComM\_BusSM-  \_ModeIndication | ComM.h | Indication of the actual bus mode by the corresponding Bus State Manager. ComM shall propagate the indicated state to the users with means of the RTE and BswM. |
| Dem\_SetEvent- Status | Dem.h | Called by SW-Cs or BSW modules to report monitor status information to the Dem. BSW modules calling Dem\_SetEventStatus can safely ignore the return value. This API will be available only if ({Dem/DemConfigSet/DemEventParameter/DemEventReportingType}  == STANDARD\_REPORTING) |
| Det\_Report- RuntimeError | Det.h | Service to report runtime errors. If a callout has been configured then this callout shall be called. |

⌋()

* + - 1. **Remark: Usage of CanIf\_SetPduMode**

Although the CanIf module provides more requestable PDU modes, the CanSM module only uses the parameters CANIF\_ONLINE, CANIF\_TX\_OFFLINE\_ACTIVE and CANIF\_TX\_OFFLINE for the call of the API CanIf\_SetPduMode.

The CANIF\_OFFLINE mode is assumed automatically by CanIf and needs not to be set by CanSM.

### Optional Interfaces

This chapter defines all interfaces, which are required to fulfill an optional functionality of the module.**[]**⌈

|  |  |  |
| --- | --- | --- |
| ***API***  ***Function*** | ***Header File*** | ***Description*** |
| CanIf\_Set- Baudrate | CanIf.h | This service shall set the baud rate configuration of the CAN controller. Depending on necessary baud rate modifications the controller might have to reset. |
| Det\_Report- Error | Det.h | Service to report development errors. |

⌋()

### Configurable Interfaces

In this chapter all interfaces are listed where the target functions could be configured. The target function is usually a callback function. The names of these kind of interfaces is not fixed because they are configurable.

* + - 1. **<User\_GetBusOffDelay> [SWS\_CanSM\_00637]**⌈

|  |  |  |
| --- | --- | --- |
| ***Service Name*** | <User\_GetBusOffDelay> | |
| ***Syntax*** | void <User\_GetBusOffDelay> ( NetworkHandleType network, uint8\* delayCyclesPtr  ) | |
| ***Sync/Async*** | Synchronous | |
| ***Reentrancy*** | Reentrant for different networks | |
| ***Parameters (in)*** | network | CAN network where a BusOff occurred. |
| ***Parameters (inout)*** | None | |
| ***Parameters (out)*** | delayCycles Ptr | Number of CanSM base cycles to wait additionally to L1/L2 after a BusOff occurred. |

|  |  |
| --- | --- |
| ***Return value*** | None |
| ***Description*** | This callout function returns the number of CanSM base cycles to wait additionally to L1/L2 after a BusOff occurred. |
| ***Available via*** | configurable |

⌋(SRS\_Can\_01144, SRS\_Can\_01146)

# Sequence diagrams

All interactions of the CanSM module with the depending modules CanIf, ComM, BswM, Dem and CanNm are specified in the state machine diagrams (ref. to [Figure](#_bookmark35) [7-1](#_bookmark35)- [Figure 7-10](#_bookmark130)). Therefore the CanSM SWS provides only some exemplary sequences for the use case to start and to stop the CAN controller(s) of a CAN network.

Remark: For the special use case of CAN network deinitialization with partial network support please refer to chapter 9 of [[9]](#_bookmark5) (Specification of CAN Transceiver Driver).

## Sequence diagram CanSm\_StartCanController



alt CanSm\_StartCanControllerVariants

[CAN controller mode change performed synchronously]

Limitations: This sequence diagram shows the main aspects of the interaction between the CanSM and the CanIf to start the CAN controllers of a CAN Network. The error handling for the case, that the CanIf API returns E\_NOT\_OK or the CanSM detects a CanIf indication timeout are not considered here.

artCanControllerLoop1

nfigured CAN controller of the CAN network]

CanIf\_SetControllerMode(return, ControllerId, ControllerMode:

=CAN\_CS\_STARTED)

CanSM\_ControllerModeIndication(ControllerId, ControllerMode:=CAN\_CS\_STARTED)

:E\_OK

[CAN controller mode chan

artCanControllerLoop2

nfigured CAN controller of the CAN network]

CanIf\_SetControllerMode(Std\_ReturnType, uint8, Can\_ControllerStateType)

:E\_OK

StartCanControllerLoop3

\_CS\_STARTED indication for all CAN controllers of the CAN network]

CanSM\_ControllerModeIndication(ControllerId, ControllerMode:=CAN\_CS\_STARTED)

loop CanSm\_ [Wait for CAN

loop CanSm\_St [Do for every co

ge performed asynchronously]

loop CanSm\_St [Do for every co

«module» CanIf

«module» CanSM

**Figure 9-1: Sequence diagram CanSm\_StartCanController**

## Sequence diagram CanSm\_StopCanController



alt CanSm\_StopCanControllerVariants

[CAN controller mode change performed synchronously]

Limitations: This sequence diagram shows the main aspects of the interaction between the CanSM and the CanIf to stop the CAN controllers of a CAN Network. The error handling for the case, that the CanIf API returns E\_NOT\_OK or the CanSM detects a CanIf indication timeout are not considered here.

loop CanSm\_StopCanControllerLoop1

[Do for every configured CAN controller of the CAN network]

CanIf\_SetControllerMode(return, ControllerId, ControllerMode:=CAN\_CS\_S

CanSM\_ControllerModeIndication(ControllerId, ControllerMode:=CAN\_CS\_STOPPED)

[CAN controller mode cha

loop CanSm\_StopCanControllerLoop2

[Do for every configured CAN controller of the CAN network]

CanIf\_SetControllerMode(Std\_ReturnType, uint8, Can\_ControllerState

loop CanSm\_StopCanControllerLoop3

[Wait for CAN\_CS\_STOPPED indication for all CAN controllers of the CAN net

CanSM\_ControllerModeIndication(ControllerId, ControllerMode:=CAN\_CS\_

work]

STOPPED)

:E\_OK

Type)

nge performed asynchronously]

:E\_OK

TOPPED)

«module» CanIf

«module» CanSM

**Figure 9-2: Sequence diagram CanSm\_StopCanController**

# Configuration specification

In general, this chapter defines configuration parameters and their clustering into containers. In order to support the specification Chapter 10.1 describes fundamentals. It also specifies a template (table) you shall use for the parameter specification. We intend to leave Chapter 10.1 in the specification to guarantee comprehension.

Chapter 10.2 specifies the structure (containers) and the parameters of the module CanSM.

Chapter 10.3 specifies published information of the module CanSM.

## How to read this chapter

For details refer to the chapter 10.1 “Introduction to configuration specification” in

*SWS\_BSWGeneral.*

## Containers and configuration parameters

The following chapters summarize all configuration parameters of the CanSM module. The detailed meanings of the parameters describe chapter [7](#_bookmark33) and chapter [8](#_bookmark148).

### CanSM

|  |  |
| --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00351] |
| **Module Name** | CanSM |
| **Description** | Configuration of the CanSM module |
| **Post-Build Variant Support** | true |
| **Supported Config Variants** | VARIANT-LINK-TIME, VARIANT-POST-BUILD, VARIANT-PRE- COMPILE |

|  |  |  |
| --- | --- | --- |
| **Included Containers** | | |
| **Container Name** | **Multiplicity** | **Scope / Dependency** |
| CanSM- Configuration | 1 | This container contains the global parameters of the CanSM and sub containers, which are for the CAN network specific configuration. |
| CanSMGeneral | 1 | Container for general pre-compile parameters of the CanSM module |

### CanSMConfiguration

|  |  |
| --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00123] |
| **Container Name** | CanSMConfiguration |
| **Parent Container** | CanSM |
| **Description** | This container contains the global parameters of the CanSM and sub containers, which are for the CAN network specific configuration. |
| **Configuration Parameters** | |

|  |  |  |  |
| --- | --- | --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00335] | | |
| **Parameter Name** | CanSMModeRequestRepetitionMax | | |
| **Parent Container** | CanSMConfiguration | | |
| **Description** | Specifies the maximal amount of mode request repetitions without a respective mode indication from the CanIf module until the CanSM module reports a Development Error to the Det and tries to go back to no communication. | | |
| **Multiplicity** | 1 | | |
| **Type** | EcucIntegerParamDef | | |
| **Range** | 0 .. 255 |  | |
| **Default value** | -- | | |
| **Post-Build Variant Value** | true | | |
| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local | | |

|  |  |
| --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00336] |
| **Parameter Name** | CanSMModeRequestRepetitionTime |
| **Parent Container** | CanSMConfiguration |
| **Description** | Specifies in which time duration the CanSM module shall repeat mode change requests by using the API of the CanIf module. |
| **Multiplicity** | 1 |
| **Type** | EcucFloatParamDef |

|  |  |  |  |
| --- | --- | --- | --- |
| **Range** | [0 .. 65.535] |  | |
| **Default value** | -- | | |
| **Post-Build Variant Value** | true | | |
| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local | | |

|  |  |  |
| --- | --- | --- |
| **Included Containers** | | |
| **Container Name** | **Multiplicity** | **Scope / Dependency** |
| CanSMManager- Network | 1..\* | This container contains the CAN network specific parameters of each CAN network |

### CanSMGeneral

|  |  |
| --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00314] |
| **Container Name** | CanSMGeneral |
| **Parent Container** | CanSM |
| **Description** | Container for general pre-compile parameters of the CanSM module |
| **Configuration Parameters** | |

|  |  |
| --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00133] |
| **Parameter Name** | CanSMDevErrorDetect |
| **Parent Container** | CanSMGeneral |
| **Description** | Switches the development error detection and notification on or off.   * true: detection and notification is enabled. * false: detection and notification is disabled. |
| **Multiplicity** | 1 |
| **Type** | EcucBooleanParamDef |
| **Default value** | false |

|  |  |  |  |
| --- | --- | --- | --- |
| **Post-Build Variant Value** | false |  | |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local |  | |

|  |  |  |  |
| --- | --- | --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00347] | | |
| **Parameter Name** | CanSMGetBusOffDelayFunction | | |
| **Parent Container** | CanSMGeneral | | |
| **Description** | This parameter configures the name of the <User\_GetBusOffDelay> callout function, which is used by CanSM to acquire an additional L1/L2 delay time. This function is only called for channels where CanSMEnableBusOffDelay is enabled. | | |
| **Multiplicity** | 0..1 | | |
| **Type** | EcucFunctionNameDef | | |
| **Default value** | -- | | |
| **Regular Expression** | -- | | |
| **Post-Build Variant Multiplicity** | false | | |
| **Post-Build Variant Value** | false | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local | | |

|  |  |
| --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00348] |
| **Parameter Name** | CanSMGetBusOffDelayHeader |
| **Parent Container** | CanSMGeneral |
| **Description** | This parameter configures the header file containing the prototype of the |

|  |  |  |  |
| --- | --- | --- | --- |
|  | <User\_GetBusOffDelay> callout function. | | |
| **Multiplicity** | 0..1 | | |
| **Type** | EcucStringParamDef | | |
| **Default value** | -- | | |
| **Regular Expression** | -- | | |
| **Post-Build Variant Multiplicity** | false | | |
| **Post-Build Variant Value** | false | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00312] | | |
| **Parameter Name** | CanSMMainFunctionTimePeriod | | |
| **Parent Container** | CanSMGeneral | | |
| **Description** | This parameter defines the cycle time of the function CanSM\_Main Function in seconds | | |
| **Multiplicity** | 1 | | |
| **Type** | EcucFloatParamDef | | |
| **Range** | ]0 .. INF[ |  | |
| **Default value** | -- | | |
| **Post-Build Variant Value** | false | | |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local | | |

|  |  |
| --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00344] |

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter Name** | CanSMPncSupport | | |
| **Parent Container** | CanSMGeneral | | |
| **Description** | Enables or disables support of partial networking. False: Partial Networking is disabled True: Partial Networking is enabled | | |
| **Multiplicity** | 0..1 | | |
| **Type** | EcucBooleanParamDef | | |
| **Default value** | false | | |
| **Post-Build Variant Multiplicity** | false | | |
| **Post-Build Variant Value** | false | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local  dependency: This parameter shall be available only if ComMPncSupport is enabled in ComM | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00343] | | |
| **Parameter Name** | CanSMSetBaudrateApi | | |
| **Parent Container** | CanSMGeneral | | |
| **Description** | The support of the Can\_SetBaudrate API is optional. If this parameter is set to true the Can\_SetBaudrate API shall be supported. Otherwise the API is not supported. | | |
| **Multiplicity** | 0..1 | | |
| **Type** | EcucBooleanParamDef | | |
| **Default value** | false | | |
| **Post-Build Variant Multiplicity** | false | | |
| **Post-Build Variant Value** | false | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Post-build time** | -- |  |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: ECU |  | |

|  |  |  |  |
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| **SWS Item** | [ECUC\_CanSM\_00349] | | |
| **Parameter Name** | CanSMTxOfflineActiveSupport | | |
| **Parent Container** | CanSMGeneral | | |
| **Description** | Determines whether the ECU passive feature is supported by CanSM. True: Enabled False: Disabled | | |
| **Multiplicity** | 0..1 | | |
| **Type** | EcucBooleanParamDef | | |
| **Default value** | -- | | |
| **Post-Build Variant Multiplicity** | false | | |
| **Post-Build Variant Value** | false | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local  dependency: CanIfTxOfflineActiveSupport | | |

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| **SWS Item** | [ECUC\_CanSM\_00311] |
| **Parameter Name** | CanSMVersionInfoApi |
| **Parent Container** | CanSMGeneral |
| **Description** | Activate/Deactivate the version information API (CanSM\_GetVersion Info).  true: version information API activated false: version information API deactivated |
| **Multiplicity** | 1 |

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| **Type** | EcucBooleanParamDef |  | |
| **Default value** | false |  | |
| **Post-Build Variant Value** | false |  | |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local |  | |

**No Included Containers**

### CanSMManagerNetwork

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| --- | --- |
| **SWS Item** | [ECUC\_CanSM\_00126] |
| **Container Name** | CanSMManagerNetwork |
| **Parent Container** | CanSMConfiguration |
| **Description** | This container contains the CAN network specific parameters of each CAN network |
| **Configuration Parameters** | |

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| **SWS Item** | [ECUC\_CanSM\_00131] | | |
| **Parameter Name** | CanSMBorCounterL1ToL2 | | |
| **Parent Container** | CanSMManagerNetwork | | |
| **Description** | This threshold defines the count of bus-offs until the bus-off recovery switches from level 1 (short recovery time) to level 2 (long recovery time). | | |
| **Multiplicity** | 1 | | |
| **Type** | EcucIntegerParamDef | | |
| **Range** | 0 .. 255 |  | |
| **Default value** | -- | | |
| **Post-Build Variant Value** | true | | |
| **Value Configuration** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |

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| **Class** | **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local | | |

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| **SWS Item** | [ECUC\_CanSM\_00128] | | |
| **Parameter Name** | CanSMBorTimeL1 | | |
| **Parent Container** | CanSMManagerNetwork | | |
| **Description** | This time parameter defines in seconds the duration of the bus-off recovery time in level 1 (short recovery time). | | |
| **Multiplicity** | 1 | | |
| **Type** | EcucFloatParamDef | | |
| **Range** | [0 .. 65.535] |  | |
| **Default value** | -- | | |
| **Post-Build Variant Value** | true | | |
| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local | | |

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| **SWS Item** | [ECUC\_CanSM\_00129] | | |
| **Parameter Name** | CanSMBorTimeL2 | | |
| **Parent Container** | CanSMManagerNetwork | | |
| **Description** | This time parameter defines in seconds the duration of the bus-off recovery time in level 2 (long recovery time). | | |
| **Multiplicity** | 1 | | |
| **Type** | EcucFloatParamDef | | |
| **Range** | [0 .. 65.535] |  | |
| **Default value** | -- | | |
| **Post-Build Variant Value** | true | | |
| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |

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| **Scope / Dependency** | scope: local |

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| **SWS Item** | [ECUC\_CanSM\_00130] | | |
| **Parameter Name** | CanSMBorTimeTxEnsured | | |
| **Parent Container** | CanSMManagerNetwork | | |
| **Description** | This parameter defines in seconds the duration of the bus-off event check. This check assesses, if the recovery has been successful after the recovery reenables the transmit path. If a new bus-off occurs during this time period, the CanSM assesses this bus-off as sequential bus-off without successful recovery. Because a bus-off only can be detected, when PDUs are transmitted, the time has to be great enough to ensure that PDUs are transmitted again (e. g. time period of the fastest cyclic transmitted PDU of the COM module, ComTxModeTimePeriod). | | |
| **Multiplicity** | 1 | | |
| **Type** | EcucFloatParamDef | | |
| **Range** | [0 .. 65.535] |  | |
| **Default value** | -- | | |
| **Post-Build Variant Value** | true | | |
| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local  dependency: CANSM\_BOR\_TX\_CONFIRMATION\_POLLING disabled | | |

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| **SWS Item** | [ECUC\_CanSM\_00339] | | |
| **Parameter Name** | CanSMBorTxConfirmationPolling | | |
| **Parent Container** | CanSMManagerNetwork | | |
| **Description** | This parameter shall configure, if the CanSM polls the CanIf\_GetTxConfirmation State API to decide the bus-off state to be recovered instead of using the Can SMBorTimeTxEnsured parameter for this decision. | | |
| **Multiplicity** | 1 | | |
| **Type** | EcucBooleanParamDef | | |
| **Default value** | -- | | |
| **Post-Build Variant Value** | false | | |
| **Value** | **Pre-compile time** | X | All Variants |

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| **Configuration Class** | **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local |  | |

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| **SWS Item** | [ECUC\_CanSM\_00346] | | |
| **Parameter Name** | CanSMEnableBusOffDelay | | |
| **Parent Container** | CanSMManagerNetwork | | |
| **Description** | This parameter defines if the <User\_GetBusOffDelay> shall be called for this network. | | |
| **Multiplicity** | 0..1 | | |
| **Type** | EcucBooleanParamDef | | |
| **Default value** | false | | |
| **Post-Build Variant Multiplicity** | false | | |
| **Post-Build Variant Value** | false | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Value Configuration Class** | **Pre-compile time** | X | All Variants |
| **Link time** | -- |  |
| **Post-build time** | -- |  |
| **Scope / Dependency** | scope: local | | |

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| **SWS Item** | [ECUC\_CanSM\_00161] | | |
| **Parameter Name** | CanSMComMNetworkHandleRef | | |
| **Parent Container** | CanSMManagerNetwork | | |
| **Description** | Unique handle to identify one certain CAN network. Reference to one of the network handles configured for the ComM. | | |
| **Multiplicity** | 1 | | |
| **Type** | Symbolic name reference to ComMChannel | | |
| **Post-Build Variant Value** | true | | |
| **Value Configuration** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |

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| **Class** | **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local dependency: ComM |  | |

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| **SWS Item** | [ECUC\_CanSM\_00137] | | |
| **Parameter Name** | CanSMTransceiverId | | |
| **Parent Container** | CanSMManagerNetwork | | |
| **Description** | ID of the CAN transceiver assigned to the configured network handle. Reference to one of the transceivers managed by the CanIf module. | | |
| **Multiplicity** | 0..1 | | |
| **Type** | Symbolic name reference to CanIfTrcvCfg | | |
| **Post-Build Variant Multiplicity** | true | | |
| **Post-Build Variant Value** | true | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local dependency: CanIf | | |

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| **Included Containers** | | |
| **Container Name** | **Multiplicity** | **Scope / Dependency** |
| CanSM- Controller | 1..\* | This container contains the controller IDs assigned to a CAN network. |
|  |  | Container for the references to DemEventParameter elements which |
| CanSMDem- |  | shall be invoked using the API Dem\_SetEventStatus in case the |
| Event- Parameter- | 0..1 | corresponding error occurs. The EventId is taken from the referenced DemEventParameter's DemEventId symbolic value. The standardized |
| Refs |  | errors are provided in this container and can be extended by vendor- |
|  |  | specific error references. |

### CanSMController

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| **SWS Item** | [ECUC\_CanSM\_00338] |
| **Container Name** | CanSMController |
| **Parent Container** | CanSMManagerNetwork |
| **Description** | This container contains the controller IDs assigned to a CAN network. |
| **Configuration Parameters** | |

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| **SWS Item** | [ECUC\_CanSM\_00141] | | |
| **Parameter Name** | CanSMControllerId | | |
| **Parent Container** | CanSMController | | |
| **Description** | Unique handle to identify one certain CAN controller. Reference to one of the CAN controllers managed by the CanIf module. | | |
| **Multiplicity** | 1 | | |
| **Type** | Symbolic name reference to CanIfCtrlCfg | | |
| **Post-Build Variant Value** | true | | |
| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local dependency: CanIf | | |

**No Included Containers**

### CanSMDemEventParameterRefs

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| **SWS Item** | [ECUC\_CanSM\_00127] |
| **Container Name** | CanSMDemEventParameterRefs |
| **Parent Container** | CanSMManagerNetwork |
| **Description** | Container for the references to DemEventParameter elements which shall be invoked using the API Dem\_SetEventStatus in case the corresponding error occurs. The EventId is taken from the referenced DemEventParameter's DemEventId symbolic value. The standardized errors are provided in this container and can be extended by |

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|  | vendor-specific error references. |
| **Configuration Parameters** | |

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| **SWS Item** | [ECUC\_CanSM\_00070] | | |
| **Parameter Name** | CANSM\_E\_BUS\_OFF | | |
| **Parent Container** | CanSMDemEventParameterRefs | | |
| **Description** | Reference to configured DEM event to report bus off errors for this CAN network. | | |
| **Multiplicity** | 0..1 | | |
| **Type** | Symbolic name reference to DemEventParameter | | |
| **Post-Build Variant Multiplicity** | true | | |
| **Post-Build Variant Value** | true | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local dependency: Dem | | |

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| **SWS Item** | [ECUC\_CanSM\_00352] | | |
| **Parameter Name** | CANSM\_E\_MODE\_REQUEST\_TIMEOUT | | |
| **Parent Container** | CanSMDemEventParameterRefs | | |
| **Description** | Reference to configured DEM event to report bus off errors for this CAN network. | | |
| **Multiplicity** | 0..1 | | |
| **Type** | Symbolic name reference to DemEventParameter | | |
| **Post-Build Variant Multiplicity** | true | | |
| **Post-Build Variant Value** | true | | |
| **Multiplicity Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |

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|  | **Post-build time** | X | VARIANT-POST-BUILD |
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| **Value Configuration Class** | **Pre-compile time** | X | VARIANT-PRE-COMPILE |
| **Link time** | X | VARIANT-LINK-TIME |
| **Post-build time** | X | VARIANT-POST-BUILD |
| **Scope / Dependency** | scope: local dependency: Dem | | |

**No Included Containers**

## Published Information

For details refer to the chapter 10.3 “Published Information” in *SWS\_BSWGeneral*

# CanSM unspecific / not applicable requirements

**[SWS\_CanSM\_00652]** ⌈ The following requirements are not applicable to this specification, because they are either general BSW requirements, which apply to all BSW modules and not only especially to the CanSM module or they are not

applicable at all.⌋ (SRS\_BSW\_00170, SRS\_BSW\_00375, SRS\_BSW\_00395, SRS\_BSW\_00416, SRS\_BSW\_00437, SRS\_BSW\_00168, SRS\_BSW\_00423, SRS\_BSW\_00426, SRS\_BSW\_00427, SRS\_BSW\_00428, SRS\_BSW\_00429, SRS\_BSW\_00432, SRS\_BSW\_00433, SRS\_BSW\_00336, SRS\_BSW\_00417, SRS\_BSW\_00161, SRS\_BSW\_00162, SRS\_BSW\_00005, SRS\_BSW\_00347, SRS\_BSW\_00314, SRS\_BSW\_00353, SRS\_BSW\_00361, SRS\_BSW\_00377, SRS\_BSW\_00308, SRS\_BSW\_00309, SRS\_BSW\_00360, SRS\_BSW\_00341, SRS\_BSW\_00439, SRS\_BSW\_00440, SRS\_BSW\_00004, SRS\_BSW\_00006, SRS\_BSW\_00007, SRS\_BSW\_00009, SRS\_BSW\_00010, SRS\_BSW\_00158, SRS\_BSW\_00159, SRS\_BSW\_00160, SRS\_BSW\_00164, SRS\_BSW\_00167, SRS\_BSW\_00172, SRS\_BSW\_00300, SRS\_BSW\_00301, SRS\_BSW\_00302, SRS\_BSW\_00305, SRS\_BSW\_00306, SRS\_BSW\_00307, SRS\_BSW\_00310, SRS\_BSW\_00312, SRS\_BSW\_00318, SRS\_BSW\_00321, SRS\_BSW\_00323, SRS\_BSW\_00325, SRS\_BSW\_00327, SRS\_BSW\_00328,, SRS\_BSW\_00330, SRS\_BSW\_00331, SRS\_BSW\_00334, SRS\_BSW\_00335, SRS\_BSW\_00339, SRS\_BSW\_00342, SRS\_BSW\_00343, SRS\_BSW\_00346, SRS\_BSW\_00348, SRS\_BSW\_00350, SRS\_BSW\_00357, SRS\_BSW\_00360, SRS\_BSW\_00369, SRS\_BSW\_00371, SRS\_BSW\_00373, SRS\_BSW\_00374, SRS\_BSW\_00378, SRS\_BSW\_00379, SRS\_BSW\_00380, SRS\_BSW\_00383, SRS\_BSW\_00384, SRS\_BSW\_00385, SRS\_BSW\_00386, SRS\_BSW\_00388, SRS\_BSW\_00389, SRS\_BSW\_00390, SRS\_BSW\_00392, SRS\_BSW\_00393, SRS\_BSW\_00394, SRS\_BSW\_00396, SRS\_BSW\_00397, SRS\_BSW\_00398, SRS\_BSW\_00399, SRS\_BSW\_00400, SRS\_BSW\_00401, SRS\_BSW\_00402, SRS\_BSW\_00408, SRS\_BSW\_00409, SRS\_BSW\_00410, SRS\_BSW\_00411, SRS\_BSW\_00413, SRS\_BSW\_00415, SRS\_BSW\_00419, SRS\_BSW\_00422, SRS\_BSW\_00438, SRS\_BSW\_00441, SRS\_BSW\_00442, SRS\_BSW\_00448, SRS\_BSW\_00449, SRS\_BSW\_00450, SRS\_BSW\_00451, SRS\_BSW\_00452, SRS\_BSW\_00453, , SRS\_BSW\_00454, SRS\_BSW\_00456, SRS\_BSW\_00457, SRS\_BSW\_00458, SRS\_BSW\_00459, SRS\_BSW\_00460, SRS\_BSW\_00461, SRS\_BSW\_00462, SRS\_BSW\_00463, SRS\_BSW\_00465, SRS\_BSW\_00466, SRS\_BSW\_00467, SRS\_BSW\_00469, SRS\_BSW\_00470, SRS\_BSW\_00471, SRS\_BSW\_00472, SRS\_Can\_01001, SRS\_Can\_01002, SRS\_Can\_01003, SRS\_Can\_01004, SRS\_Can\_01005, SRS\_Can\_01006, SRS\_Can\_01007, SRS\_Can\_01008, SRS\_Can\_01009, SRS\_Can\_01011, SRS\_Can\_01013, SRS\_Can\_01014, SRS\_Can\_01015, SRS\_Can\_01016, SRS\_Can\_01018, SRS\_Can\_01020, SRS\_Can\_01021, SRS\_Can\_01022, SRS\_Can\_01023, SRS\_Can\_01027, SRS\_Can\_01028, SRS\_Can\_01029, SRS\_Can\_01032, SRS\_Can\_01033, SRS\_Can\_01034, SRS\_Can\_01035, SRS\_Can\_01036, SRS\_Can\_01037, SRS\_Can\_01038, SRS\_Can\_01039, SRS\_Can\_01041, SRS\_Can\_01042, SRS\_Can\_01043, SRS\_Can\_01045, SRS\_Can\_01049, SRS\_Can\_01051, SRS\_Can\_01053, SRS\_Can\_01054, SRS\_Can\_01055, SRS\_Can\_01058, SRS\_Can\_01059, SRS\_Can\_01060, SRS\_Can\_01061, SRS\_Can\_01062, SRS\_Can\_01065, SRS\_Can\_01066, SRS\_Can\_01068, SRS\_Can\_01069, SRS\_Can\_01071, SRS\_Can\_01073, SRS\_Can\_01074, SRS\_Can\_01075,

SRS\_Can\_01076, SRS\_Can\_01078, SRS\_Can\_01079, SRS\_Can\_01081, SRS\_Can\_01082, SRS\_Can\_01086, SRS\_Can\_01090, SRS\_Can\_01091, SRS\_Can\_01092, SRS\_Can\_01095, SRS\_Can\_01096, SRS\_Can\_01097, SRS\_Can\_01098, SRS\_Can\_01099, SRS\_Can\_01100, SRS\_Can\_01101, SRS\_Can\_01103, SRS\_Can\_01107, SRS\_Can\_01108, SRS\_Can\_01109, SRS\_Can\_01110, SRS\_Can\_01111, SRS\_Can\_01112, SRS\_Can\_01114, SRS\_Can\_01115, SRS\_Can\_01116, SRS\_Can\_01117, SRS\_Can\_01121, SRS\_Can\_01122, SRS\_Can\_01125, SRS\_Can\_01126, SRS\_Can\_01129, SRS\_Can\_01130, SRS\_Can\_01131, SRS\_Can\_01132, SRS\_Can\_01134, SRS\_Can\_01135, SRS\_Can\_01136, SRS\_Can\_01138, SRS\_Can\_01139, SRS\_Can\_01140, SRS\_Can\_01141, SRS\_Can\_01143, SRS\_Can\_01147, SRS\_Can\_01148, SRS\_Can\_01149, SRS\_Can\_01150, SRS\_Can\_01151, SRS\_Can\_01153, SRS\_Can\_01154, SRS\_Can\_01155, SRS\_Can\_01156, SRS\_Can\_01157, SRS\_Can\_01159, SRS\_Can\_01160, SRS\_Can\_01161,

SRS\_Can\_01162, SRS\_Can\_01163, SRS\_ModeMgm\_00049, SRS\_ModeMgm\_09001, SRS\_ModeMgm\_09009, SRS\_ModeMgm\_09017, SRS\_ModeMgm\_09028, SRS\_ModeMgm\_09071, SRS\_ModeMgm\_09072, SRS\_ModeMgm\_09078, SRS\_ModeMgm\_09080, SRS\_ModeMgm\_09081, SRS\_ModeMgm\_09083, SRS\_ModeMgm\_09084, SRS\_ModeMgm\_09085, SRS\_ModeMgm\_09087, SRS\_ModeMgm\_09089, SRS\_ModeMgm\_09090, SRS\_ModeMgm\_09097, SRS\_ModeMgm\_09098, SRS\_ModeMgm\_09100, SRS\_ModeMgm\_09101, SRS\_ModeMgm\_09102, SRS\_ModeMgm\_09104, SRS\_ModeMgm\_09106, SRS\_ModeMgm\_09107, SRS\_ModeMgm\_09109, SRS\_ModeMgm\_09110, SRS\_ModeMgm\_09112, SRS\_ModeMgm\_09113, SRS\_ModeMgm\_09114, SRS\_ModeMgm\_09115, SRS\_ModeMgm\_09116, SRS\_ModeMgm\_09118, SRS\_ModeMgm\_09119, SRS\_ModeMgm\_09120, SRS\_ModeMgm\_09122, SRS\_ModeMgm\_09125, SRS\_ModeMgm\_09126, SRS\_ModeMgm\_09127, SRS\_ModeMgm\_09128, SRS\_ModeMgm\_09132, SRS\_ModeMgm\_09133, SRS\_ModeMgm\_09136, SRS\_ModeMgm\_09141, SRS\_ModeMgm\_09143, SRS\_ModeMgm\_09145, SRS\_ModeMgm\_09146, SRS\_ModeMgm\_09147, SRS\_ModeMgm\_09149, SRS\_ModeMgm\_09155, SRS\_ModeMgm\_09156, SRS\_ModeMgm\_09157, SRS\_ModeMgm\_09158, SRS\_ModeMgm\_09159, SRS\_ModeMgm\_09160, SRS\_ModeMgm\_09161, SRS\_ModeMgm\_09162, SRS\_ModeMgm\_09163, SRS\_ModeMgm\_09164, SRS\_ModeMgm\_09165, SRS\_ModeMgm\_09166, SRS\_ModeMgm\_09168, SRS\_ModeMgm\_09169, SRS\_ModeMgm\_09172, SRS\_ModeMgm\_09173, SRS\_ModeMgm\_09174, SRS\_ModeMgm\_09175, SRS\_ModeMgm\_09176, SRS\_ModeMgm\_09177, SRS\_ModeMgm\_09178, SRS\_ModeMgm\_09179, SRS\_ModeMgm\_09180, SRS\_ModeMgm\_09182, SRS\_ModeMgm\_09183, SRS\_ModeMgm\_09184, SRS\_ModeMgm\_09185, SRS\_ModeMgm\_09186, SRS\_ModeMgm\_09187, SRS\_ModeMgm\_09188, SRS\_ModeMgm\_09189, SRS\_ModeMgm\_09190, SRS\_ModeMgm\_09194, SRS\_ModeMgm\_09199, SRS\_ModeMgm\_09207, SRS\_ModeMgm\_09220, SRS\_ModeMgm\_09221, SRS\_ModeMgm\_09222, SRS\_ModeMgm\_09223, SRS\_ModeMgm\_09225, SRS\_ModeMgm\_09226, SRS\_ModeMgm\_09228, SRS\_ModeMgm\_09229, SRS\_ModeMgm\_09230, SRS\_ModeMgm\_09231, SRS\_ModeMgm\_09232, SRS\_ModeMgm\_09233, SRS\_ModeMgm\_09234, SRS\_ModeMgm\_09235, SRS\_ModeMgm\_09236, SRS\_ModeMgm\_09237, SRS\_ModeMgm\_09238, SRS\_ModeMgm\_09239, SRS\_ModeMgm\_09240, SRS\_ModeMgm\_09241, SRS\_ModeMgm\_09242, SRS\_ModeMgm\_09243, SRS\_ModeMgm\_09244,

SRS\_ModeMgm\_09245, SRS\_ModeMgm\_09246, SRS\_ModeMgm\_09247, SRS\_ModeMgm\_09248, SRS\_ModeMgm\_09249, SRS\_ModeMgm\_09250, SRS\_ModeMgm\_09251, SRS\_ModeMgm\_09252, SRS\_ModeMgm\_09253, SRS\_ModeMgm\_09254, SRS\_ModeMgm\_09255, SRS\_ModeMgm\_09256, SRS\_ModeMgm\_09270, SRS\_ModeMgm\_09271, SRS\_ModeMgm\_09272, SRS\_ModeMgm\_09274, SRS\_ModeMgm\_09275, SRS\_ModeMgm\_09276, SRS\_ModeMgm\_09277)