

SCADE Formal Model Documentation

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# **openETCS / UNISIG Subset-026-3**

## *3.5 Management of Radio Communication (MoRC)*

### **Summary:**

#### 3.5 Management of Radio Communication (MoRC)

This document describes the formal SCADE model implementation of the behaviour of the ETCS OBU user application interacting with Euroradio protocols.

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**Authors:** Uwe Steinke

**Reference:** UNISIG Subset-026-3 3.0.0, Chapter 3.5 "Management of Radio Communication"

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**Distribution List:** <https://github.com/openETCS/model-evaluation>

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# 1. General Project Description

This SCADE model implements the behaviour of the ETCS OBU user application interacting with Euroradio protocols.

The top level of this model is represented by the node "managementOfRadioCommunication".

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## D3.5 Management of Radio Communication

- Name: MoRC.etp
- Description: SUBSET-026-3, ISSUE : 3.3.0, 3.5 Management of Radio Communication)
- Copyright Siemens AG, 2013
- Licensed under the EUPL V.1.1  
( <http://joinup.ec.europa.eu/software/page/eupl/licence-eupl> )
- Gist URL: ---
- Cryptography: No
- Author(s): Uwe Steinke

The use of this software is limited to non-vital applications.

It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss.

THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.

## 2. Software Architecture

### 2.1. Project Architecture

This section displays the package hierarchy of projects.

Project [MoRC](#)

### 2.2. Call Graph

This Call Graph displays the dependency tree of model operators.

1. [managementOfRadioCommunication](#)
  - 1.1. digital::FallingEdge (\_L56=)
  - 1.2. digital::FallingEdge (\_L88=)
  - 1.3. digital::RisingEdge (\_L87=)
  - 1.4. digital::RisingEdge (\_L90=)
  - 1.5. digital::RisingEdge (CommunicationSession\_SM:Establishing:\_L43=)
  - 1.6. [establish a CommunicationSession](#)  
(CommunicationSession\_SM:Establishing: L19=)
  - 1.7. [evaluateOrderToContactAnRBD](#)  
(CommunicationSession\_SM:Establishing: L1=)
  - 1.8. [evaluateOrderToContactAnRBD](#)  
(CommunicationSession\_SM:NoSession: L2=)
    - 1.8.1. digital::FallingEdge (\_L20=)
    - 1.8.2. linear::MemoryBasic (\_L16=)
  - 1.9. [Initiate a Session](#) (CommunicationSession\_SM:NoSession: L5=)
  - 1.10. [initiateTerminatingASession](#) (\_L18=)
    - 1.10.1. [waitAndRepeatTimer](#)  
(TrainExitedFromRBCArea\_SM:WaitForOrderToTerminateTheSession: L25=)
      - 1.10.1.1. [countDownTimer](#) (\_L1=)
        - 1.10.1.1.1. linear::MemoryBasic  
(TimerStatus\_SM:Counting:\_L4=)
  - 1.11. [isOrderToEstablishConnection](#)  
(CommunicationSession\_SM:NoSession: L36=)
  - 1.12. [isOrderToEstablishConnection](#)  
(CommunicationSession\_SM:NoSession: L37=)
  - 1.13. [isOrderToEstablishConnection](#)  
(CommunicationSession\_SM:NoSession: L38=)
  - 1.14. [maintaining a CommunicationSession](#)  
(CommunicationSession\_SM:Maintaining: L1=)
    - 1.14.1. [countDownTimer](#)  
(Maintaining\_SM:CommunicationSessionEstablished: L3=)
      - 1.14.1.1. linear::MemoryBasic (TimerStatus\_SM:Counting:\_L4=)
  - 1.15. [registeringToTheRadioNetwork](#) (\_L1=)
    - 1.15.1. digital::FlipFlopReset (\_L108=)
    - 1.15.2. digital::RisingEdge (\_L110=)
    - 1.15.3. digital::RisingEdge (\_L14=)
    - 1.15.4. digital::RisingEdge (\_L16=)

- 1.15.5. digital::RisingEdge (\_L6=)
- 1.15.6. linear::MemoryBasic (\_L24=)
- 1.15.7. [radioNetworkMobile](#) (\_L58=)
  - 1.15.7.1. linear::MemoryBasic (\_L18=)
  - 1.15.7.2. linear::MemoryBasic (\_L2=)
  - 1.15.7.3. linear::MemoryBasic (\_L40=)
- 1.16. [safeRadioConnectionIndication](#) (\_L7=)
  - 1.16.1. [countDownTimer](#) (\_L21=)
    - 1.16.1.1. linear::MemoryBasic (TimerStatus\_SM:Counting:\_L4=)
- 1.17. [terminateAndEstablishSession](#) (\_L57=)
  - 1.17.1. linear::MemoryBasic (\_L30=)
- 1.18. [terminating a CommunicationSession](#)  
([CommunicationSession SM:Terminating: L1=](#))
  - 1.18.1. [waitAndRepeatTimer](#)  
([TerminateTheCommunicationSession SM:WaitForAcknowledgementMessage: L1=](#))
    - 1.18.1.1. [countDownTimer](#) (\_L1=)
      - 1.18.1.1.1. linear::MemoryBasic  
(TimerStatus\_SM:Counting:\_L4=)
- 2. [RBCTransition forSafeRadioConnectionIndication](#)

## 3. MoRC Project

### 3.1. Root Elements

#### 3.1.1. Types

**Table 1: Public Types of MoRC**

Name	Definition	Comments/Annotations
ETCS_Level_Type	enum {ETCS_Level_1, ETCS_Level_2, ETCS_Level_3}	<b>Comments:</b> The ETCS Level of Operation <b>ETCS_Level_1 Comments:</b> Level 1 <b>ETCS_Level_2 Comments:</b> Level 2 <b>ETCS_Level_3 Comments:</b> Level 3
ETCS_Mode_Type	enum {ETCS_Mode_x, ETCS_Mode_y, ETCS_Mode_EndOfMission}	<b>Comments:</b> ETCS Mode <b>ETCS_Mode_x Comments:</b> Modes are not specified in Chapter 3.5 <b>ETCS_Mode_EndOfMission Comments:</b> 3.5.3.4 c)
mobileHWAAction_Type	enum {mhwa_nop, mhwa_register, mhwa_connect, mhwa_disconnect, mhwa_unregister}	<b>Comments:</b> 3.5.6, 3.5.6.3.2, 3.5.6.5, 3.5.6.5:Commands to the mobile hardware <b>mhwa_nop Comments:</b> noAction
mobileHWCmd_Type	{valid : bool, action : mobileHWAAction_Type, radioNetworkID : radioNetworkID_Type}	<b>Comments:</b> 3.5.6, 3.5.6.3.2, 3.5.6.5, 3.5.6.5:Commands to the mobile hardware
mobileHWConnectionStatus_Type	enum {mhwc_notRegistered, mhwc_registered, mhwc_connectionSetupInProgress, mhwc_connected}	<b>Comments:</b> 3.5.6.5
mobileHWStatus_Type	{valid : bool, connectionStatus : mobileHWConnectionStatus_Type, settingUpConnectionHasFailed : bool}	<b>Comments:</b> 3.5.6.5
mobileSWAction_Type	enum {mswa_nop, mswa_register, mswa_connect, mswa_establishRadioConnection, mswa_terminateRadioConnection, mswa_disconnect, mswa_unregister}	
mobileSWCmd_Type	{valid : bool, action : mobileSWAction_Type, radioNetworkID : radioNetworkID_Type}	

Name	Definition	Comments/Annotations
mobileSWConnectionStatus_Type	enum {mswc_unregistered, mswc_registering, mswc_registered, mswc_connecting, mswc_connected, mswc_establishingSession, mswc_sessionEstablished}	
mobileSWStatus_Type	{valid : bool, mobileHW_available : bool, connectionStatus : mobileSWConnectionStatus_Type, registeredRadioNetworkID : radioNetworkID_Type, settingUpConnectionHasFailed : bool}	
morc_RBC_action_Type	enum {morc_rbca_noAction, morc_rbca_establishSession, morc_rbca_terminateSession}	<b>Comments:</b> 3.5.3.5 a)
orderToContactAnAcceptingRBC_Type	{valid : bool, rbc_id : rbc_id_Type, telephoneNoOfTheRBC : rbc_phoneNo_Type, appliesAlsoToSleepingUnits : bool}	<b>Comments:</b> 3.5.3.5.3
orderToContactAnRBC_Type	{valid : bool, rbc_id : rbc_id_Type, telephoneNoOfTheRBC : rbc_phoneNo_Type, actionToBePerformed : morc_RBC_action_Type, appliesAlsoToSleepingUnits : bool}	<b>Comments:</b> 3.5.3.5
orderToContactARadioInfillUnit_Type	{valid : bool, radioInfillUnit_id : rbc_id_Type, telephoneNoOfTheRadioInfillUnit : rbc_phoneNo_Type, actionToBePerformed : morc_RBC_action_Type}	<b>Comments:</b> 3.5.3.6
radioNetworkID_Type	int	<b>Comments:</b> 3.5.6.2
RadioNetworkMobileHWStatusType	{valid : bool, connectionStatus : mobileHWConnectionStatus_Type}	<b>Comments:</b> 3.5.6
rbc_id_Type	int	<b>Comments:</b> 3.5.3.16
rbc_phoneNo_Type	int	<b>Comments:</b> 3.5.3.16
rbc_TransitionOrder_Type	{valid : bool, orderToContactAnAcceptingRBC : orderToContactAnAcceptingRBC_Type}	<b>orderToContactAnAcceptingRBC Comments:</b> 3.5.3.5.3

Name	Definition	Comments/Annotations
safeRadioConnectionStatus_Type	enum {srcs_NoConnection, srcs_ConnectionLost_SetupFailed, srcs_ConnectionUp}	<b>Comments:</b> 3.5.7.1
safeRadioConnectionStatusValid_Type	{valid : bool, status : safeRadioConnectionStatus_Type}	
sessionStatus_Type	enum {morc_st_inactive, morc_st_establishing, morc_st_maintaining, morc_st_terminating}	<b>Comments:</b> Designates the MoRC session status
time_Type	int	<b>Comments:</b> time in ms
validRadioNetworkID_Type	{valid : bool, radioNetworkID : radioNetworkID_Type}	<b>Comments:</b> 3.5.6.2

### 3.1.2. Constants

**Table 2: Public Constants of MoRC**

Name	Type	Value	Comments/Annotations
cEstablishSafeRadioConnectionCmd	mobileSWCmd_Type	{valid : true, action : mswa_establishRadioConnection, radioNetworkID : 0}	
cInvalidmobileHWCmd	mobileHWCmd_Type	{valid : false, action : mhwa_nop, radioNetworkID : 0}	
cInvalidMobileHWStatus_Type	mobileHWStatus_Type	{valid : false, connectionStatus : mhwc_notRegistered, settingUpConnectionHasFailed : false}	
cInvalidMobileSWCmd	mobileSWCmd_Type	{valid : false, action : mswa_nop, radioNetworkID : 0}	
cInvalidMobileSWStatus	mobileSWStatus_Type	{valid : false, mobileHW_available : false, connectionStatus : mswc_unregistered, registeredRadioNetworkID : 0, settingUpConnectionHasFailed : false}	
cInvalidOrderToContactAnRBC	orderToContactAnRBC_Type	{valid : false, rbc_id : 0, telephoneNoOfTheRBC : 0, actionToBePerformed : morc_rbca_noAction, appliesAlsoToSleepingUnits : false}	
cInvalidRadioNetworkID	validRadioNetworkID_Type	{valid : false, radioNetworkID : 0}	



Name	Type	Value	Comments/Annotations
cInvalidRadioNetworkID_value	radioNetworkID_Type	-1	
cMaxNoOfConnectionRetries	int	3	<b>Comments:</b> 3.5.3.7 a)
cMobileSWStatus_noHW	mobileSWStatus_Type	{valid : true, mobileHW_available : false, connectionStatus : mswc_unregistered, registeredRadioNetworkID : cInvalidRadioNetworkID_value, settingUpConnectionHasFailed : false}	
cMobileSWStatus_unregistered	mobileSWStatus_Type	{valid : true, mobileHW_available : true, connectionStatus : mswc_unregistered, registeredRadioNetworkID : 0, settingUpConnectionHasFailed : false}	
cPositionReoport_MaxNoOfRepetitions	int	5	<b>Comments:</b> 3.5.5.1e)
cPositionReportRepetitionInterval	time_Type	10000	<b>Comments:</b> 3.5.5.1e)
cRadioConnectionReestablishingTimeout	time_Type	0	<b>Comments:</b> 3.5.4.1, 3.5.4.2.1
cRBC_id_contactLastKnownRBC	rbc_id_Type	-1	<b>Comments:</b> 3.5.3.13: Order to contact the last known RBC 3.5.3.16, Option 1: Contact the last known RBC
cRBC_phoneNo_UseOnboardStoredShortNo	rbc_phoneNo_Type	-1	<b>Comments:</b> 3.5.3.16, Option 2: Use on-board stored short number
cTerminateSafeRadioConnectionCmd	mobileSWCmd_Type	{valid : true, action : mswa_terminateRadio Connection, radioNetworkID : 0}	
cTerminationOfCommunicationSession_MaxNoOfRepetitions	int	5	<b>Comments:</b> 3.5.5.3.1
cTerminationOfCommunicationSessionRepetitionInterval	time_Type	1000	<b>Comments:</b> 3.5.5.3.1
cTime_0	time_Type	0	

### 3.1.3. countdownTimer Operator

Declared as **private node**

#### 3.1.3.1. Comments and Information

##### **countdownTimer Comments:**

- The countdownTimer implements a generic timer function.

**Table 3: countdownTimer Annotations**

Note Name	Attribute	Value
GdC_1	Author	Author : Uwe Steinke
	DateC	Created : 2012-10-15
	DateM	Modified : 2012-12-20
	Version	Version : 00.00.00.001
Remark_1	Description	<p>- Name: countdownTimer  - Description: Implements a generic Count Down Timer  - Copyright Siemens AG, 2013  - Licensed under the EUPL V.1.1  ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )  - Gist URL: ---  - Cryptography: No  - Author(s): Uwe Steinke</p> <p>The use of this software is limited to non-vital applications.  It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.</p>

#### 3.1.3.2. Node Hierarchy

state-machine : [TimerStatus\\_SM](#)

state : [Stopped](#)

state : [Counting](#)

state : [Expired](#)

### 3.1.3.3. Graphical Views

#### 3.1.3.3.1. View of diagram\_countDownTimer\_1

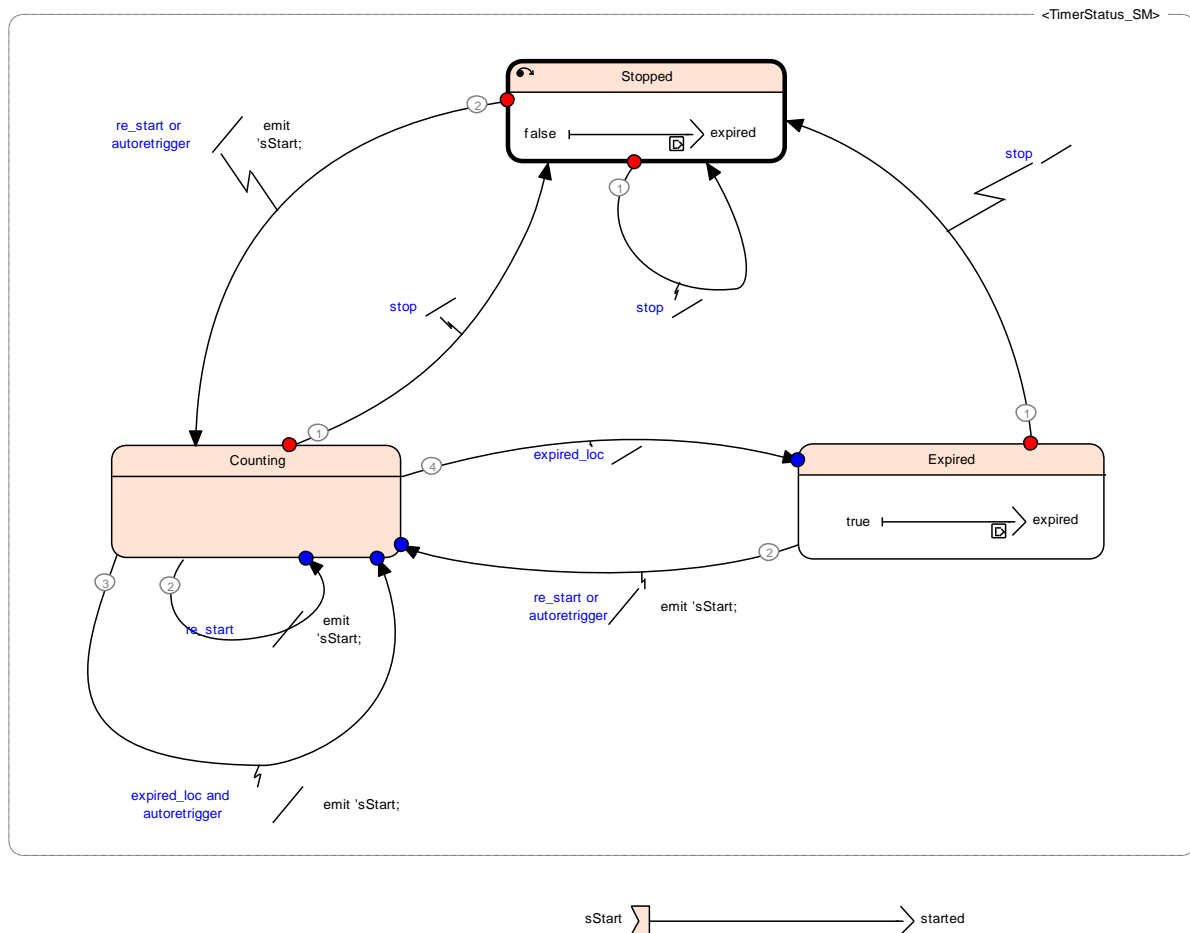


Figure 1: View of diagram\_countDownTimer\_1

Table 4: States of diagram\_countDownTimer\_1

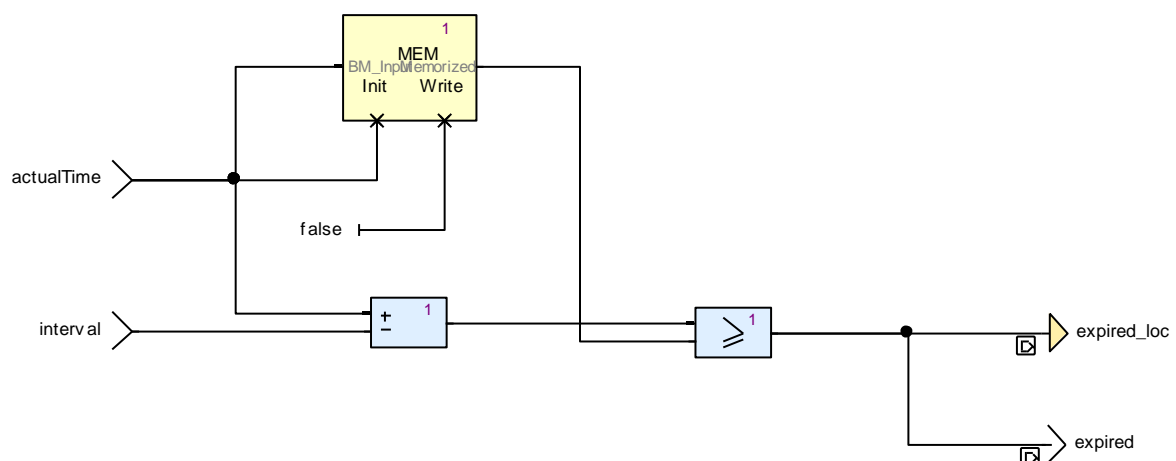
State	Comments/Annotations
TimerStatus_SM:Stopped	
TimerStatus_SM:Counting	
TimerStatus_SM:Expired	

Table 5: Transitions of diagram\_countDownTimer\_1

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> TimerStatus_SM:Stopped <b>Target:</b> TimerStatus_SM:Counting	2	<b>Condition:</b> re_start or autoretrigger <b>Actions:</b> emit 'sStart;	
<b>Source:</b> TimerStatus_SM:Counting <b>Target:</b> TimerStatus_SM:Stopped	1	<b>Condition:</b> stop	

Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> TimerStatus_SM:Counting <b>Target:</b> TimerStatus_SM:Expired	4	<b>Condition:</b> expired_loc <b>Actions:</b>	
<b>Source:</b> TimerStatus_SM:Expired <b>Target:</b> TimerStatus_SM:Counting	2	<b>Condition:</b> re_start or autoretrigger <b>Actions:</b> emit 'sStart;	
<b>Source:</b> TimerStatus_SM:Expired <b>Target:</b> TimerStatus_SM:Stopped	1	<b>Condition:</b> stop	
<b>Source:</b> TimerStatus_SM:Counting <b>Target:</b> TimerStatus_SM:Counting	2	<b>Condition:</b> re_start <b>Actions:</b> emit 'sStart;	
<b>Source:</b> TimerStatus_SM:Counting <b>Target:</b> TimerStatus_SM:Counting	3	<b>Condition:</b> expired_loc and autoretrigger <b>Actions:</b> emit 'sStart;	
<b>Source:</b> TimerStatus_SM:Stopped <b>Target:</b> TimerStatus_SM:Stopped	1	<b>Condition:</b> stop	

#### 3.1.3.3.2. View of diagram\_Counting\_1 (TimerStatus\_SM:Counting:)



**Figure 2: View of diagram\_Counting\_1 (TimerStatus\_SM:Counting:)**

#### 3.1.3.4. Interface

**Table 6: Inputs of countdownTimer**

Name	Type	Comments/Annotations
re_start	bool	

Name	Type	Comments/Annotations
stop	bool	
actualTime	time_Type	
autoretrigger	bool	
interval	time_Type	

**Table 7: Outputs of countDownTimer**

Name	Type	Properties	Comments/Annotations
expired	bool	default false	
started	bool		

### 3.1.3.5. Locals

**Table 8: Locals of countDownTimer**

Name	Type	Properties	Comments/Annotations
expired_loc	bool	default false	

**Table 9: Signals of countDownTimer**

Name	Comments/Annotations
sStart	

### 3.1.4. establish\_a\_CommunicationSession Operator

Declared as **private node**

#### 3.1.4.1. Comments and Information

##### **establish\_a\_CommunicationSession Comments:**

- Subset 096, REQ 3.5.3
- Implements the establishing process of a communication session

**Table 10: establish\_a\_CommunicationSession Annotations**

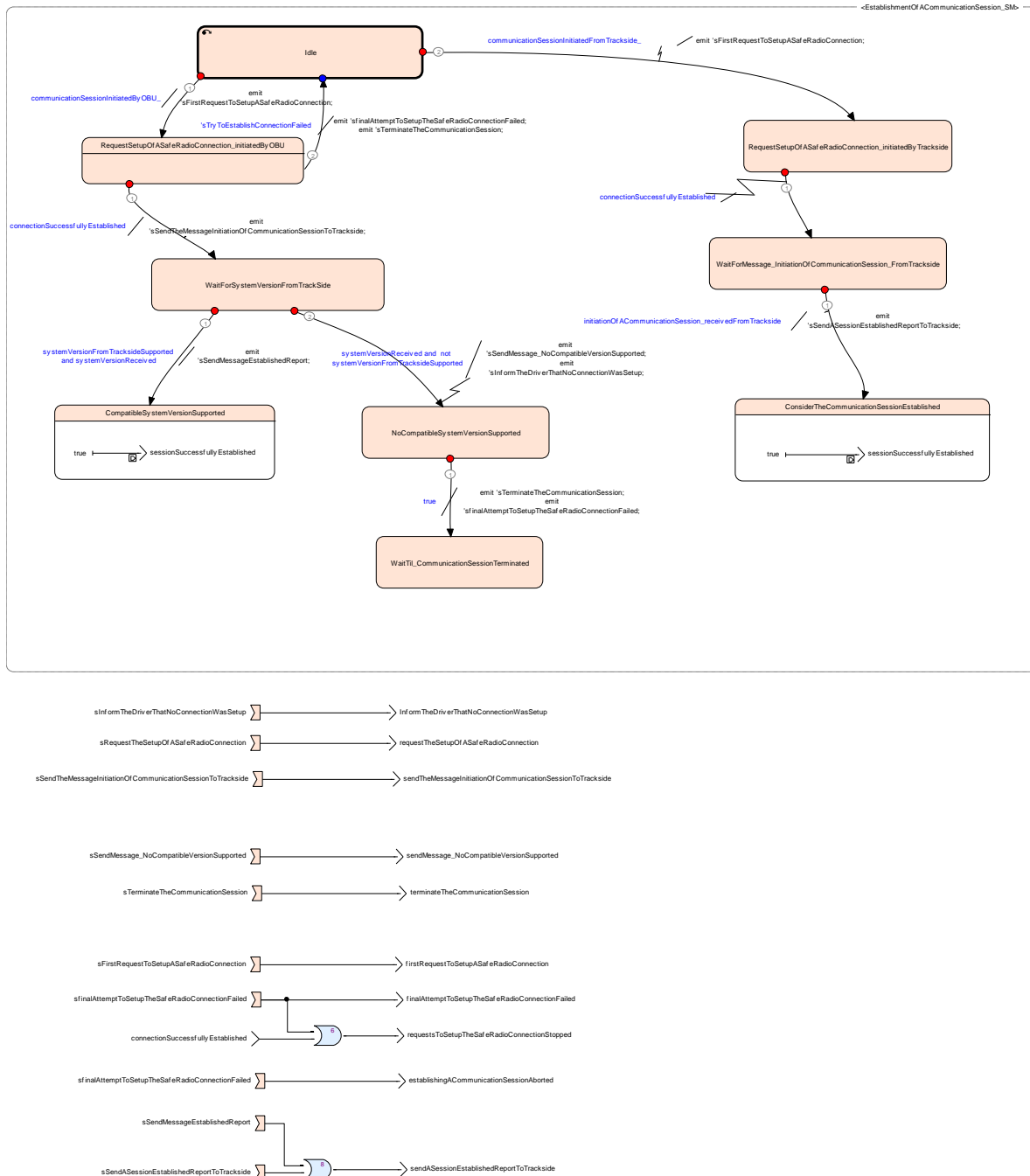
Note Name	Attribute	Value
Remark_1	Description	<ul style="list-style-type: none"> <li>- Name: establish_a_CommunicationSession</li> <li>- Description: Implements the establishing process of a communication session</li> <li>- Copyright Siemens AG, 2013</li> <li>- Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )</li> <li>- Gist URL: ---</li> <li>- Cryptography: No</li> <li>- Author(s): Uwe Steinke</li> </ul> <p>The use of this software is limited to non-vital applications.          It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss.          THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OHER KIND OF USE.</p>

### 3.1.4.2. Node Hierarchy

state-machine : [EstablishmentOfACommunicationSession SM](#)  
 state : [Idle](#)  
 state : [RequestSetupOfASafeRadioConnection initiatedByOBU](#)  
 state-machine : [RequestConnectionWithTrackSide SM](#)  
 state : [Start](#)  
 state : [TryToEstablishConnection isPartOfStartOfMission](#)  
 state-machine : [RepeatSetupConnection SM](#)  
 state : [Start](#)  
 state : [Retry](#)  
 state : [Success](#)  
 state : [NoSuccess](#)  
 state : [TryToEstablishConnection isNotPartOfStartOfMission](#)  
 state-machine : [RepeatSetupConnection SM](#)  
 state : [Start](#)  
 state : [Retry](#)  
 state : [WaitForSystemVersionFromTrackSide](#)  
 state : [CompatibleSystemVersionSupported](#)  
 state : [NoCompatibleSystemVersionSupported](#)  
 state : [WaitTil CommunicationSessionTerminated](#)  
 state : [RequestSetupOfASafeRadioConnection initiatedByTrackside](#)  
 state : [WaitForMessage InitiationOfCommunicationSession FromTrackside](#)  
 state : [ConsiderTheCommunicationSessionEstablished](#)

### 3.1.4.3. Graphical Views

#### 3.1.4.3.1. View of diagram\_establish\_a\_CommunicationSession



**Figure 3: View of diagram\_establish\_a\_CommunicationSession**

**Table 11: State Machines of diagram\_establish\_a\_CommunicationSession**

State Machine	Comments/Annotations
EstablishmentOfACommunicationSession_SM	<b>Comments:</b> 3.5.3.7

**Table 12: States of diagram\_establish\_a\_CommunicationSession**

State	Comments/Annotations
EstablishmentOfACommunicationSession_SM:Idle	
EstablishmentOfACommunicationSession_SM:RequestSetupOfASafeRadioConnection_initiatedByOBU	<b>Comments:</b> 3.5.3.7 a)
EstablishmentOfACommunicationSession_SM:WaitForSystemVersionFromTrackSide	<b>Comments:</b> 3.5.3.7 c), 3.5.3.8
EstablishmentOfACommunicationSession_SM:CompatibleSystemVersionSupported	<b>Comments:</b> 3.5.3.8 a) Communication Session established and SystemVersionFromTrackside supported by the OBU
EstablishmentOfACommunicationSession_SM:NotCompatibleSystemVersionSupported	<b>Comments:</b> 3.5.3.8 b) Communication Session established and SystemVersionFromTrackside not supported by the OBU
EstablishmentOfACommunicationSession_SM:WaitTil_CommunicationSessionTerminated	<b>Comments:</b> 3.5.3.8 b) Communication Session established and waiting til communication session terminates
EstablishmentOfACommunicationSession_SM:RequestSetupOfASafeRadioConnection_initiatedByTrackside	<b>Comments:</b> 3.5.3.10 a)
EstablishmentOfACommunicationSession_SM:WaitForMessage_InitiationOfCommunicationSession_FromTrackside	<b>Comments:</b> 3.5.3.10 b) Wait for message InitiationOfCommunicationSession from trackside.
EstablishmentOfACommunicationSession_SM:ConsiderTheCommunicationSessionEstablished	<b>Comments:</b> 3.5.3.10 c)

**Table 13: Transitions of diagram\_establish\_a\_CommunicationSession**

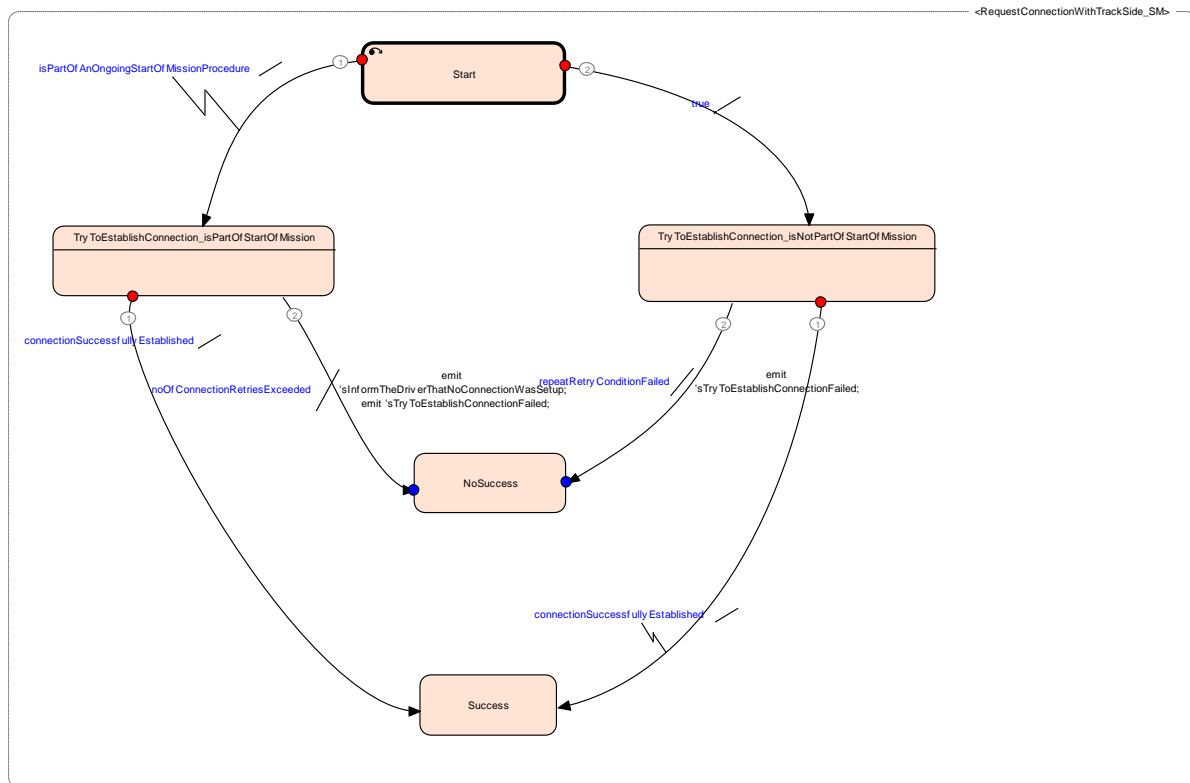
Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> EstablishmentOfACommunicationSession_SM:Idle <b>Target:</b> EstablishmentOfACommunicationSession_SM:RequestSetupOfASafeRadioConnection_initiatedByOBU	1	<b>Condition:</b> communicationSessionInitiatedByOBU_ <b>Actions:</b> emit 'sFirstRequestToSetupASafeRadioConnection;	
<b>Source:</b> EstablishmentOfACommunicationSession_SM:RequestSetupOfASafeRadioConnection_initiatedByOBU <b>Target:</b> EstablishmentOfACommunicationSession_SM:WaitForSystemVersionFromTrackSide	1	<b>Condition:</b> connectionSuccessfullyEstablished <b>Actions:</b> emit 'sSendMessageInitiationOfCommunicationSessionToTrackside;	



Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> EstablishmentOfACommunicationSession_SM:RequestSetupOfASafeRadioConnection_initiatedByOBU <b>Target:</b> EstablishmentOfACommunicationSession_SM:Idle	2	<b>Condition:</b> 'sTryToEstablishConnectionFailed <b>Actions:</b> let emit 'sfinalAttemptToSetupTheSafeRadioConnectionFailed; emit 'sTerminateTheCommunicationSession; tel	
<b>Source:</b> EstablishmentOfACommunicationSession_SM:WaitForSystemVersionFromTrackSide <b>Target:</b> EstablishmentOfACommunicationSession_SM:CompatibleSystemVersionSupported	1	<b>Condition:</b> systemVersionFromTracksideSupported and systemVersionReceived <b>Actions:</b> emit 'sSendMessageEstablishedReport;	
<b>Source:</b> EstablishmentOfACommunicationSession_SM:WaitForSystemVersionFromTrackSide <b>Target:</b> EstablishmentOfACommunicationSession_SM:NoCompatibleSystemVersionSupported	2	<b>Condition:</b> systemVersionReceived and not systemVersionFromTracksideSupported <b>Actions:</b> let emit 'sSendMessage_NoCompatibleVersionSupported; emit 'sInformTheDriverThatNoConnectionWasSetup; tel	
<b>Source:</b> EstablishmentOfACommunicationSession_SM:NoCompatibleSystemVersionSupported <b>Target:</b> EstablishmentOfACommunicationSession_SM:WaitTil_CommunicationSessionTerminated	1	<b>Condition:</b> true <b>Actions:</b> let emit 'sTerminateTheCommunicationSession; emit 'sfinalAttemptToSetupTheSafeRadioConnectionFailed; tel	<b>Comments:</b> 3.5.3.8 b)

Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> EstablishmentOfACommunicationSession_SM:Idle <b>Target:</b> EstablishmentOfACommunicationSession_SM:RequestSetupOfASafeRadioConnection_initiatedByTrackside	2	<b>Condition:</b> communicationSessionInitiatedFromTrackside  <b>Actions:</b> emit 'sFirstRequestToSetupASafeRadioConnection;	<b>Comments:</b> 3.5.3.10 a)
<b>Source:</b> EstablishmentOfACommunicationSession_SM:RequestSetupOfASafeRadioConnection_initiatedByTrackside <b>Target:</b> EstablishmentOfACommunicationSession_SM:WaitForMessage_InitiationOfCommunicationSession_FromTrackside	1	<b>Condition:</b> connectionSuccessfullyEstablished	
<b>Source:</b> EstablishmentOfACommunicationSession_SM:WaitForMessage_InitiationOfCommunicationSession_FromTrackside <b>Target:</b> EstablishmentOfACommunicationSession_SM:ConsiderTheCommunicationSessionEstablished	1	<b>Condition:</b> initiationOfACommunicationSession_receivedFromTrackside <b>Actions:</b> emit 'sSendASessionEstablishedReportToTrackside;	<b>Comments:</b> 3.5.3.10 c)

3.1.4.3.2. View of diagram\_RequestSetupOfASafeRadioConnection\_initiatedByOBU\_1  
(EstablishmentOfACommunicationSession\_SM:RequestSetupOfASafeRadioConnection\_initiatedByOBU:)



**Figure 4: View of diagram\_RequestSetupOfASafeRadioConnection\_initiatedByOBU\_1  
(EstablishmentOfACommunicationSession\_SM:RequestSetupOfASafeRadioConnection\_initiatedByOBU:)**

**Table 14: State Machines of diagram\_RequestSetupOfASafeRadioConnection\_initiatedByOBU\_1**

State Machine	Comments/Annotations
RequestConnectionWithTrackSide_SM	<b>Comments:</b> 3.5.3.7

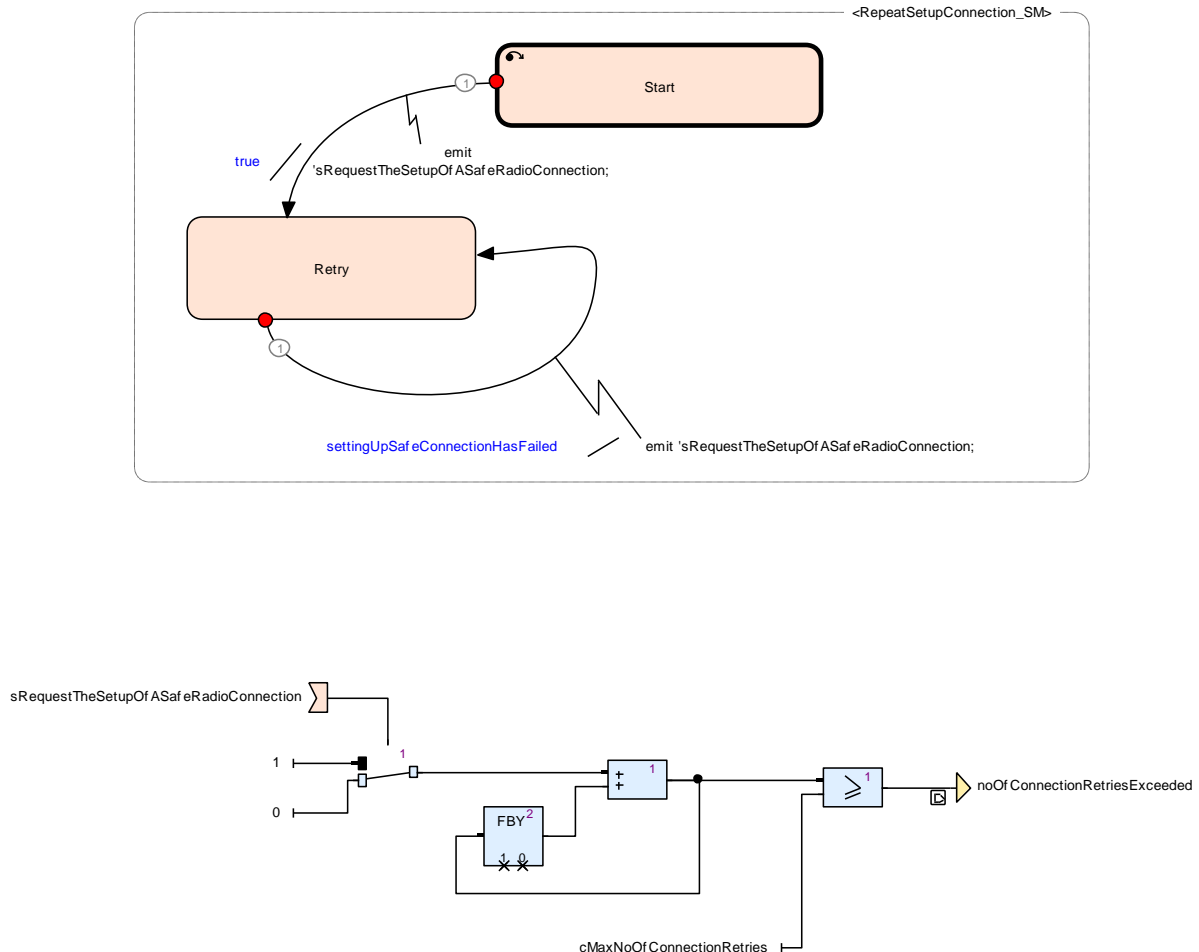
**Table 15: States of diagram\_RequestSetupOfASafeRadioConnection\_initiatedByOBU\_1**

State	Comments/Annotations
RequestConnectionWithTrackSide_SM:Start	
RequestConnectionWithTrackSide_SM:TryToEstablishConnection_isPartOfStartOfMission	<b>Comments:</b> 3.5.3.7 a)
RequestConnectionWithTrackSide_SM:Success	
RequestConnectionWithTrackSide_SM:NoSuccess	
RequestConnectionWithTrackSide_SM:TryToEstablishConnection_isNotPartOfStartOfMission	

**Table 16: Transitions of diagram\_RequestSetupOfASafeRadioConnection\_initiatedByOBU\_1**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> RequestConnectionWithTrackSide_ SM:Start <b>Target:</b> RequestConnectionWithTrackSide_ SM:TryToEstablishConnection_isPar tOfStartOfMission	1	<b>Condition:</b> isPartOfAnOngoingStar tOfMissionProcedure	
<b>Source:</b> RequestConnectionWithTrackSide_ SM:TryToEstablishConnection_isPar tOfStartOfMission <b>Target:</b> RequestConnectionWithTrackSide_ SM:Success	1	<b>Condition:</b> connectionSuccessfully Established	
<b>Source:</b> RequestConnectionWithTrackSide_ SM:TryToEstablishConnection_isPar tOfStartOfMission <b>Target:</b> RequestConnectionWithTrackSide_ SM:NoSuccess	2	<b>Condition:</b> noOfConnectionRetries Exceeded <b>Actions:</b> let emit 'sInformTheDriverThat NoConnectionWasSetu p; emit 'sTryToEstablishConnec tionFailed; tel	
<b>Source:</b> RequestConnectionWithTrackSide_ SM:Start <b>Target:</b> RequestConnectionWithTrackSide_ SM:TryToEstablishConnection_isNot PartOfStartOfMission	2	<b>Condition:</b> true	
<b>Source:</b> RequestConnectionWithTrackSide_ SM:TryToEstablishConnection_isNot PartOfStartOfMission <b>Target:</b> RequestConnectionWithTrackSide_ SM:NoSuccess	2	<b>Condition:</b> repeatRetryConditionFa iled <b>Actions:</b> emit 'sTryToEstablishConnec tionFailed;	
<b>Source:</b> RequestConnectionWithTrackSide_ SM:TryToEstablishConnection_isNot PartOfStartOfMission <b>Target:</b> RequestConnectionWithTrackSide_ SM:Success	1	<b>Condition:</b> connectionSuccessfully Established	

3.1.4.3.3. View of diagram\_TryToEstablishConnection\_isPartOfStartOfMission\_1  
(EstablishmentOfACommunicationSession\_SM:RequestSetupOfASafeRadioConnection\_initiatedByOBU:RequestConnectionWithTrackSide\_SM:TryToEstablishConnection\_isPartOfStartOfMission:)



**Figure 5: View of diagram\_TryToEstablishConnection\_isPartOfStartOfMission\_1  
(EstablishmentOfACommunicationSession\_SM:RequestSetupOfASafeRadioConnection\_initiatedByOBU:RequestConnectionWithTrackSide\_SM:TryToEstablishConnection\_isPartOfStartOfMission:)**

**Table 17: States of diagram\_TryToEstablishConnection\_isPartOfStartOfMission\_1**

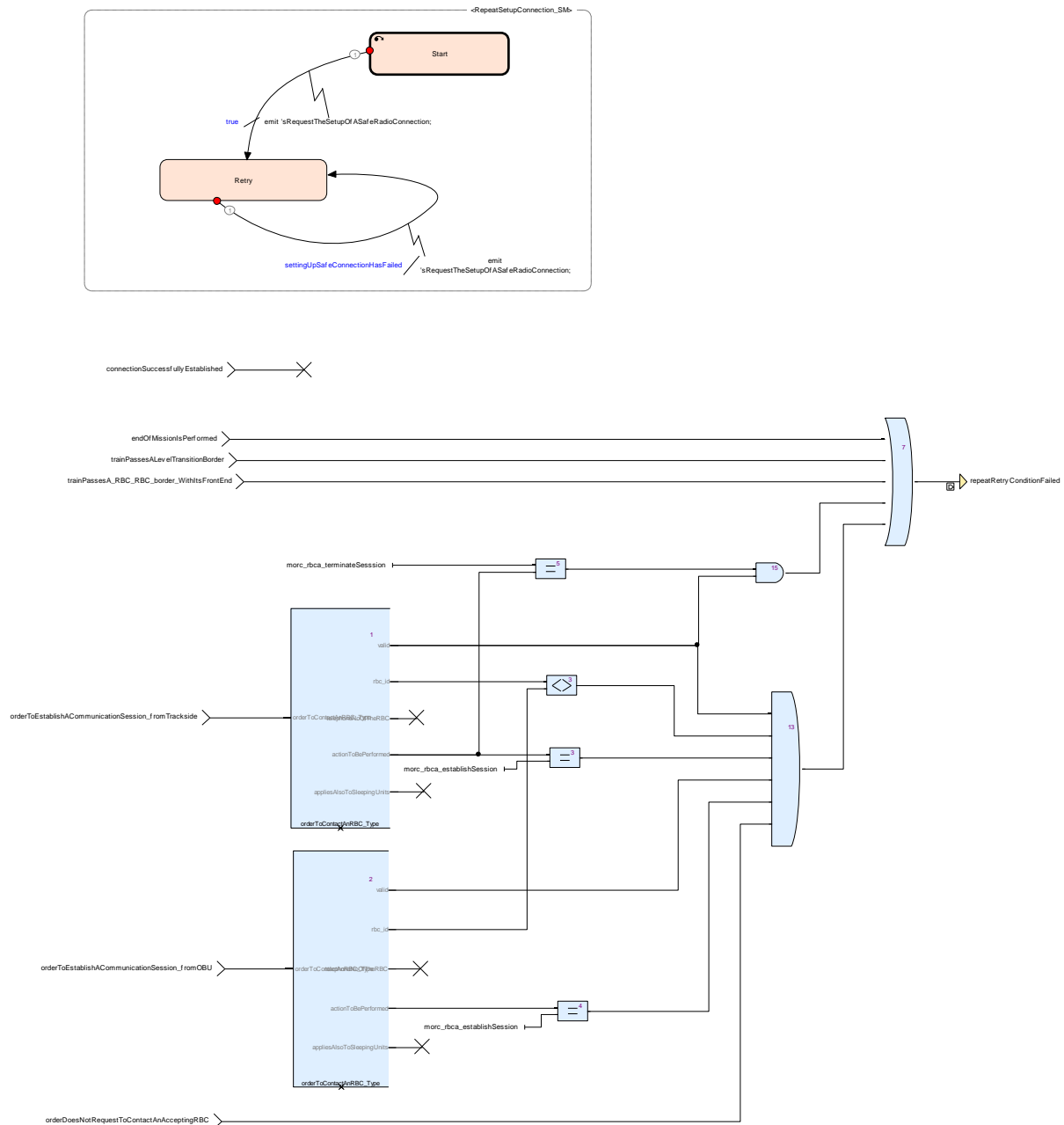
State	Comments/Annotations
RepeatSetupConnection_SM:Start	
RepeatSetupConnection_SM:Retry	

**Table 18: Transitions of diagram\_TryToEstablishConnection\_isPartOfStartOfMission\_1**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> RepeatSetupConnection_SM:Start <b>Target:</b> RepeatSetupConnection_SM:Retry	1	<b>Condition:</b> true <b>Actions:</b> emit 'sRequestTheSetupOfASafeRadioConnection;	

Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> RepeatSetupConnection_SM:Retry <b>Target:</b> RepeatSetupConnection_SM:Retry	1	<b>Condition:</b> settingUpSafeConnecti onHasFailed <b>Actions:</b> emit 'sRequestTheSetupOfA SafeRadioConnection;	

3.1.4.3.4. View of diagram\_TryToEstablishConnection\_isNotPartOfStartOfMission\_1  
(EstablishmentOfACommunicationSession\_SM:RequestSetupOfASafeRadioConnection\_initiatedByOBU:RequestConnectionWithTrackSide\_SM:TryToEstablishConnection\_isNotPartOfStartOfMission:)



**Figure 6: View of diagram\_TryToEstablishConnection\_isNotPartOfStartOfMission\_1  
(EstablishmentOfACommunicationSession\_SM:RequestSetupOfASafeRadioConnection\_initiatedByOBU:RequestConnectionWithTrackSide\_SM:TryToEstablishConnection\_isNotPartOfStartOfMission:)**

**Table 19: States of diagram\_TryToEstablishConnection\_isNotPartOfStartOfMission\_1**

State	Comments/Annotations
RepeatSetupConnection_SM:Start	
RepeatSetupConnection_SM:Retry	

**Table 20: Transitions of diagram\_TryToEstablishConnection\_isNotPartOfStartOfMission\_1**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> RepeatSetupConnection_SM:Start <b>Target:</b> RepeatSetupConnection_SM:Retry	1	<b>Condition:</b> true <b>Actions:</b> emit 'sRequestTheSetupOfA SafeRadioConnection;	
<b>Source:</b> RepeatSetupConnection_SM:Retry <b>Target:</b> RepeatSetupConnection_SM:Retry	1	<b>Condition:</b> settingUpSafeConnecti onHasFailed <b>Actions:</b> emit 'sRequestTheSetupOfA SafeRadioConnection;	

#### 3.1.4.4. Interface

**Table 21: Inputs of establish\_a\_CommunicationSession**

Name	Type	Comments/Annotations
isPartOfAnOngoingS tartOfMissionProced ure	bool	<b>Comments:</b> 3.5.3.7
connectionSuccessf ullyEstablished	bool	<b>Comments:</b> 3.5.3.7 a) Safe Radio Connection successfully established
settingUpSafeConne ctionHasFailed	bool	<b>Comments:</b> 3.5.3.7 a)
endOfMissionIsPerfo rmed	bool	<b>Comments:</b> 3.5.3.7 a)
trainPassesALevelTr ansitionBorder	bool	<b>Comments:</b> 3.5.3.7 a) trainPassesALevelTransitionBorder with it's front end
orderToEstablishAC ommunicationSessi on_fromTrackside	orderToConta ctAnRBC_Typ e	<b>Comments:</b> 3.5.3.7 a)
orderToEstablishAC ommunicationSessi on_fromOBU	orderToConta ctAnRBC_Typ e	<b>Comments:</b> 3.5.3.7 a)
orderDoesNotReque stToContactAnAccep tingRBC	bool	<b>Comments:</b> 3.5.3.7 a)
trainPassesA_RBC_ RBC_border_WithIts FrontEnd	bool	<b>Comments:</b> 3.5.3.7 a)
systemVersionFrom TracksideSupported	bool	<b>Comments:</b> 3.5.3.8 a)
systemVersionRecei ved	bool	<b>Comments:</b> 3.5.3.8 a)
initiationOfACommu nicationSession_rec eivedFromTrackside	bool	<b>Comments:</b> 3.5.3.10 b)



Name	Type	Comments/Annotations
communicationSessionInitiatedByOBU_	bool	
communicationSessionInitiatedFromTrackside_	bool	

**Table 22: Outputs of establish\_a\_CommunicationSession**

Name	Type	Properties		Comments/Annotations
InformTheDriverThatNoConnectionWasSetup	bool			
requestTheSetupOfASafeRadioConnection	bool			
sendTheMessageInitiationOfCommunicationSessionToTrackside	bool			<b>Comments:</b> 3.5.3.7 b)
sendMessage_NoCompatibleVersionSupported	bool			<b>Comments:</b> 3.5.3.8 b)
terminateTheCommunicationSession	bool			<b>Comments:</b> 3.5.3.8 b)
sendASessionEstablishedReportToTrackside	bool			<b>Comments:</b> 3.5.3.10 c) 3.5.3.8 a) sSendMessageEstablishedReport to trackside
firstRequestToSetupASafeRadioConnection	bool			<b>Comments:</b> 3.5.7.3a)
finalAttemptToSetupTheSafeRadioConnectionFailed	bool			<b>Comments:</b> 3.5.7.5[1]
requestsToSetupTheSafeRadioConnectionStopped	bool			<b>Comments:</b> 3.5.7.4
sessionSuccessfullyEstablished	bool	default	false	
establishingACommunicationSessionAborted	bool			

### 3.1.4.5. Locals

**Table 23: Signals of establish\_a\_CommunicationSession**

Name	Comments/Annotations
sRequestTheSetupOfASafeRadioConnection	
sInformTheDriverThatNoConnectionWasSetup	

Name	Comments/Annotations
sTryToEstablishConnectionFailed	
sSendMessageInitiationOfCommunicationSessionToTrackside	<b>Comments:</b> 3.5.3.7 b)
sSendMessageEstablishedReport	<b>Comments:</b> 3.5.3.8 a) sSendMessageEstablishedReport to trackside
sSendMessage_NoCompatibleVersionSupported	<b>Comments:</b> 3.5.3.8 b)
sTerminateTheCommunicationSession	<b>Comments:</b> 3.5.3.8 b)
sSendASessionEstablishedReportToTrackside	<b>Comments:</b> 3.5.3.10 c)
sFirstRequestToSetupASafeRadioConnection	<b>Comments:</b> 3.5.7.3a)
sfinalAttemptToSetupTheSafeRadioConnectionFailed	<b>Comments:</b> 3.5.7.5[1]

**Table 24: Locals of establish\_a\_CommunicationSession/EstablishmentOfACommunicationSession\_SM:RequestSetupOfASafeRadioConnection\_initiatedByOBU:**

Name	Type	Properties		Comments/Annotations
noOfConnectionRetriesExceeded	bool	default	false	<b>Comments:</b> 3.5.3.7 a)
repeatRetryConditionFailed	bool	default	false	

### 3.1.5. evaluateOrderToContactAnRBD Operator

Declared as **private node**

#### 3.1.5.1. Comments and Information

##### **evaluateOrderToContactAnRBD Comments:**

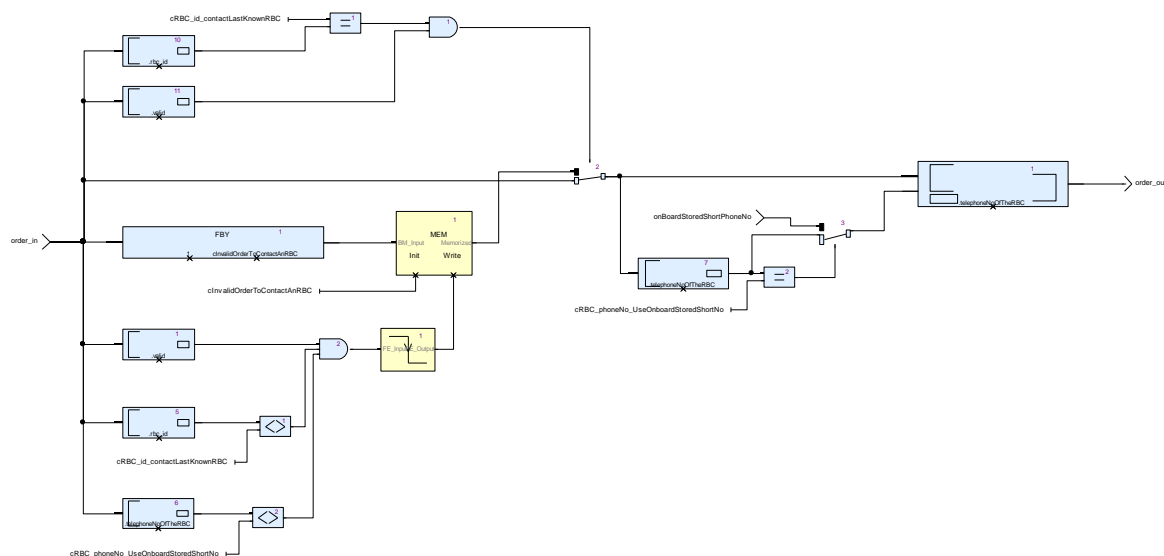
- Subset 096, REQ 3.5.3.13, 3.5.3.16, 3.5.3.13.1, 3.5.3.14, 3.5.3.15:
- Evaluates the order to contact a RBC, i. e. establish, maintain or terminate a communication session.

**Table 25: evaluateOrderToContactAnRBD Annotations**

Note Name	Attribute	Value
Remark_1	Description	<p>- Name: evaluateOrderToContactAnRBD - Description: Evaluates the orders to establish, maintain or terminate a communication session - Copyright Siemens AG, 2013 - Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> ) - Gist URL: --- - Cryptography: No - Author(s): Uwe Steinke</p> <p>The use of this software is limited to non-vital applications. It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OHER KIND OF USE.</p>

### 3.1.5.2. Graphical Views

#### 3.1.5.2.1. View of diagram\_evaluateOrderToContactAnRBD\_1



**Figure 7: View of diagram\_evaluateOrderToContactAnRBD\_1**

### 3.1.5.3. Interface

**Table 26: Inputs of evaluateOrderToContactAnRBD**

Name	Type	Comments/Annotations
order_in	orderToContactAnRBD_Type	
onBoardStoredShortPhoneNo	rbc_phoneNo_Type	

**Table 27: Outputs of evaluateOrderToContactAnRBD**

Name	Type	Comments/Annotations
order_out	orderToContactAnRBC_Type	

### 3.1.6. Initiate\_a\_Session Operator

Declared as **private node**

#### 3.1.6.1. Comments and Information

##### **Initiate\_a\_Session Comments:**

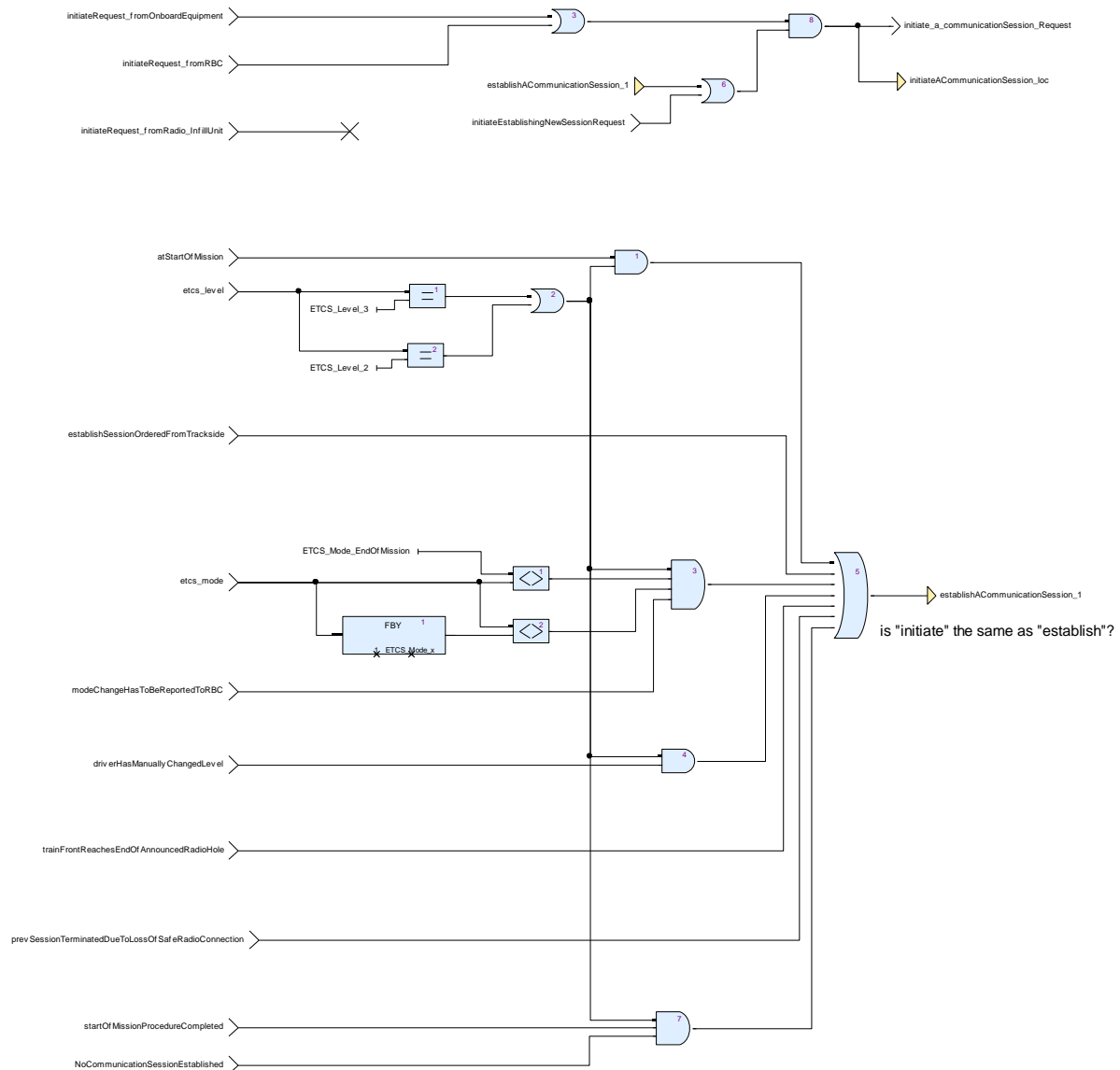
- Subset 096, REQ 3.5.3:
- Determines, if a communication session has to be initiated.

**Table 28: Initiate\_a\_Session Annotations**

Note Name	Attribute	Value
Remark_1	Description	<ul style="list-style-type: none"><li>- Name: Initiate_a_Session</li><li>- Description: Determines, if a communication session has to be initiated.</li><li>- Copyright Siemens AG, 2013</li><li>- Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )</li><li>- Gist URL: ---</li><li>- Cryptography: No</li><li>- Author(s): Uwe Steinke</li></ul> <p>The use of this software is limited to non-vital applications. It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.</p>

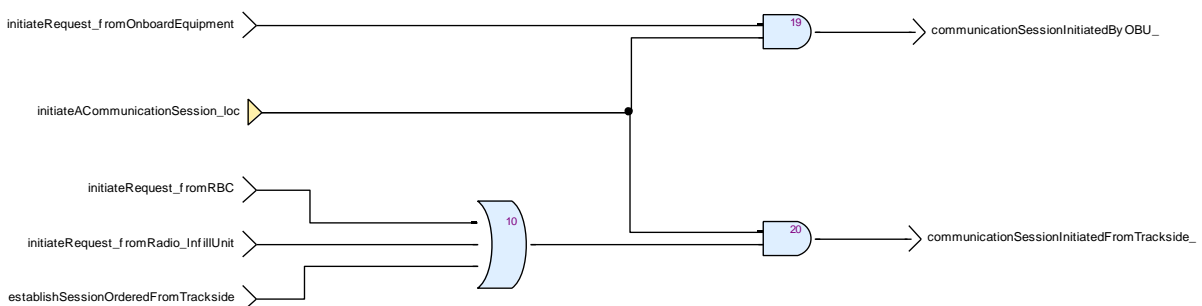
### 3.1.6.2. Graphical Views

#### 3.1.6.2.1. View of diagram\_Initiate\_a\_Session\_1



**Figure 8: View of diagram\_Initiate\_a\_Session\_1**

#### 3.1.6.2.2. View of diagram\_Initiate\_a\_Session\_2



**Figure 9: View of diagram\_Initiate\_a\_Session\_2**

### 3.1.6.3. Interface

**Table 29: Inputs of Initiate\_a\_Session**

Name	Type	Comments/Annotations
initiateRequest_fromOnboardEquipment	bool	<b>Comments:</b> 3.5.3.1: Initiate Request from ERTMS/ETCS on-board equipment
initiateRequest_fromRBC	bool	
initiateRequest_fromRadio_InfillUnit	bool	
etcs_level	ETCS_Level_Type	
atStartOfMission	bool	<b>Comments:</b> Start of Mission 3.5.3.4. a)
establishSessionOrderedFromTrackside	bool	<b>Comments:</b> 3.5.3.4 b) Is this the same as the initiateRequest_fromRBC input ?
etcs_mode	ETCS_Mode_Type	
modeChangeHasToBeReportedToRBC	bool	<b>Comments:</b> 3.5.3.4 c)
driverHasManuallyChangedLevel	bool	<b>Comments:</b> 3.5.3.4 d)
trainFrontReachesEndOfAnnouncedRadioHole	bool	<b>Comments:</b> 3.5.3.4e)
prevSessionTerminatedDueToLossOfSafeRadioConnection	bool	<b>Comments:</b> 3.5.3.4 f)
startOfMissionProcedureCompleted	bool	<b>Comments:</b> 3.5.3.4 e)
NoCommunicationSessionEstablished	bool	<b>Comments:</b> 3.5.3.4 g)
initiateEstablishingNewSessionRequest	bool	<b>Comments:</b> 3.5.3.5.2

**Table 30: Outputs of Initiate\_a\_Session**

Name	Type	Comments/Annotations
initiate_a_communicationSession_Request	bool	
communicationSessionInitiatedByOBU_	bool	
communicationSessionInitiatedFromTrackside_	bool	

### 3.1.6.4. Locals

**Table 31: Locals of Initiate\_a\_Session**

Name	Type	Comments/Annotations
establishACommunicationSession_1	bool	<b>Comments:</b> 3.5.3.4
initiateACommunicationSession_loc	bool	

### 3.1.7. initiateTerminatingASession Operator

Declared as **private node**

#### 3.1.7.1. Comments and Information

**initiateTerminatingASession Comments:**

- Subset 096, REQ 3.5.5.1
- Initiates and processes the termination of a communication session.

**Table 32: initiateTerminatingASession Annotations**

Note Name	Attribute	Value
Remark_1	Description	<p>- Name: initiateTerminatingASession  - Description: Initiates and processes the termination of a communication session.  - Copyright Siemens AG, 2013  - Licensed under the EUPL V.1.1  ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )  - Gist URL: ---  - Cryptography: No  - Author(s): Uwe Steinke</p> <p>The use of this software is limited to non-vital applications.  It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss.  THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.</p>

#### 3.1.7.2. Node Hierarchy

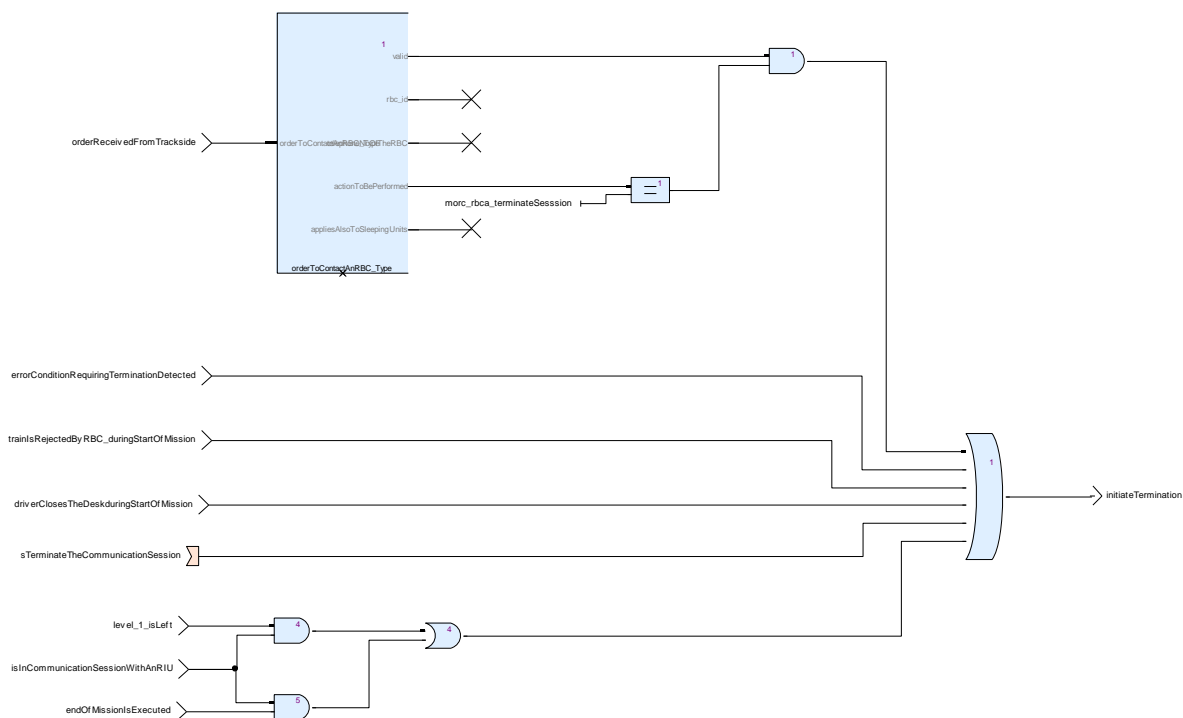
state-machine : [TrainExitedFromRBCArea SM](#)

state : [Idle](#)

state : [WaitForOrderToTerminateTheSession](#)

### 3.1.7.3. Graphical Views

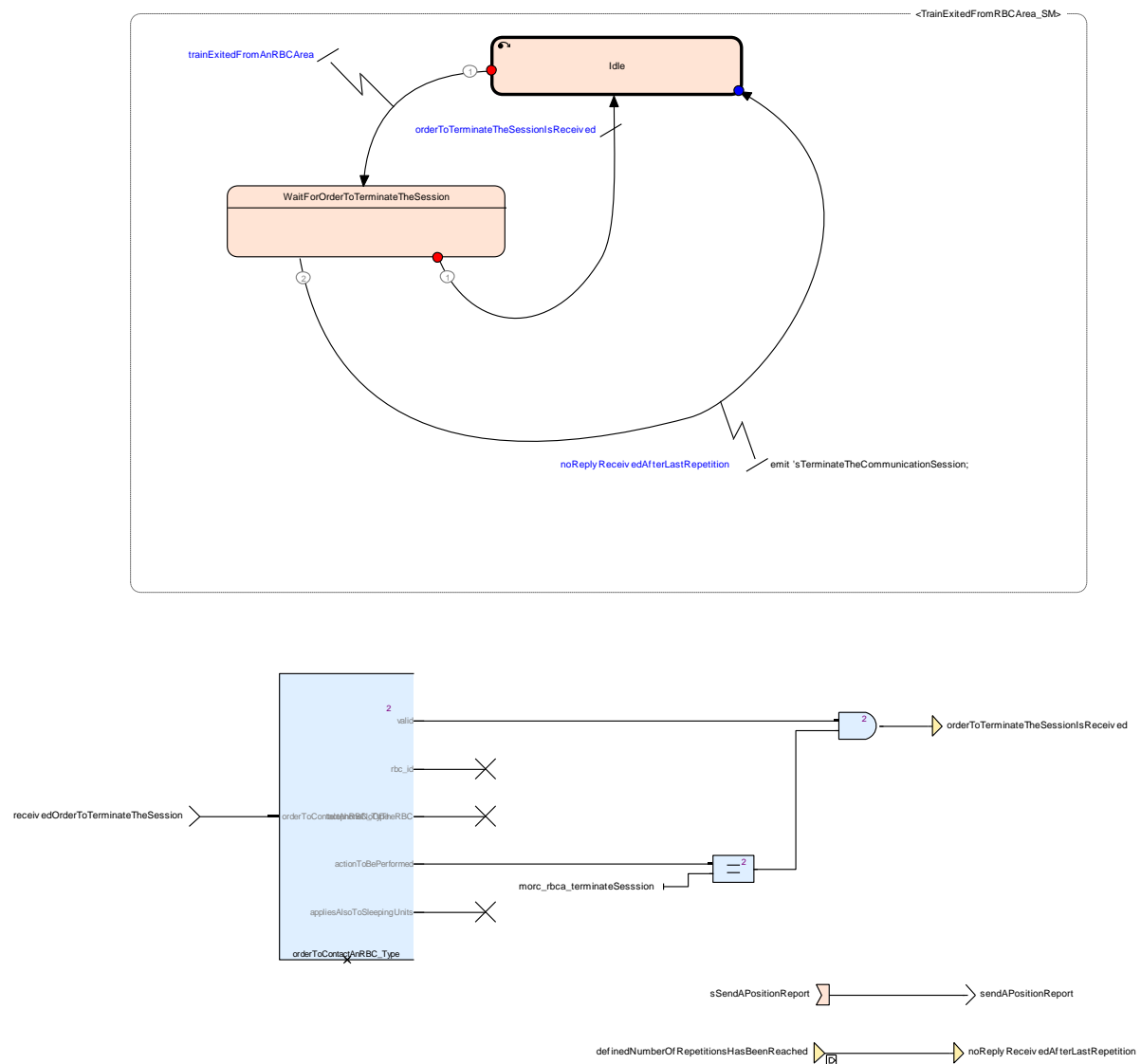
#### 3.1.7.3.1. View of diagram\_initiateTerminatingASession\_1



**Figure 10: View of diagram\_initiateTerminatingASession\_1**



### 3.1.7.3.2. View of diagram\_initiateTerminatingASession\_2



**Figure 11: View of diagram\_initiateTerminatingASession\_2**

**Table 33: State Machines of diagram\_initiateTerminatingASession\_2**

State Machine	Comments/Annotations
TrainExitedFromRBCArea_SM	<b>Comments:</b> 3.5.5.1e

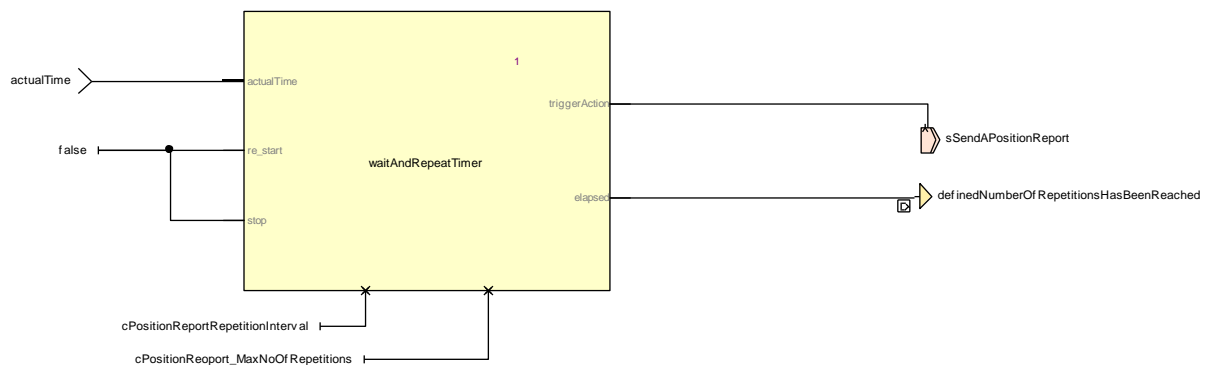
**Table 34: States of diagram\_initiateTerminatingASession\_2**

State	Comments/Annotations
TrainExitedFromRBCArea_SM:Idle	
TrainExitedFromRBCArea_SM:WaitForOrderToTerminateTheSession	

**Table 35: Transitions of diagram\_initiateTerminatingASession\_2**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> TrainExitedFromRBCArea_SM:Idle <b>Target:</b> TrainExitedFromRBCArea_SM:WaitForOrderToTerminateTheSession	1	<b>Condition:</b> trainExitedFromAnRBCArea <b>Actions:</b>	
<b>Source:</b> TrainExitedFromRBCArea_SM:WaitForOrderToTerminateTheSession <b>Target:</b> TrainExitedFromRBCArea_SM:Idle	1	<b>Condition:</b> orderToTerminateTheSessionIsReceived	
<b>Source:</b> TrainExitedFromRBCArea_SM:WaitForOrderToTerminateTheSession <b>Target:</b> TrainExitedFromRBCArea_SM:Idle	2	<b>Condition:</b> noReplyReceivedAfterLastRepetition <b>Actions:</b> emit 'sTerminateTheCommunicationSession;	

### 3.1.7.3.3. View of diagram\_WaitForOrderToTerminateTheSession\_1 (TrainExitedFromRBCArea\_SM:WaitForOrderToTerminateTheSession:)



**Figure 12: View of diagram\_WaitForOrderToTerminateTheSession\_1  
(TrainExitedFromRBCArea\_SM:WaitForOrderToTerminateTheSession:)**

### 3.1.7.4. Interface

**Table 36: Inputs of initiateTerminatingASession**

Name	Type	Comments/Annotations
orderReceivedFromTrackside	orderToContactAnRBC_Type	<b>Comments:</b> 3.5.5.1a)
errorConditionRequiringTerminationDetected	bool	<b>Comments:</b> 3.5.5.1b)
trainIsRejectedByRBC_duringStartOfMission	bool	<b>Comments:</b> 3.5.5.1c)
driverClosesTheDeskduringStartOfMission	bool	<b>Comments:</b> 3.5.5.1d)

Name	Type	Comments/Annotations
trainExitedFromAnRBCArea	bool	<b>Comments:</b> 3.5.5.1e)
receivedOrderToTerminateTheSession	orderToContactAnRBC_Type	<b>Comments:</b> 3.5.5.1e)
actualTime	time_Type	
isInCommunicationSessionWithAnRIU	bool	<b>Comments:</b> 3.5.5.1f)
level_1_isLeft	bool	<b>Comments:</b> 3.5.5.1f)
endOfMissionIsExecuted	bool	<b>Comments:</b> 3.5.5.1f)

**Table 37: Outputs of initiateTerminatingASession**

Name	Type	Comments/Annotations
initiateTermination	bool	
sendAPositionReport	bool	<b>Comments:</b> 3.5.5.1e)

### 3.1.7.5. Locals

**Table 38: Locals of initiateTerminatingASession**

Name	Type	Properties		Comments/Annotations
orderToTerminateTheSessionIsReceived	bool			<b>Comments:</b> 3.5.5.1e)
noReplyReceivedAfterLastRepetition	bool			<b>Comments:</b> 3.5.5.1e)
definedNumberOfRepetitionsHasBeenReached	bool	default	false	<b>Comments:</b> 3.5.5.1e)

**Table 39: Signals of initiateTerminatingASession**

Name	Comments/Annotations
sTerminateTheCommunicationSession	<b>Comments:</b> 3.5.5.1e)
sSendAPositionReport	<b>Comments:</b> 3.5.5.1e)

### 3.1.8. isOrderToEstablishConnection Operator

Declared as **private function**

#### 3.1.8.1. Comments and Information

**isOrderToEstablishConnection Comments:**

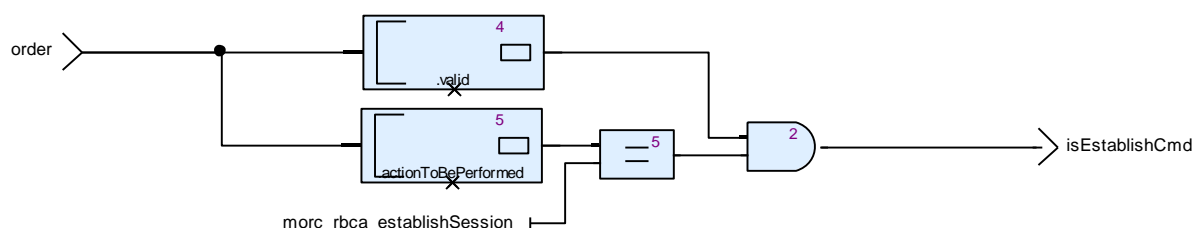
- Checks, if the order carries a valid "Establish Session" command

**Table 40: isOrderToEstablishConnection Annotations**

Note Name	Attribute	Value
Remark_1	Description	<ul style="list-style-type: none"> <li>- Name: isOrderToEstablishConnection</li> <li>- Description: Checks, if the order carries a valid "Establish Session" command</li> <li>- Copyright Siemens AG, 2013</li> <li>- Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )</li> <li>- Gist URL: ---</li> <li>- Cryptography: No</li> <li>- Author(s): Uwe Steinke</li> </ul> <p>The use of this software is limited to non-vital applications. It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.</p>

### 3.1.8.2. Graphical Views

#### 3.1.8.2.1. View of diagram\_isOrder



**Figure 13: View of diagram\_isOrder**

### 3.1.8.3. Interface

**Table 41: Inputs of isOrderToEstablishConnection**

Name	Type	Comments/Annotations
order	orderToContactAnRBC_Type	

**Table 42: Outputs of isOrderToEstablishConnection**

Name	Type	Comments/Annotations
isEstablishCmd	bool	

### 3.1.9. maintaining\_a\_CommunicationSession Operator

Declared as **private node**

### 3.1.9.1. Comments and Information

#### **maintaining\_a\_CommunicationSession Comments:**

- Subset 096, REQ 3.5.4
- Maintains an established communication session.

**Table 43: maintaining\_a\_CommunicationSession Annotations**

Note Name	Attribute	Value
Remark_1	Description	<p>- Name: maintaining_a_CommunicationSession</p> <p>- Description: Maintains an established communication session.</p> <p>- Copyright Siemens AG, 2013</p> <p>- Licensed under the EUPL V.1.1          ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )</p> <p>- Gist URL: ---</p> <p>- Cryptography: No</p> <p>- Author(s): Uwe Steinke</p> <p>The use of this software is limited to non-vital applications.          It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss.          THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.</p>

### 3.1.9.2. Node Hierarchy

state-machine : [Maintaining\\_SM](#)

state : [CommunicationSessionNotEstablished](#)

state : [CommunicationSessionEstablished](#)

state-machine : [RadioConnection\\_SM](#)

state : [SafeRadio\\_connected](#)

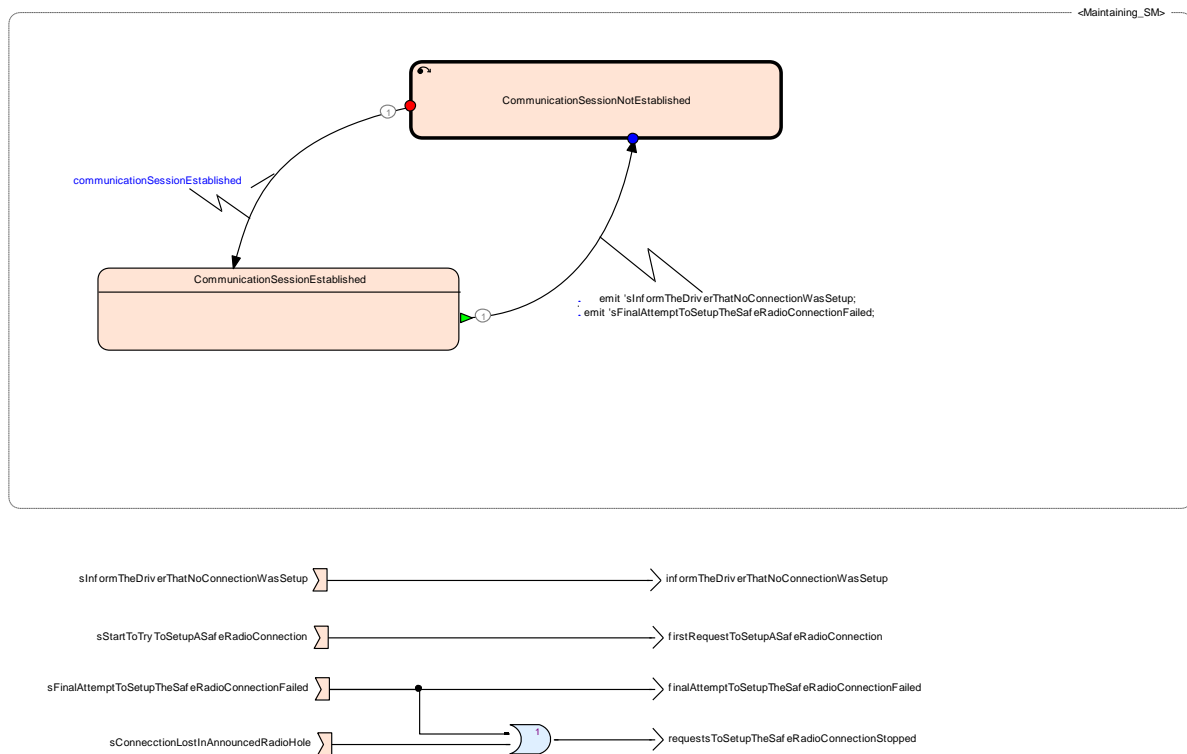
state : [ConnectionLost](#)

state : [RadioConnectionLostTimerExpired](#)

state : [ConnecctionLostInAnnouncedRadioHole](#)

### 3.1.9.3. Graphical Views

#### 3.1.9.3.1. View of diagram\_maintaining\_a\_CommunicationSession\_1



**Figure 14: View of diagram\_maintaining\_a\_CommunicationSession\_1**

**Table 44: States of diagram\_maintaining\_a\_CommunicationSession\_1**

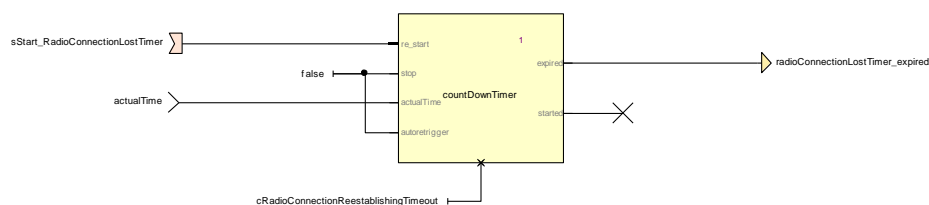
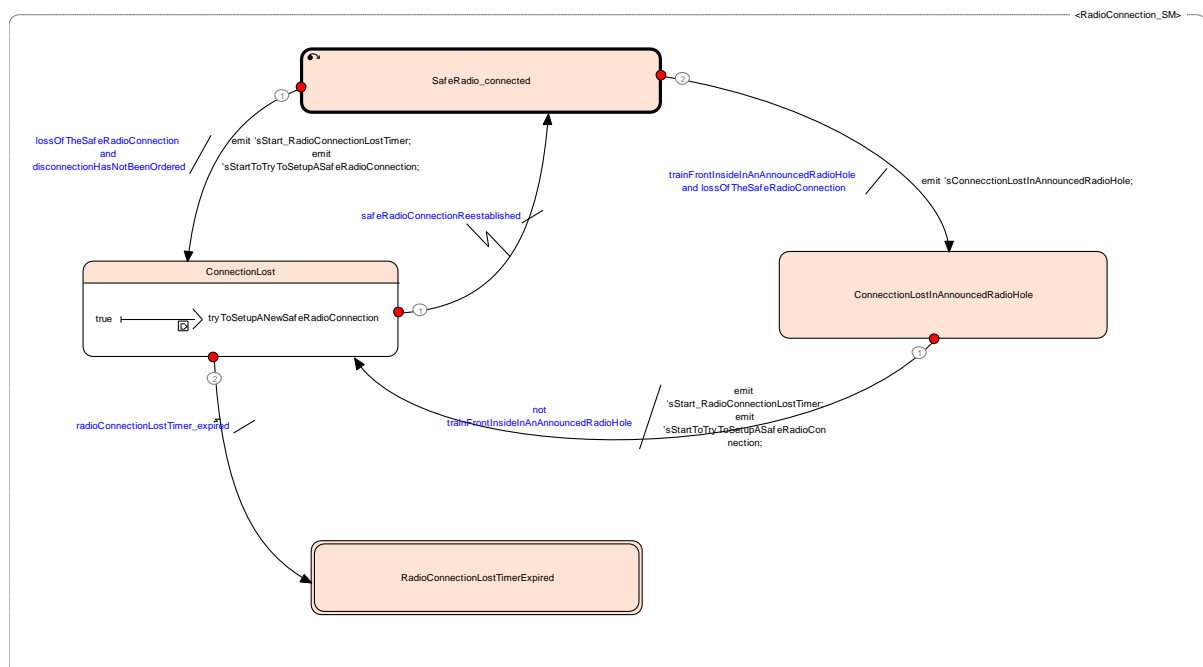
State	Comments/Annotations
Maintaining_SM:CommunicationSessionNotEstablished	
Maintaining_SM:CommunicationSessionEstablished	<b>Comments:</b> 3.5.4.1

**Table 45: Transitions of diagram\_maintaining\_a\_CommunicationSession\_1**

Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> Maintaining_SM:CommunicationSessionNotEstablished <b>Target:</b> Maintaining_SM:CommunicationSessionEstablished	1	<b>Condition:</b> communicationSessionEstablished	<b>Comments:</b> 3.5.4.1

Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> Maintaining_SM:CommunicationSessionEstablished <b>Target:</b> Maintaining_SM:CommunicationSessionNotEstablished	1	<b>Actions:</b> let emit 'sInformTheDriverThat NoConnectionWasSetup; emit 'sFinalAttemptToSetup TheSafeRadioConnectionFailed; tel	<b>Comments:</b> 3.5.4.3

### 3.1.9.3.2. View of diagram\_CommunicationSessionEstablished\_1 (Maintaining\_SM:CommunicationSessionEstablished:)



**Figure 15: View of diagram\_CommunicationSessionEstablished\_1  
(Maintaining\_SM:CommunicationSessionEstablished:)**

**Table 46: States of diagram\_CommunicationSessionEstablished\_1**

State	Comments/Annotations
RadioConnection_SM:SafeRadio_connected	

State	Comments/Annotations
RadioConnection_SM:ConnectionLost	
RadioConnection_SM:RadioConnectionLostTimerExpired	
RadioConnection_SM:ConnecctionLostInAnnouncedRadioHole	<b>Comments:</b> 3.5.4.4

**Table 47: Transitions of diagram\_CommunicationSessionEstablished\_1**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> RadioConnection_SM:SafeRadio_connected <b>Target:</b> RadioConnection_SM:ConnectionLost	1	<b>Condition:</b> lossOfTheSafeRadioConnection and disconnectionHasNotBeenOrdered <b>Actions:</b> let emit 'sStart_RadioConnectionLostTimer; emit 'sStartToTryToSetupASafeRadioConnection; tel	<b>Comments:</b> 3.5.4.1
<b>Source:</b> RadioConnection_SM:ConnectionLost <b>Target:</b> RadioConnection_SM:RadioConnectionLostTimerExpired	2	<b>Condition:</b> radioConnectionLostTimer_expired	<b>Comments:</b> 3.5.4.2.1, 3.5.4.3
<b>Source:</b> RadioConnection_SM:ConnectionLost <b>Target:</b> RadioConnection_SM:SafeRadio_connected	1	<b>Condition:</b> safeRadioConnectionReestablished	<b>Comments:</b> 3.5.4.3
<b>Source:</b> RadioConnection_SM:SafeRadio_connected <b>Target:</b> RadioConnection_SM:ConnecctionLostInAnnouncedRadioHole	2	<b>Condition:</b> trainFrontInsideInAnAnnouncedRadioHole and lossOfTheSafeRadioConnection <b>Actions:</b> emit 'sConnecctionLostInAnnouncedRadioHole;	



Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> RadioConnection_SM:ConnecctionLostInAnnouncedRadioHole <b>Target:</b> RadioConnection_SM:ConnectionLost	1	<b>Condition:</b> not trainFrontInsideInAnAnnouncedRadioHole <b>Actions:</b> let emit 'sStart_RadioConnectionLostTimer; emit 'sStartToTryToSetupASafeRadioConnection; tel	<b>Comments:</b> 3.5.4.4

### 3.1.9.4. Interface

**Table 48: Inputs of maintaining\_a\_CommunicationSession**

Name	Type	Comments/ Annotations
communicationSessionEstablished	bool	<b>Comments:</b> 3.5.4.1
safeRadioConnectionReestablished	bool	<b>Comments:</b> 3.5.4.1
lossOfTheSafeRadioConnection	bool	<b>Comments:</b> 3.5.4.1
disconnectionHasNotBeenOrdered	bool	<b>Comments:</b> 3.5.4.1
trainFrontInsideInAnAnnouncedRadioHole	bool	<b>Comments:</b> 3.5.4.4
actualTime	time_Type	

**Table 49: Outputs of maintaining\_a\_CommunicationSession**

Name	Type	Properties	Comments/ Annotations
tryToSetupANewSafeRadioConnection	bool	default false	
informTheDriverThatNoConnectionWasSetup	bool		
firstRequestToSetupASafeRadioConnection	bool		<b>Comments:</b> 3.5.7.3b)
finalAttemptToSetupTheSafeRadioConnectionFailed	bool		<b>Comments:</b> 3.5.7.5[6]
requestsToSetupTheSafeRadioConnectionStopped	bool		<b>Comments:</b> 3.5.7.4

### 3.1.9.5. Locals

**Table 50: Signals of maintaining\_a\_CommunicationSession**

Name	Comments/Annotations
sInformTheDriverThatNoCon nectionWasSetup	
sStartToTryToSetupASafeRad ioConnection	<b>Comments:</b> 3.5.7.3b)
sFinalAttemptToSetupTheSaf eRadioConnectionFailed	
sConnecctionLostInAnnounce dRadioHole	

**Table 51: Locals of  
maintaining\_a\_CommunicationSession/Maintaining\_SM:CommunicationSessionEstablished:**

Name	Type	Comments/Annotations
radioConnectionLost Timer_expired	bool	

**Table 52: Signals of  
maintaining\_a\_CommunicationSession/Maintaining\_SM:CommunicationSessionEstablished:**

Name	Comments/Annotations
sStart_RadioConnectionLostT imer	

### 3.1.10. managementOfRadioCommunication Operator

Declared as **public node**

#### 3.1.10.1. Comments and Information

##### **managementOfRadioCommunication Comments:**

- Subset 096, REQ 3.5
- This is the top level node of the "Management of Radio Communication" function.

**Table 53: managementOfRadioCommunication Annotations**

Note Name	Attribute	Value
Remark_1	Description	<ul style="list-style-type: none"><li>- Name: managementOfRadioCommunication</li><li>- Description: This is the top level node of the "Management of Radio Communication" function</li><li>- Copyright Siemens AG, 2013</li><li>- Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )</li><li>- Gist URL: ---</li><li>- Cryptography: No</li><li>- Author(s): Uwe Steinke</li></ul> <p>The use of this software is limited to non-vital applications. It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OHER KIND OF USE.</p>

#### 3.1.10.2. Node Hierarchy

state-machine : [CommunicationSession\\_SM](#)

state : [NoSession](#)

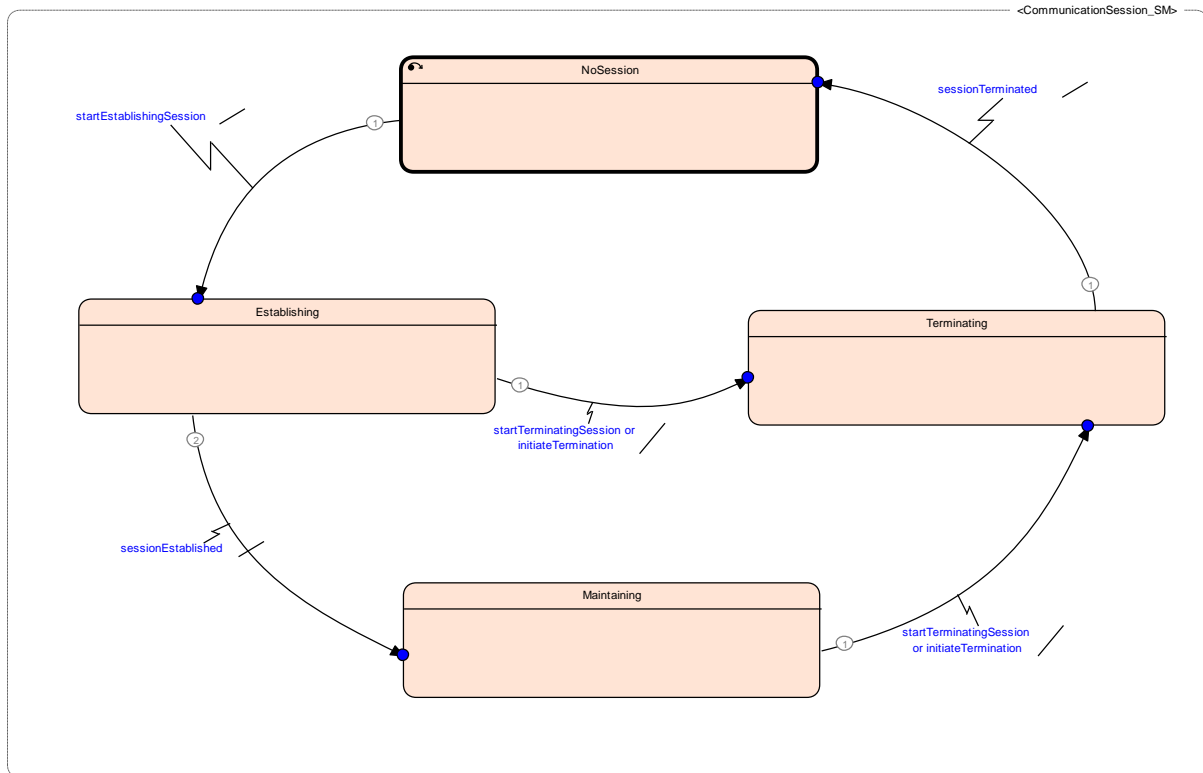
state : [Establishing](#)

state : [Maintaining](#)

state : [Terminating](#)

### 3.1.10.3. Graphical Views

#### 3.1.10.3.1. View of diagram\_SessionManagement



**Figure 16: View of diagram\_SessionManagement**

**Table 54: States of diagram\_SessionManagement**

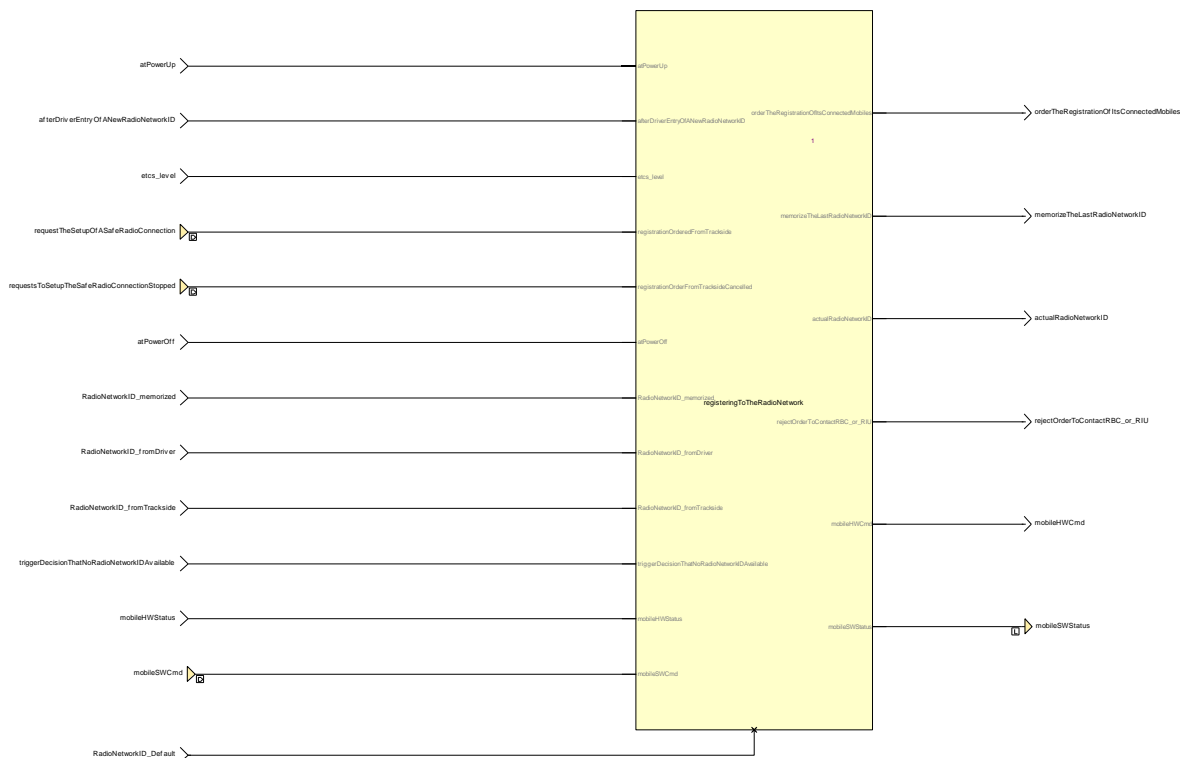
State	Comments/Annotations
CommunicationSession_SM:NoSession	
CommunicationSession_SM:Establishing	
CommunicationSession_SM:Maintaining	
CommunicationSession_SM:Terminating	

**Table 55: Transitions of diagram\_SessionManagement**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> CommunicationSession_SM:NoSession <b>Target:</b> CommunicationSession_SM:Establishing	1	<b>Condition:</b> startEstablishingSession <b>Actions:</b>	
<b>Source:</b> CommunicationSession_SM:Establishing <b>Target:</b> CommunicationSession_SM:Maintaining	2	<b>Condition:</b> sessionEstablished <b>Actions:</b>	

Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> CommunicationSession_SM:Maintaining <b>Target:</b> CommunicationSession_SM:Terminating	1	<b>Condition:</b> startTerminatingSession or initiateTermination <b>Actions:</b>	
<b>Source:</b> CommunicationSession_SM:Terminating <b>Target:</b> CommunicationSession_SM:NoSession	1	<b>Condition:</b> sessionTerminated <b>Actions:</b>	
<b>Source:</b> CommunicationSession_SM:Establishing <b>Target:</b> CommunicationSession_SM:Terminating	1	<b>Condition:</b> startTerminatingSession or initiateTermination <b>Actions:</b>	

### 3.1.10.3.2. View of diagram\_NetworkRegistration



**Figure 17: View of diagram\_NetworkRegistration**

### 3.1.10.3.3. View of diagram\_safeRadioConnectionIndication

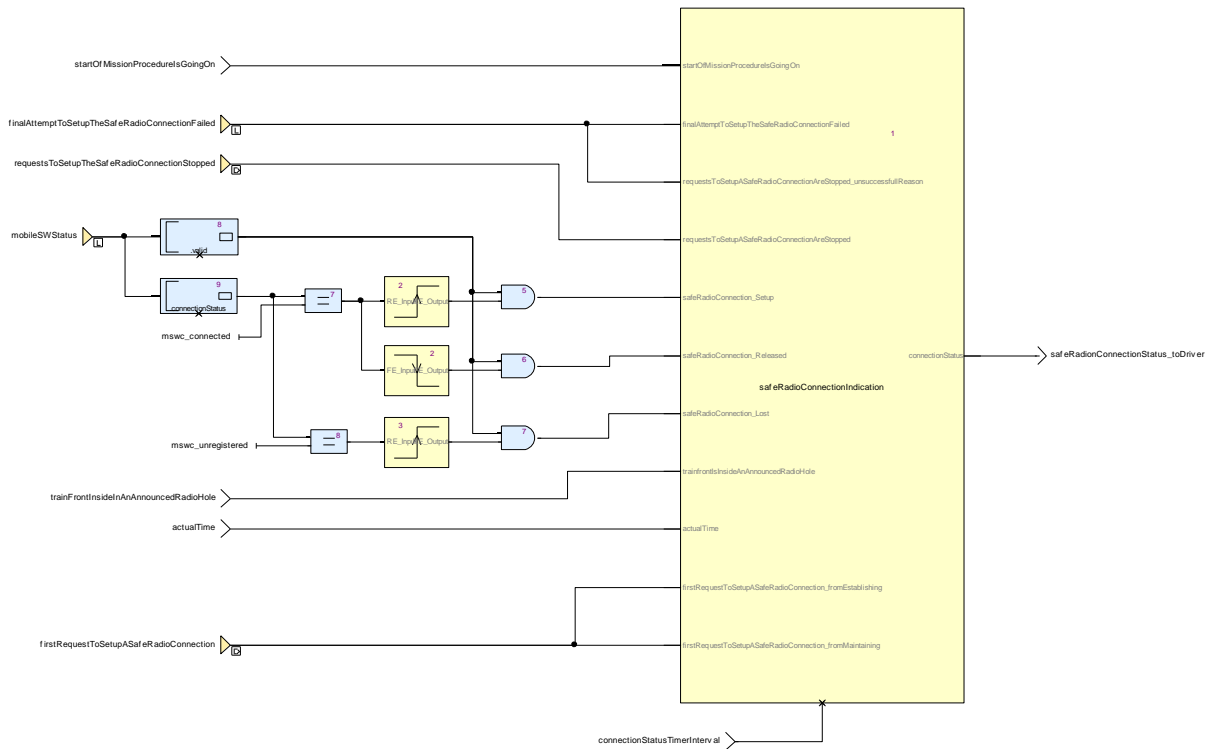
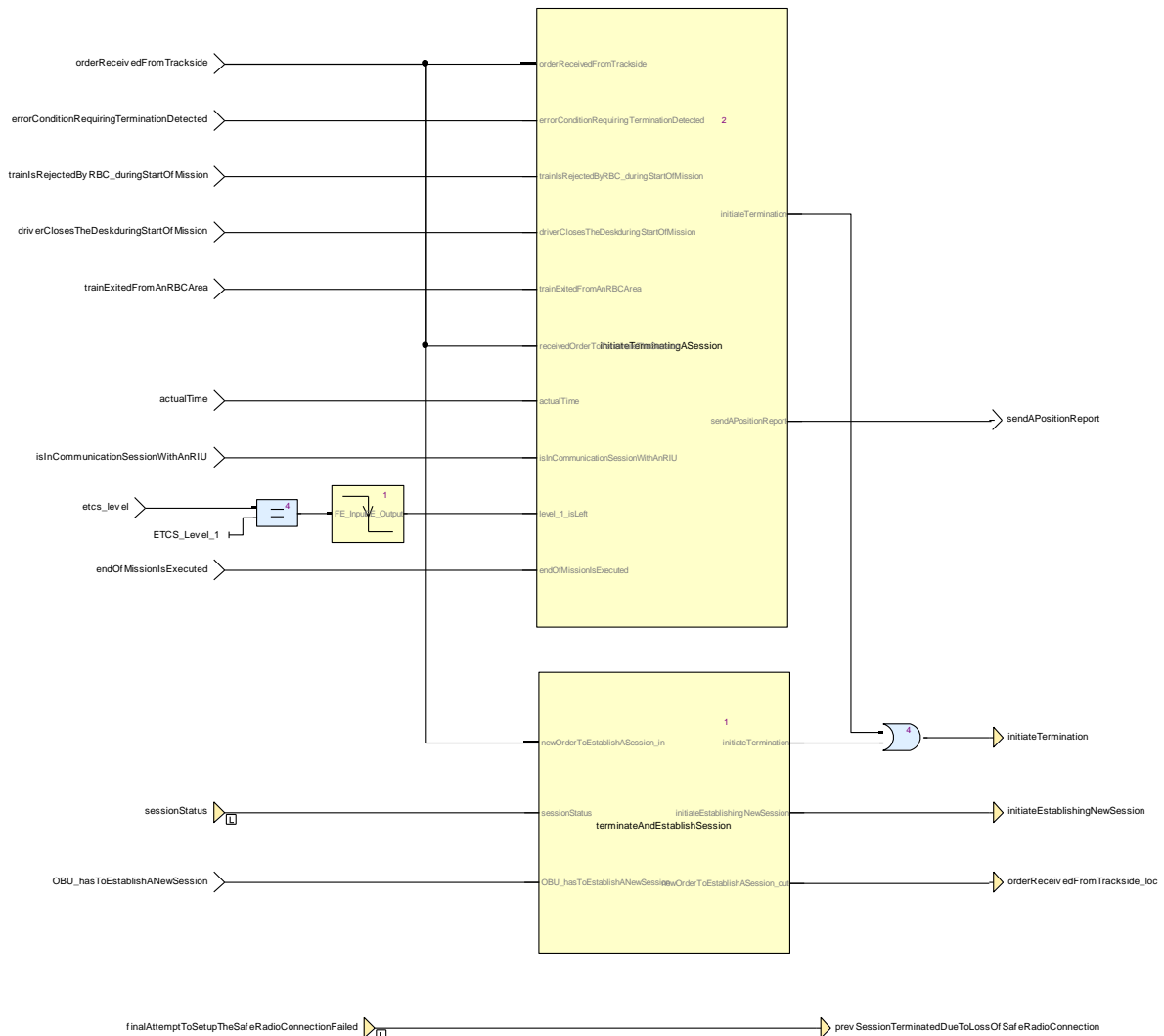


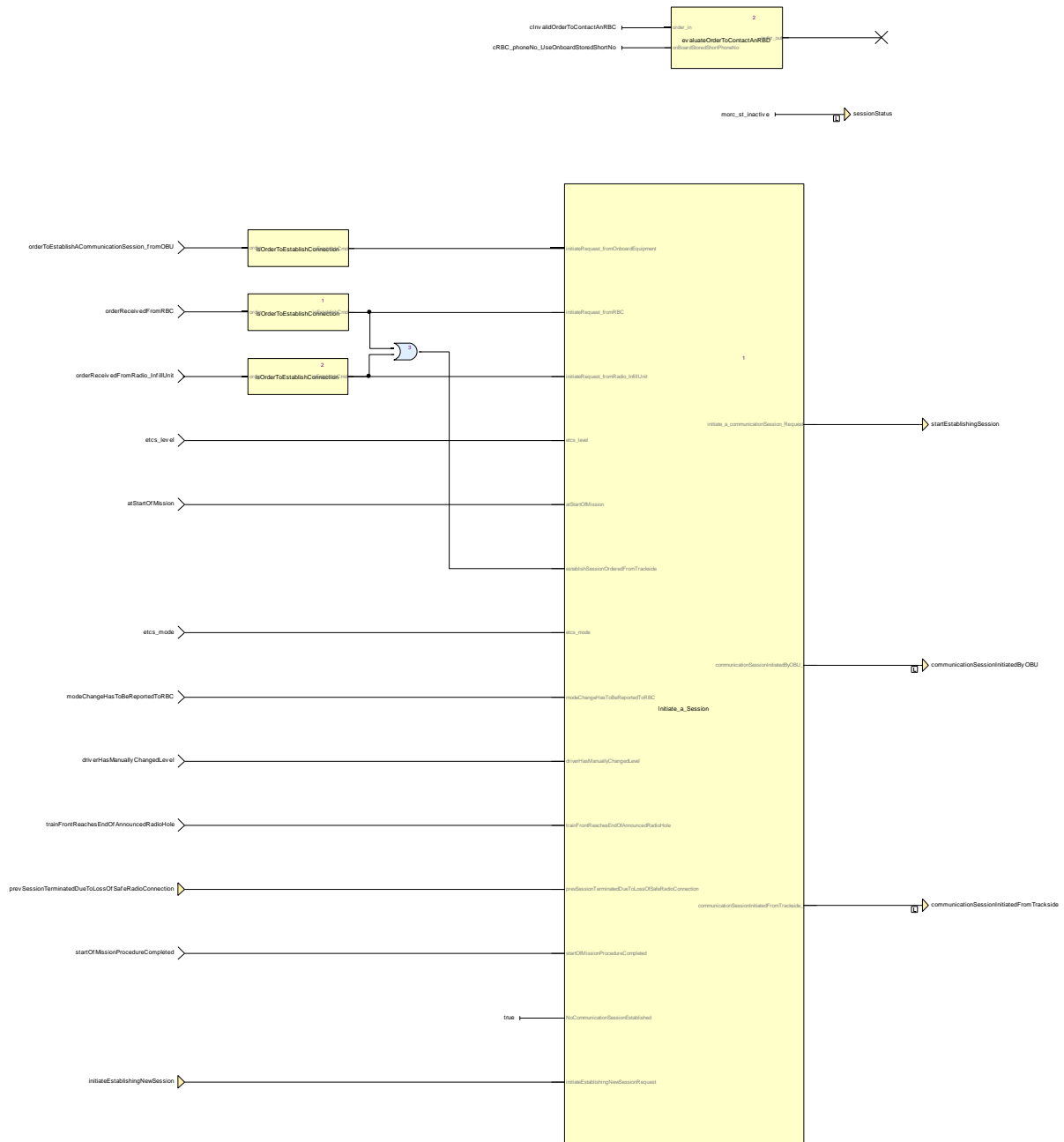
Figure 18: View of diagram\_safeRadioConnectionIndication

#### 3.1.10.3.4. View of diagram\_TerminationInitiation



**Figure 19: View of diagram\_TerminationInitiation**

### 3.1.10.3.5. View of diagram\_NoSession\_1 (CommunicationSession\_SM:NoSession:)

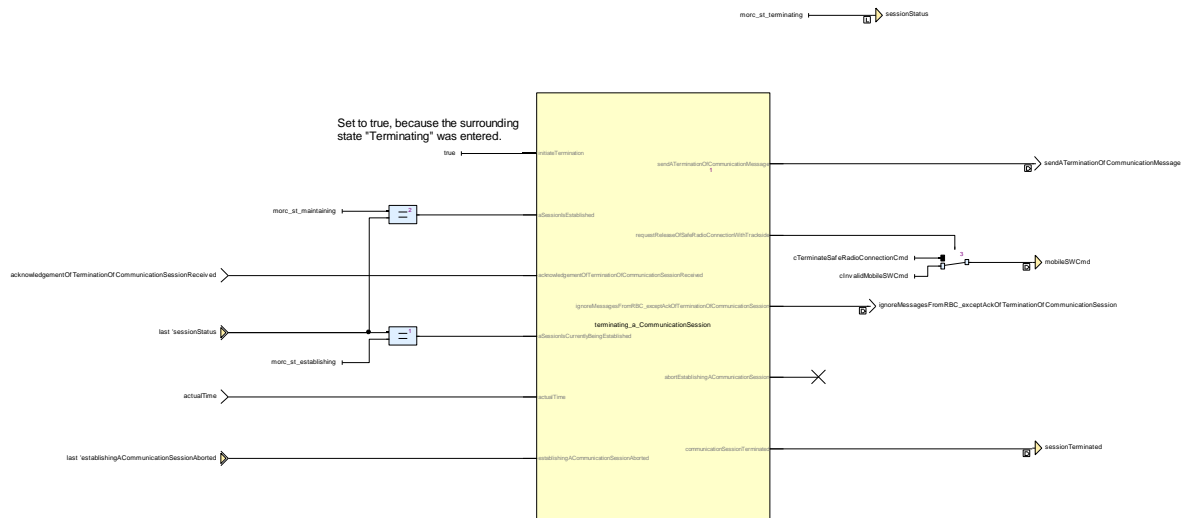


**Figure 20: View of diagram\_NoSession\_1 (CommunicationSession\_SM:NoSession:)**





### 3.1.10.3.8. View of diagram\_Terminating\_1 (CommunicationSession\_SM:Terminating:)



**Figure 23: View of diagram\_Terminating\_1 (CommunicationSession\_SM:Terminating:)**

### 3.1.10.4. Interface

**Table 56: Inputs of managementOfRadioCommunication**

Name	Type	Comments/Annotations
actualTime	time_Type	
acknowledgementOfTerminationOfCommunicationSessionReceived	bool	<b>Comments:</b> 3.5.5.2c)
orderReceivedFromTrackside	orderToContactAnRBC_Type	<b>Comments:</b> 3.5.5.1a)
orderReceivedFromRBC	orderToContactAnRBC_Type	<b>Comments:</b> 3.5.3.1
orderReceivedFromRadio_InfillUnit	orderToContactAnRBC_Type	<b>Comments:</b> 3.5.3.2
errorConditionRequiringTerminationDetected	bool	<b>Comments:</b> 3.5.5.1b)
trainIsRejectedByRBC_duringStartOfMission	bool	<b>Comments:</b> 3.5.5.1c)
driverClosesTheDesk_duringStartOfMission	bool	<b>Comments:</b> 3.5.5.1d)
trainExitedFromAnRBCArea	bool	<b>Comments:</b> 3.5.5.1e)
endOfMissionIsExecuted	bool	<b>Comments:</b> 3.5.5.1f)
isInCommunicationSessionWithAnRIU	bool	<b>Comments:</b> 3.5.5.1f)
atPowerUp	bool	<b>Comments:</b> 3.5.6.1a)

Name	Type	Comments/Annotations
atPowerOff	bool	<b>Comments:</b> 3.5.6.2
etcs_level	ETCS_Level_Type	<b>Comments:</b> 3.5.6.1b)
RadioNetworkID memorized	validRadioNetworkID_Type	<b>Comments:</b> 3.5.6.2
RadioNetworkID_fromDriver	validRadioNetworkID_Type	<b>Comments:</b> 3.5.6.2
RadioNetworkID_fromTrackside	validRadioNetworkID_Type	<b>Comments:</b> 3.5.6.1c), 3.5.6.2
afterDriverEntryOfANewRadioNetworkID	bool	<b>Comments:</b> 3.5.6.1b), 3.5.6.2 Strobe input, activated when the driver sets the Radio Network ID
triggerDecisionThatNoRadioNetworkIDAvailable	bool	<b>Comments:</b> 3.5.6.3
mobileHWStatus	mobileHWStatus_Type	<b>Comments:</b> Communication status received from the mobile hardware. If valid, designates that this operator is connected to an existing mobile hardware
isPartOfAnOngoingStartOfMissionProcedure	bool	<b>Comments:</b> 3.5.3.7
trainPassesALevelTransitionBorder	bool	<b>Comments:</b> 3.5.3.7 a) trainPassesALevelTransitionBorder with it's front end
orderToEstablishACommunicationSession_fromOBU	orderToContactAnRBC_Type	<b>Comments:</b> 3.5.3.7 a)
orderDoesNotRequestToContactAnAcceptingRBC	bool	<b>Comments:</b> 3.5.3.7 a)
trainPassesA_RBC_RBC_border_WithItsFrontEnd	bool	<b>Comments:</b> 3.5.3.7 a)
systemVersionFromTracksideSupported	bool	<b>Comments:</b> 3.5.3.8 a)
systemVersionReceived	bool	<b>Comments:</b> 3.5.3.8 a)
etcs_mode	ETCS_Mode_Type	
atStartOfMission	bool	<b>Comments:</b> Start of Mission 3.5.3.4. a)
modeChangeHasToBeReportedToRBC	bool	<b>Comments:</b> 3.5.3.4 c)
driverHasManuallyChangedLevel	bool	<b>Comments:</b> 3.5.3.4 d)
trainFrontReachesEndOfAnnouncedRadioHole	bool	<b>Comments:</b> 3.5.3.4e)
startOfMissionProcedureCompleted	bool	<b>Comments:</b> 3.5.3.4 e)

Name	Type	Comments/Annotations
trainFrontInsideInAnAnnouncedRadioHole	bool	<b>Comments:</b> 3.5.4.4
OBU_hasToEstablishANewSession	bool	<b>Comments:</b> 3.5.3.5.2
startOfMissionProcedureIsGoingOn	bool	<b>Comments:</b> 3.5.7.5 [1]
RadioNetworkID_Default	validRadioNetworkID_Type	<b>Comments:</b> 3.5.6.3
connectionStatusTimerInterval	time_Type	<b>Comments:</b> 3.5.7.2

**Table 57: Outputs of managementOfRadioCommunication**

Name	Type	Properties		Comments/Annotations
sendAPositionReport	bool			<b>Comments:</b> 3.5.5.1e)
mobileHWCmd	mobileHWCmd_Type			<b>Comments:</b> 3.5.6, 3.5.6.3.2, 3.5.6.5, 3.5.6.5:Commands to the mobile hardware
memorizeTheLastRadioNetworkID	bool			<b>Comments:</b> 3.5.6.2
actualRadioNetworkID	validRadioNetworkID_Type			<b>Comments:</b> 3.5.6.2
orderTheRegistrationOfItsConnectedMobiles	bool			<b>Comments:</b> 3.5.6.1
rejectOrderToContactRBC_or_RIU	bool			<b>Comments:</b> 3.5.6.7
InformTheDriverThatNoConnectionWasSetup	bool	default	false	
sendTheMessageInitiationOfCommunicationSessionToTrackside	bool	default	false	<b>Comments:</b> 3.5.3.7 b)
sendMessage_NoCompatibleVersionSupported	bool	default	false	<b>Comments:</b> 3.5.3.8 b)
sendASessionEstablishedReportToTrackside	bool	default	false	<b>Comments:</b> 3.5.3.10 c) 3.5.3.8 a) sSendMessageEstablishedReport to trackside
sendATerminationOfCommunicationMessage	bool	default	false	<b>Comments:</b> 3.5.5.2a), 3.5.5.3.1
ignoreMessagesFromRBC_exceptAckOfTerminationOfCommunicationSession	bool	default	false	<b>Comments:</b> 3.5.5.3.6
safeRadionConnectionStatus_toDriver	safeRadioConnectionStatusValid_Type			<b>Comments:</b> 3.5.7.1

### 3.1.10.5. Locals

**Table 58: Locals of managementOfRadioCommunication**

Name	Type	Properties		Comments/Annotations
sessionEstablished	bool	last	false	
startTerminatingSession	bool	default	false	
sessionTerminated	bool	default	false	
startEstablishingSession	bool			
communicationSessionInitiatedByOBU	bool	last	false	
communicationSessionInitiatedFromTrackside	bool	last	false	
sessionStatus	sessionStatus_Type	last	morc_st_inactive	
initiateTermination	bool			
establishingACommunicationSessionAborted	bool	last	false	
requestTheSetupOfASafeRadioConnection	bool	default	false	
requestsToSetupTheSafeRadioConnectionStopped	bool	default	false	
mobileSWStatus	mobileSWStatus_Type	last	cInvalidMobileSWStatus	
prevSessionTerminatedDueToLossOfSafeRadioConnection	bool			
initiateEstablishingNewSession	bool			<b>Comments:</b> 3.5.3.5.2
finalAttemptToSetupTheSafeRadioConnectionFailed	bool	last	false	
mobileSWCmd	mobileSWCmd_Type	default	cInvalidMobileSWCmd	
orderReceivedFromTrackside_loc	orderToContactAnRBC_Type			
firstRequestToSetupASafeRadioConnection	bool	default	false	<b>Comments:</b> 3.5.7.3a), 3.5.7.3b)

### 3.1.11. radioNetworkMobile Operator

Declared as **private node**

#### 3.1.11.1. Comments and Information

**radioNetworkMobile Comments:**

- Subset 096, REQ 3.5.6.3.2, 3.5.6.5
- Controls the registration to the radio network for a single mobile terminal.

**Table 59: radioNetworkMobile Annotations**

Note Name	Attribute	Value
Remark_1	Description	<p>- Name: radioNetworkMobile  - Description: Controls the registration to the radio network for a single mobile terminal.  - Copyright Siemens AG, 2013  - Licensed under the EUPL V.1.1  ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )  - Gist URL: ---  - Cryptography: No  - Author(s): Uwe Steinke</p> <p>The use of this software is limited to non-vital applications.  It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss.  THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.</p>

### 3.1.11.2. Node Hierarchy

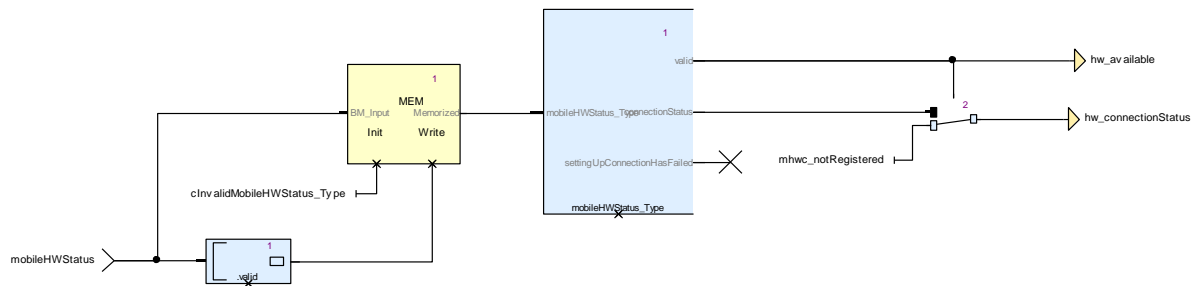
```

state-machine : MobileHW\_available\_SM
  state : MobileHWNotAvailable
  state : MobileHWAvailable
    state-machine : MobileSWConnection\_SM
      state : UnregisteredToTheRadioNetwork
      state : RegisteringToTheRadioNetwork
      state : RegisteredToTheRadioNetwork
      state : ConnectingToTheRadioNetwork
      state : ConnectedToTheRadioNetwork
      state : EstablishingASession
      state : SessionEstablished
    activate if : IfBlock1
      branch : then
      branch : else
        branch : then
        branch : else
          branch : then
          branch : else
            branch : then
            branch : else
  state : InitialState

```

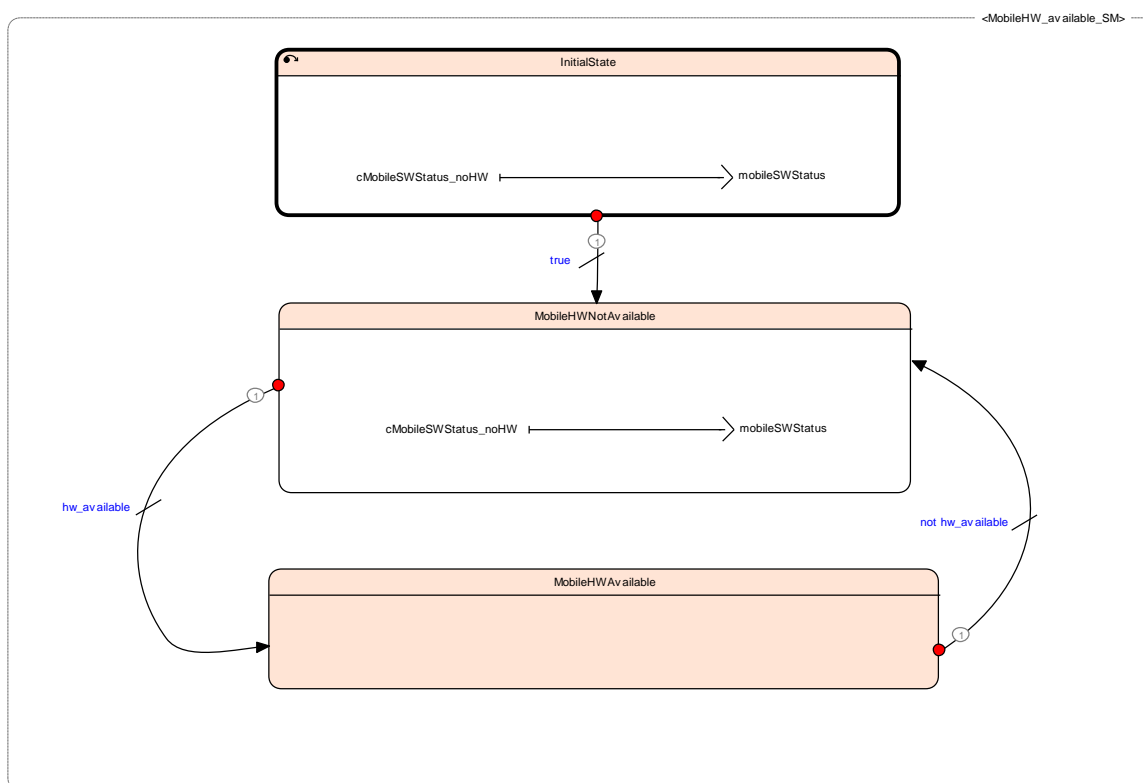
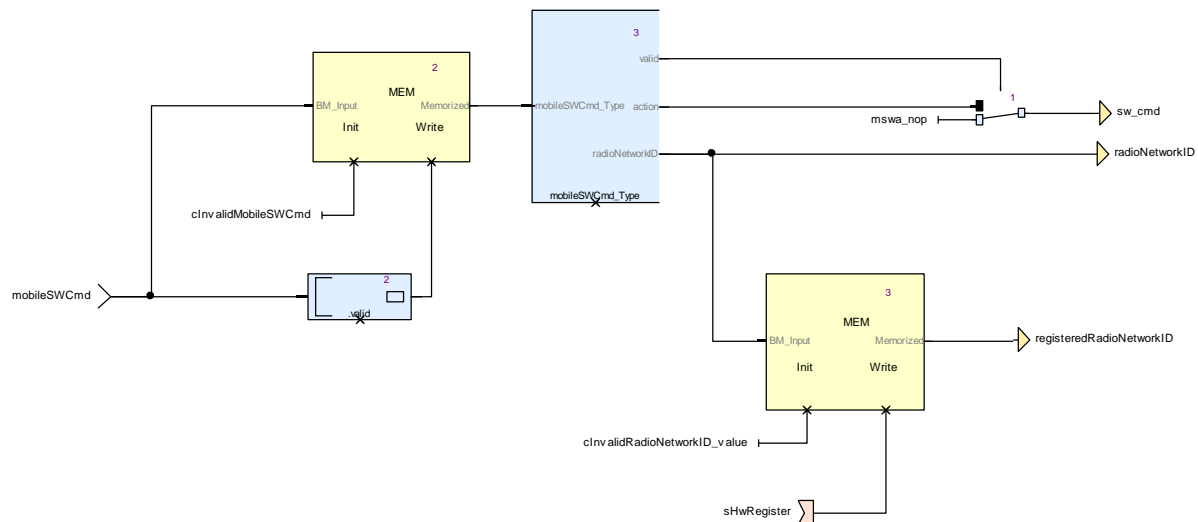
### 3.1.11.3. Graphical Views

#### 3.1.11.3.1. View of diagram\_radioNetworkMobile\_1



**Figure 24: View of diagram\_radioNetworkMobile\_1**

### 3.1.11.3.2. View of diagram\_radioNetworkMobile\_2



**Figure 25: View of diagram\_radioNetworkMobile\_2**

**Table 60: States of diagram\_radioNetworkMobile\_2**

State	Comments/Annotations
MobileHW_available_SM:MobileHWNotAvailable	
MobileHW_available_SM:MobileHWAvailable	



State	Comments/Annotations
MobileHW_available_SM:InitialState	

**Table 61: Transitions of diagram\_radioNetworkMobile\_2**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> MobileHW_available_SM:InitialState <b>Target:</b> MobileHW_available_SM:MobileHWNotAvailable	1	<b>Condition:</b> true <b>Actions:</b>	
<b>Source:</b> MobileHW_available_SM:MobileHWNotAvailable <b>Target:</b> MobileHW_available_SM:MobileHWAvailable	1	<b>Condition:</b> hw_available <b>Actions:</b>	
<b>Source:</b> MobileHW_available_SM:MobileHWAvailable <b>Target:</b> MobileHW_available_SM:MobileHWNotAvailable	1	<b>Condition:</b> not hw_available <b>Actions:</b>	

### 3.1.11.3.3. View of diagram\_MobileHWAavailable\_1 (MobileHW\_available\_SM:MobileHWAavailable:)

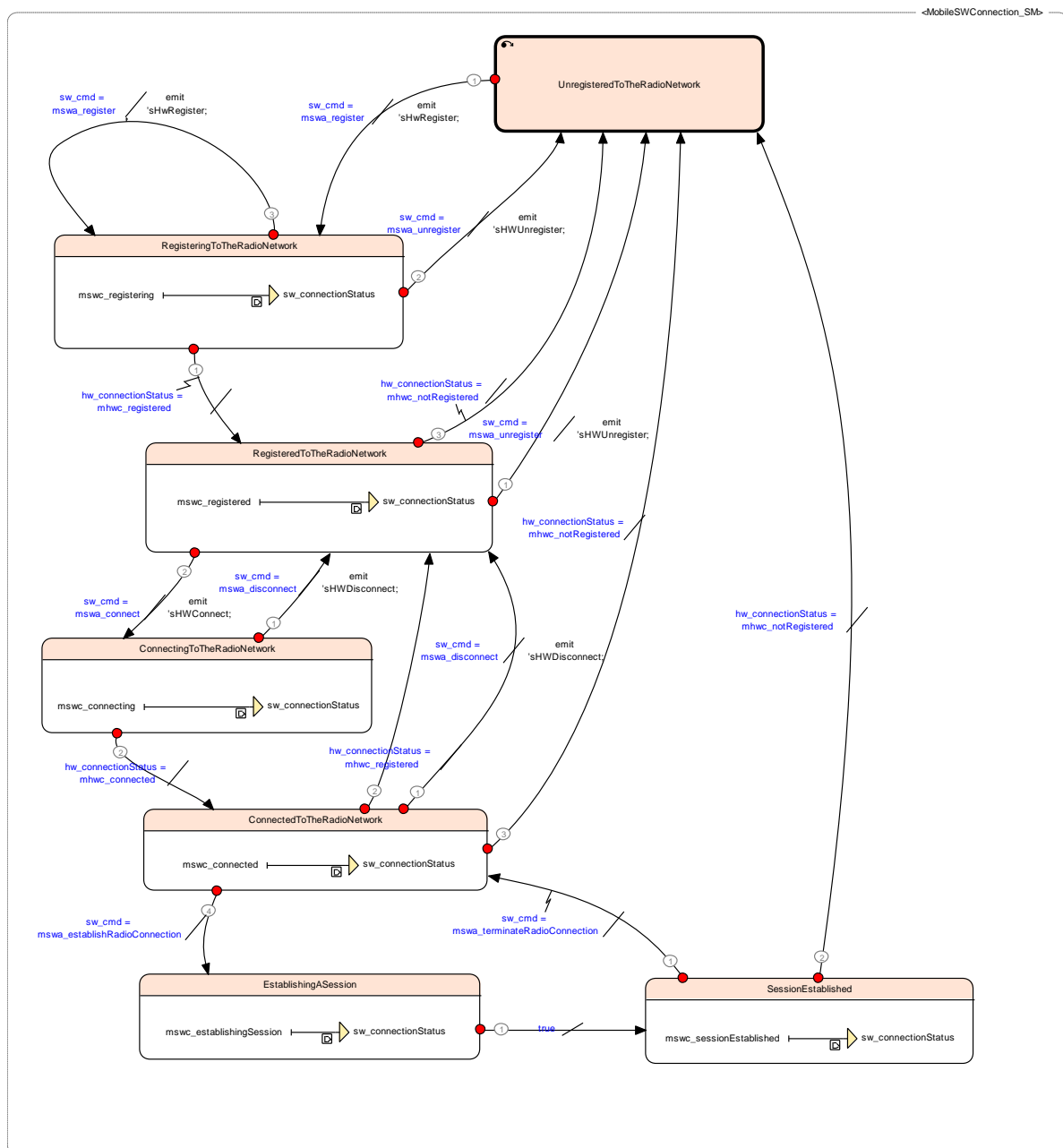


Figure 26: View of diagram\_MobileHWAavailable\_1 (MobileHW\_available\_SM:MobileHWAavailable:)

Table 62: States of diagram\_MobileHWAavailable\_1

State	Comments/ Annotations
MobileSWConnection_SM:UnregisteredToTheRadioNetwork	
MobileSWConnection_SM:RegisteringToTheRadioNetwork	<b>Comments:</b> 3.5.6.3.2: attempts to register to this Radio Network
MobileSWConnection_SM:RegisteredToTheRadioNetwork	

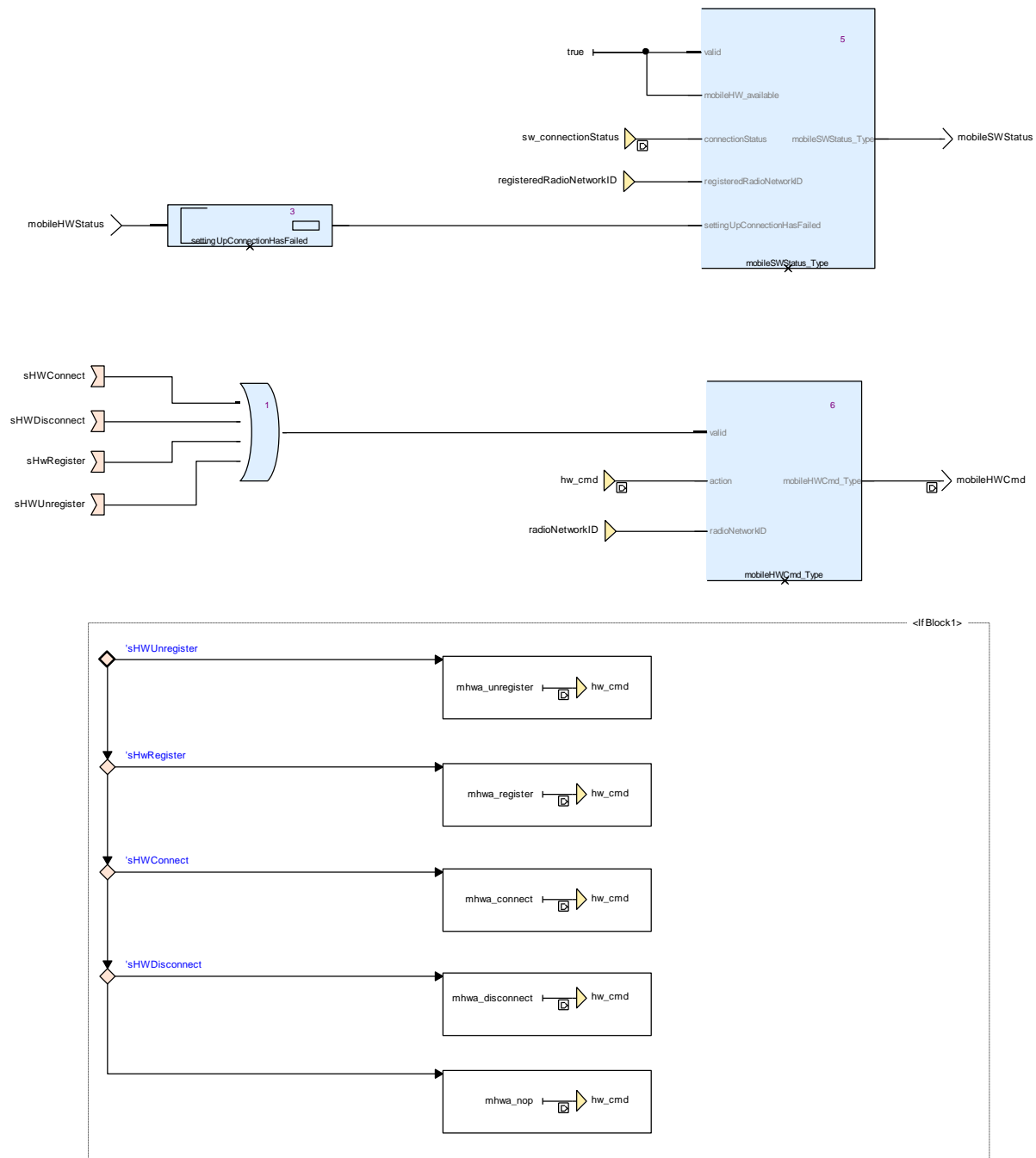
State	Comments/Annotations
MobileSWConnection_SM:ConnectingToTheRadioNetwork	
MobileSWConnection_SM:ConnectedToTheRadioNetwork	
MobileSWConnection_SM:EstablishingASession	
MobileSWConnection_SM:SessionEstablished	

**Table 63: Transitions of diagram\_MobileHWAavailable\_1**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> MobileSWConnection_SM:UnregisteredToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:RegisteringToTheRadioNetwork	1	<b>Condition:</b> sw_cmd = mswa_register <b>Actions:</b> emit 'sHwRegister;	<b>Comments:</b> 3.5.6.3.2: attempts to register to this Radio Network
<b>Source:</b> MobileSWConnection_SM:RegisteringToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:RegistereddToTheRadioNetwork	1	<b>Condition:</b> hw_connectionStatus = mhw_c_registered	
<b>Source:</b> MobileSWConnection_SM:RegisteringToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:UnregisteredToTheRadioNetwork	2	<b>Condition:</b> sw_cmd = mswa_unregister <b>Actions:</b> emit 'sHWUnregister;	
<b>Source:</b> MobileSWConnection_SM:RegistereddToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:UnregisteredToTheRadioNetwork	1	<b>Condition:</b> sw_cmd = mswa_unregister <b>Actions:</b> emit 'sHWUnregister;	
<b>Source:</b> MobileSWConnection_SM:RegistereddToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:UnregisteredToTheRadioNetwork	3	<b>Condition:</b> hw_connectionStatus = mhw_c_notRegistered	
<b>Source:</b> MobileSWConnection_SM:RegistereddToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:ConnectingToTheRadioNetwork	2	<b>Condition:</b> sw_cmd = mswa_connect <b>Actions:</b> emit 'sHWConnect;	
<b>Source:</b> MobileSWConnection_SM:ConnectingToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:RegistereddToTheRadioNetwork	1	<b>Condition:</b> sw_cmd = mswa_disconnect <b>Actions:</b> emit 'sHWDisconnect;	

Source/Target	#	Conditions/ Actions	Comments/ Annotations
<b>Source:</b> MobileSWConnection_SM:Connectin gToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:Connecte dToTheRadioNetwork	2	<b>Condition:</b> hw_connectionStatus = mhwc_connected	
<b>Source:</b> MobileSWConnection_SM:Connecte dToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:Register dToTheRadioNetwork	1	<b>Condition:</b> sw_cmd = mswa_disconnect <b>Actions:</b> emit 'sHWDDisconnect;	
<b>Source:</b> MobileSWConnection_SM:Connecte dToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:Register dToTheRadioNetwork	2	<b>Condition:</b> hw_connectionStatus = mhwc_registered	
<b>Source:</b> MobileSWConnection_SM:Connecte dToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:Unregist eredToTheRadioNetwork	3	<b>Condition:</b> hw_connectionStatus = mhwc_notRegistered	
<b>Source:</b> MobileSWConnection_SM:Connecte dToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:Establishi ngASession	4	<b>Condition:</b> sw_cmd = mswa_establishRadioC onnection	
<b>Source:</b> MobileSWConnection_SM:Establishi ngASession <b>Target:</b> MobileSWConnection_SM:SessionEs tablished	1	<b>Condition:</b> true	
<b>Source:</b> MobileSWConnection_SM:SessionEs tablished <b>Target:</b> MobileSWConnection_SM:Connecte dToTheRadioNetwork	1	<b>Condition:</b> sw_cmd = mswa_terminateRadio Connection	
<b>Source:</b> MobileSWConnection_SM:SessionEs tablished <b>Target:</b> MobileSWConnection_SM:Unregist eredToTheRadioNetwork	2	<b>Condition:</b> hw_connectionStatus = mhwc_notRegistered	
<b>Source:</b> MobileSWConnection_SM:Registerin gToTheRadioNetwork <b>Target:</b> MobileSWConnection_SM:Registerin gToTheRadioNetwork	3	<b>Condition:</b> sw_cmd = mswa_register <b>Actions:</b> emit 'sHwRegister;	

#### 3.1.11.3.4. View of diagram\_MobileHWAavailable\_2 (MobileHW\_available\_SM:MobileHWAavailable:)



**Figure 27: View of diagram\_MobileHWAavailable\_2 (MobileHW\_available\_SM:MobileHWAavailable:)**

**Table 64: Actions of diagram\_MobileHWAavailable\_2**

Conditional Block Action	Comments/Annotations
IfBlock1:then	
IfBlock1:else:else:else:else	
IfBlock1:else:then	
IfBlock1:else:else:then	

Conditional Block Action	Comments/Annotations
IfBlock1:else:else:else:then	

#### 3.1.11.4. Interface

**Table 65: Inputs of radioNetworkMobile**

Name	Type	Comments/Annotations
mobileHWStatus	mobileHWStatus_Type	<b>Comments:</b> Communication status received from the mobile hardware. If valid, designates that this operator is connected to an existing mobile hardware
mobileSWCmd	mobileSWCmd_Type	<b>Comments:</b> Cmd inputs to this operator 3.5.6.5: includes the order to use and occupy this mobile for a (established) communication session

**Table 66: Outputs of radioNetworkMobile**

Name	Type	Properties		Comments/Annotations
mobileHWCmd	mobileHWCmd_Type	default	cInvalidmobileHWCmd	<b>Comments:</b> 3.5.6, 3.5.6.3.2, 3.5.6.5, 3.5.6.5: Commands to the mobile hardware
mobileSWStatus	mobileSWStatus_Type			<b>Comments:</b> SW-Status of the mobile: 3.5.6.5 Indicates, that this mobile is in use for an Established Communication Session

#### 3.1.11.5. Locals

**Table 67: Locals of radioNetworkMobile**

Name	Type	Properties		Comments/Annotations
hw_available	bool			
hw_connectionStatus	mobileHWConnectionStatus_Type			
sw_cmd	mobileSWAction_Type			
radioNetworkID	radioNetworkID_Type			
hw_cmd	mobileHWAction_Type	default	mhwa_nop	
sw_connectionStatus	mobileSWConnectionStatus_Type	default	mswc_unregistered	
registeredRadioNetworkID	radioNetworkID_Type			

**Table 68: Signals of radioNetworkMobile**

Name	Comments/Annotations
sHwRegister	
sHWConnect	
sHWDisconnect	
sHWUnregister	

### 3.1.12. RBCTransition\_forSafeRadioConnectionIndication Operator

Declared as **private function**

#### 3.1.12.1. Comments and Information

##### **RBCTransition\_forSafeRadioConnectionIndication Comments:**

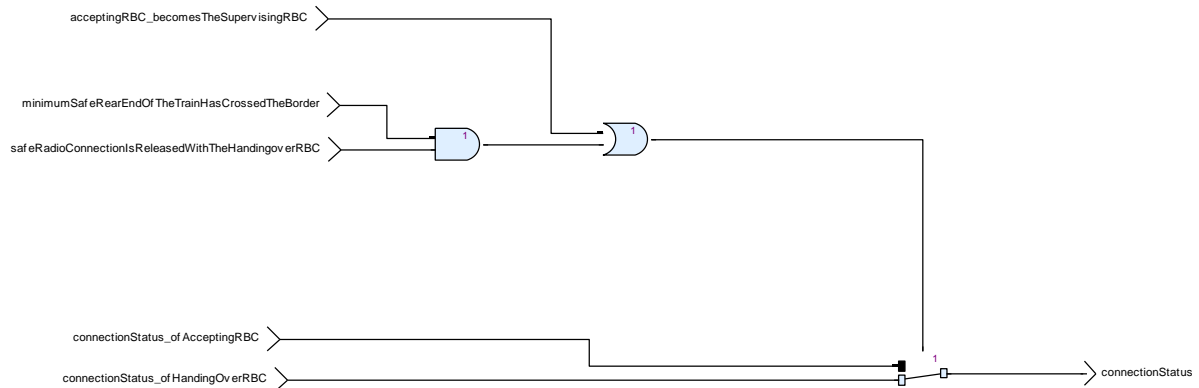
- Subset 096, REQ 3.5.7.6
- Manages the switch of the indication status in the case of an RBC/RBC transition

**Table 69: RBCTransition\_forSafeRadioConnectionIndication Annotations**

Note Name	Attribute	Value
Remark_1	Description	<p>- Name:  RBCTransition_forSafeRadioConnectionIndication  - Description: Manages the switch of the indication status in the case of an RBC/RBC transition  - Copyright Siemens AG, 2013  - Licensed under the EUPL V.1.1  ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )  - Gist URL: ---  - Cryptography: No  - Author(s): Uwe Steinke</p> <p>The use of this software is limited to non-vital applications.  It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss.  THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.</p>

### 3.1.12.2. Graphical Views

#### 3.1.12.2.1. View of diagram\_RBCTransition\_forSafeRadioConnectionIndication\_1



**Figure 28: View of diagram\_RBCTransition\_forSafeRadioConnectionIndication\_1**

### 3.1.12.3. Interface

**Table 70: Inputs of RBCTransition\_forSafeRadioConnectionIndication**

Name	Type	Comments/Annotations
connectionStatus_of HandingOverRBC	safeRadioCon nectionStatus Valid_Type	<b>Comments:</b> 3.5.7.1
connectionStatus_of AcceptingRBC	safeRadioCon nectionStatus Valid_Type	<b>Comments:</b> 3.5.7.1
acceptingRBC_beco mesTheSupervising RBC	bool	<b>Comments:</b> 3.5.7.6a)
safeRadioConnectio nIsReleasedWithThe HandingoverRBC	bool	<b>Comments:</b> 3.5.7.6b)
minimumSafeRearE ndOfTheTrainHasCr ossedTheBorder	bool	<b>Comments:</b> 3.5.7.6b)

**Table 71: Outputs of RBCTransition\_forSafeRadioConnectionIndication**

Name	Type	Comments/Annotations
connectionStatus	safeRadioCon nectionStatus Valid_Type	<b>Comments:</b> 3.5.7.1

### 3.1.13. registeringToTheRadioNetwork Operator

Declared as **private node**

#### 3.1.13.1. Comments and Information

**registeringToTheRadioNetwork Comments:**

- Subset 096, REQ 3.5.6



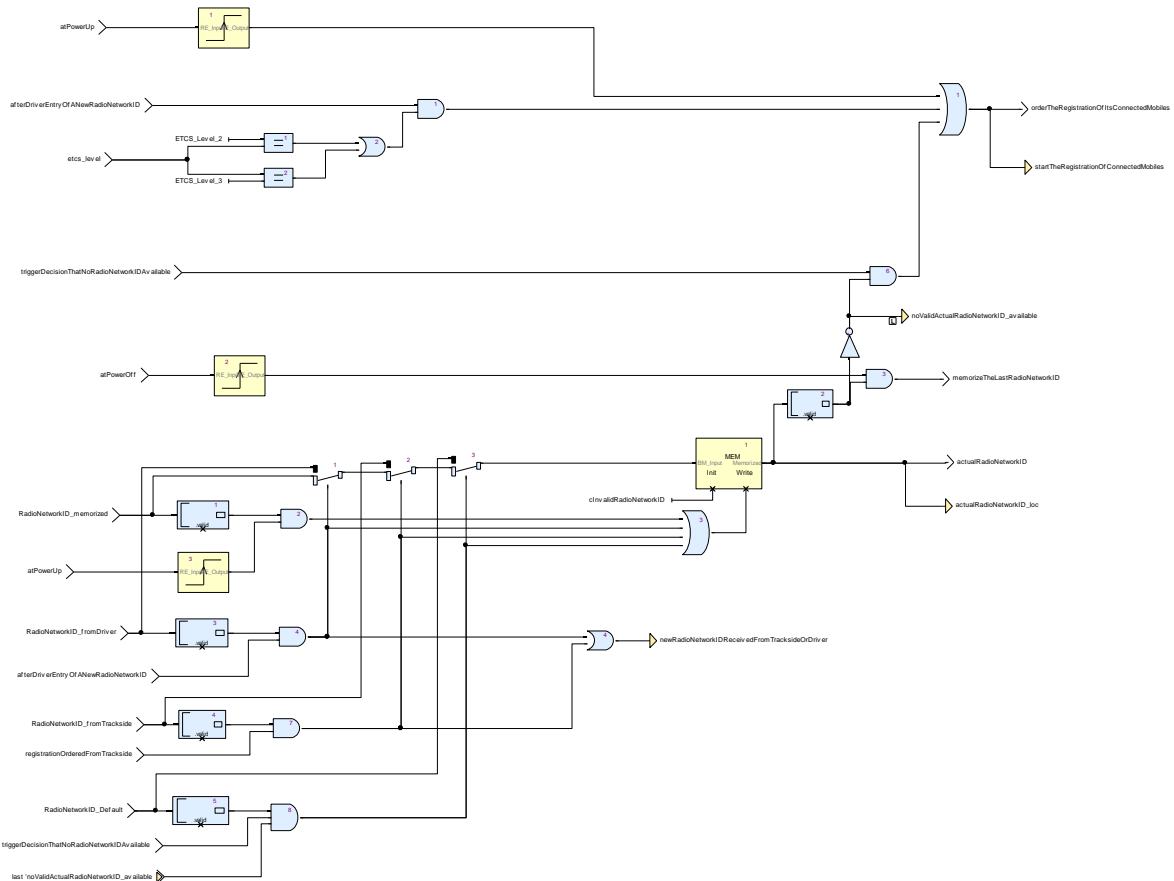
- Implements the registration to the radio network.

**Table 72: registeringToTheRadioNetwork Annotations**

Note Name	Attribute	Value
Remark_1	Description	<ul style="list-style-type: none"> <li>- Name: registeringToTheRadioNetwork</li> <li>- Description: Implements the registration to the radio network.</li> <li>- Copyright Siemens AG, 2013</li> <li>- Licensed under the EUPL V.1.1  ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )</li> <li>- Gist URL: ---</li> <li>- Cryptography: No</li> <li>- Author(s): Uwe Steinke</li> </ul> <p>The use of this software is limited to non-vital applications.  It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss.  THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OHER KIND OF USE.</p>

### 3.1.13.2. Graphical Views

#### 3.1.13.2.1. View of diagram\_registeringToTheRadioNetwork\_1



**Figure 29: View of diagram\_registeringToTheRadioNetwork\_1**

### 3.1.13.2.2. View of diagram\_registeringToTheRadioNetwork\_2

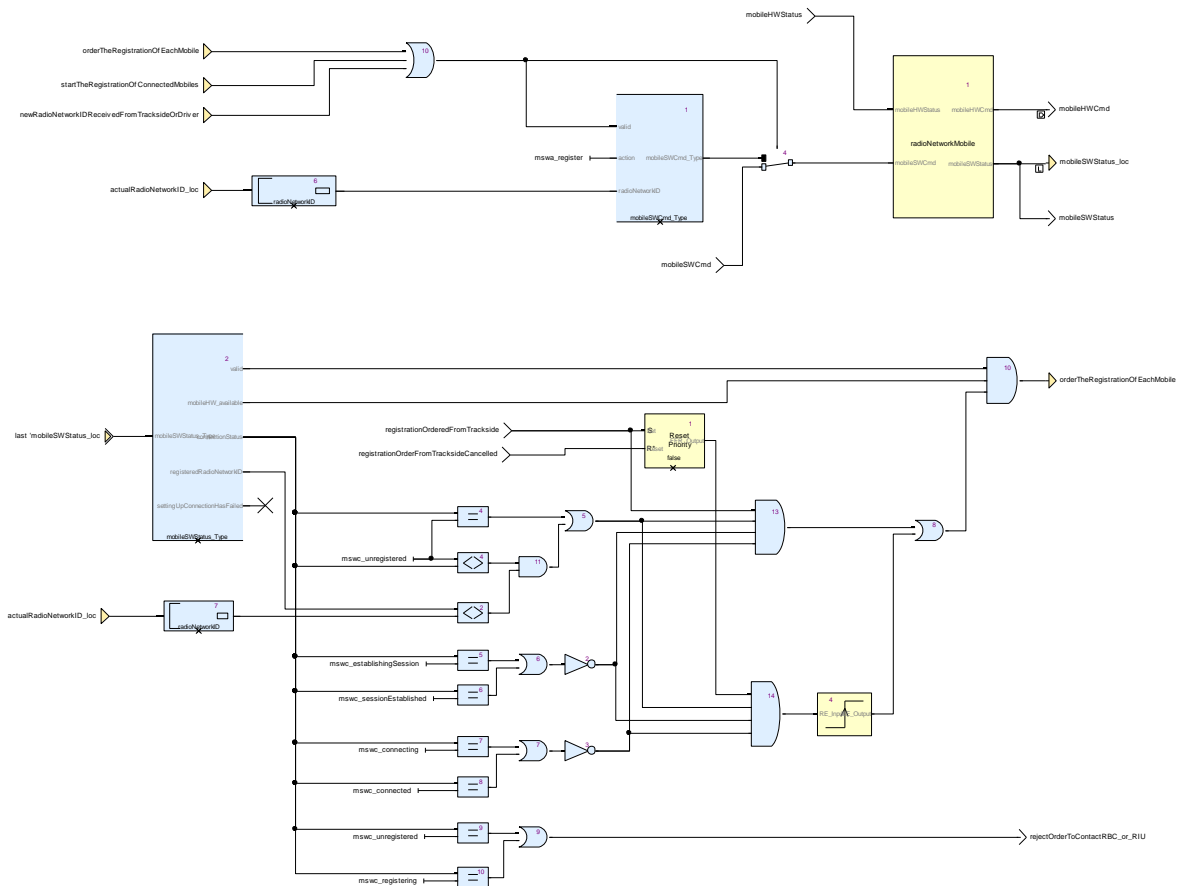


Figure 30: View of diagram\_registeringToTheRadioNetwork\_2

### 3.1.13.3. Interface

Table 73: Inputs of registeringToTheRadioNetwork

Name	Type	Comments/Annotations
atPowerUp	bool	<b>Comments:</b> 3.5.6.1a)
afterDriverEntryOfA NewRadioNetworkID	bool	<b>Comments:</b> 3.5.6.1b), 3.5.6.2 Strobe input, activated when the driver sets the Radio Network ID
etcs_level	ETCS_Level_Type	<b>Comments:</b> 3.5.6.1b)
registrationOrdered FromTrackside	bool	<b>Comments:</b> 3.5.6.1.c)
registrationOrderFro mTracksideCancelle d	bool	<b>Comments:</b> 3.5.6.6
atPowerOff	bool	<b>Comments:</b> 3.5.6.2
RadioNetworkID_m emorized	validRadioNet workID_Type	<b>Comments:</b> 3.5.6.2
RadioNetworkID_fro mDriver	validRadioNet workID_Type	<b>Comments:</b> 3.5.6.2

Name	Type	Comments/Annotations
RadioNetworkID_fro mTrackside	validRadioNet workID_Type	<b>Comments:</b> 3.5.6.1c), 3.5.6.2
triggerDecisionThat NoRadioNetworkIDA vailable	bool	<b>Comments:</b> 3.5.6.3
mobileHWStatus	mobileHWSta tus_Type	<b>Comments:</b> Communication status received from the mobile hardware. If valid, designates that this operator is connected to an existing mobile hardware
mobileSWCmd	mobileSWCm d_Type	<b>Comments:</b> Cmd inputs to this operator 3.5.6.5: includes the order to use and occupy this mobile for a (established) communication session
RadioNetworkID_De fault	validRadioNet workID_Type	<b>Comments:</b> 3.5.6.3

**Table 74: Outputs of registeringToTheRadioNetwork**

Name	Type	Properties		Comments/Annotations
orderTheRegistratio nOfItsConnectedMo biles	bool			<b>Comments:</b> 3.5.6.1
memorizeTheLastRa dioNetworkID	bool			<b>Comments:</b> 3.5.6.2
actualRadioNetwork ID	validRadioNet workID_Type			<b>Comments:</b> 3.5.6.2
rejectOrderToConta ctRBC_or_RIU	bool			<b>Comments:</b> 3.5.6.7
mobileHWCmd	mobileHWCm d_Type	default	cInvalidmobil eHWCmd	<b>Comments:</b> 3.5.6, 3.5.6.3.2, 3.5.6.5, 3.5.6.5:Commands to the mobile hardware
mobileSWStatus	mobileSWStat us_Type			<b>Comments:</b> SW-Status of the mobile: 3.5.6.5 Indicates, that this mobile is in use for an Established Communication Session

#### 3.1.13.4. Locals

**Table 75: Locals of registeringToTheRadioNetwork**

Name	Type	Properties		Comments/Annotations
startTheRegistration OfConnectedMobiles	bool			
noValidActualRadio NetworkID_avaiabl e	bool	last	true	<b>Comments:</b> 3.5.6.3
newRadioNetworkID ReceivedFromTrack sideOrDriver	bool			<b>Comments:</b> 3.5.6.3.2
actualRadioNetwork ID_loc	validRadioNet workID_Type			

Name	Type	Properties		Comments/Annotations
mobileSWStatus_loc	mobileSWStatus_Type	last	cInvalidMobileSWStatus	
orderTheRegistrationOfEachMobile	bool			<b>Comments:</b> 3.5.6.5

### 3.1.14. safeRadioConnectionIndication Operator

Declared as **private node**

#### 3.1.14.1. Comments and Information

##### **safeRadioConnectionIndication Comments:**

- Subset 096, REQ 3.5.7
- Controls the radio connection indication for the driver.

**Table 76: safeRadioConnectionIndication Annotations**

Note Name	Attribute	Value
Remark_1	Description	- Name: safeRadioConnectionIndication - Description: Controls the radio connection indication for the driver. - Copyright Siemens AG, 2013 - Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> ) - Gist URL: --- - Cryptography: No - Author(s): Uwe Steinke  The use of this software is limited to non-vital applications. It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.

#### 3.1.14.2. Node Hierarchy

state-machine : [connectionStatus SM](#)

state : [NoConnection](#)

state : [ConnectionLost\\_SetupFailed](#)

state : [ConnectionUp](#)

### 3.1.14.3. Graphical Views

#### 3.1.14.3.1. View of diagram\_safeRadioConnectionIndication\_1

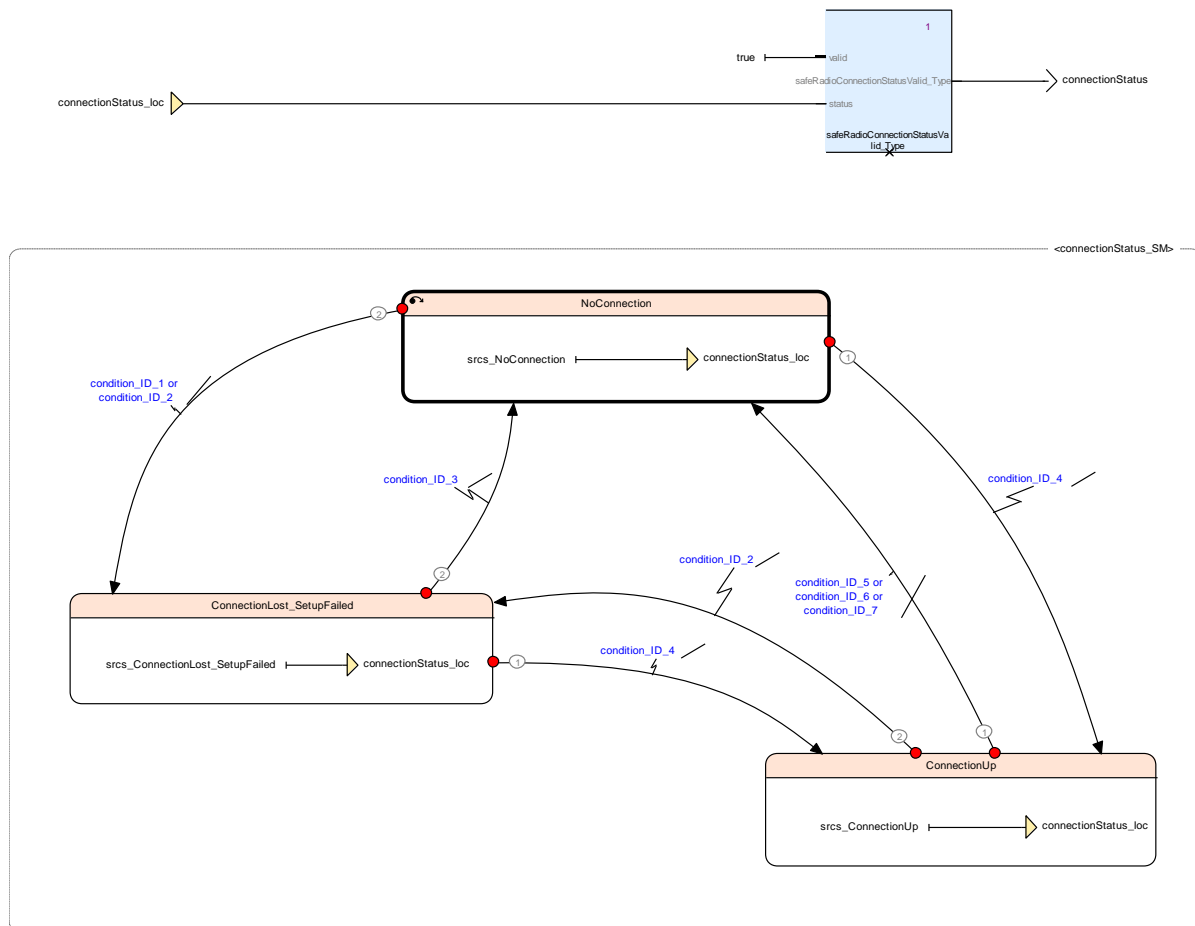


Figure 31: View of diagram\_safeRadioConnectionIndication\_1

Table 77: State Machines of diagram\_safeRadioConnectionIndication\_1

State Machine	Comments/Annotations
connectionStatus_SM	<b>Comments:</b> 3.5.7.1

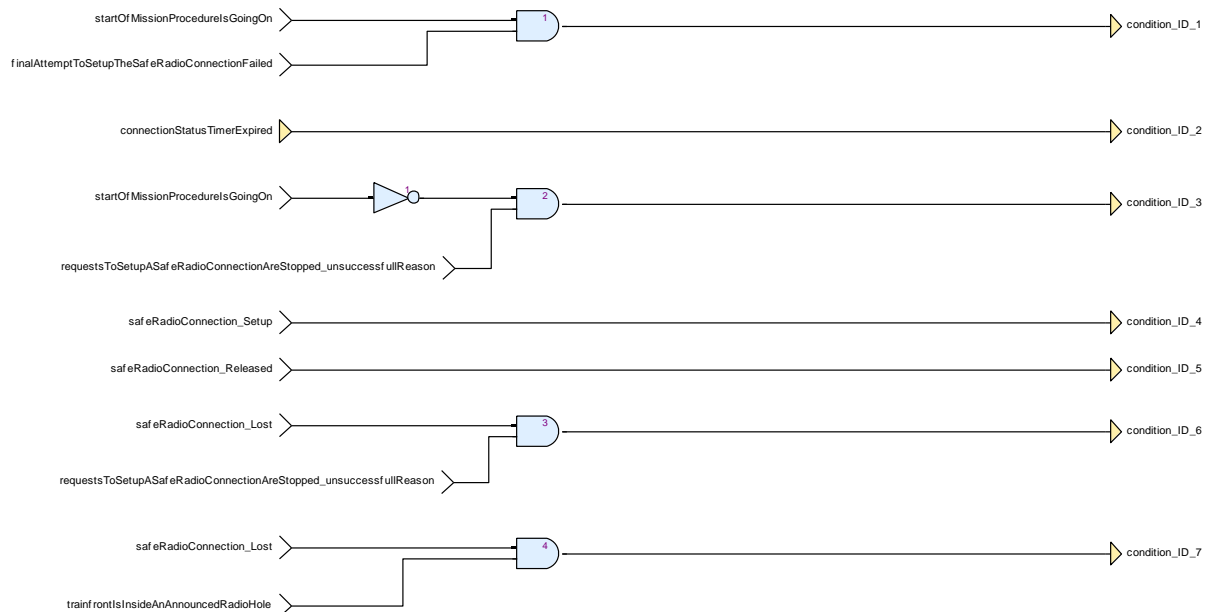
Table 78: States of diagram\_safeRadioConnectionIndication\_1

State	Comments/Annotations
connectionStatus_SM:NoConnection	
connectionStatus_SM:ConnectionLost_SetupFailed	
connectionStatus_SM:ConnectionUp	

**Table 79: Transitions of diagram\_safeRadioConnectionIndication\_1**

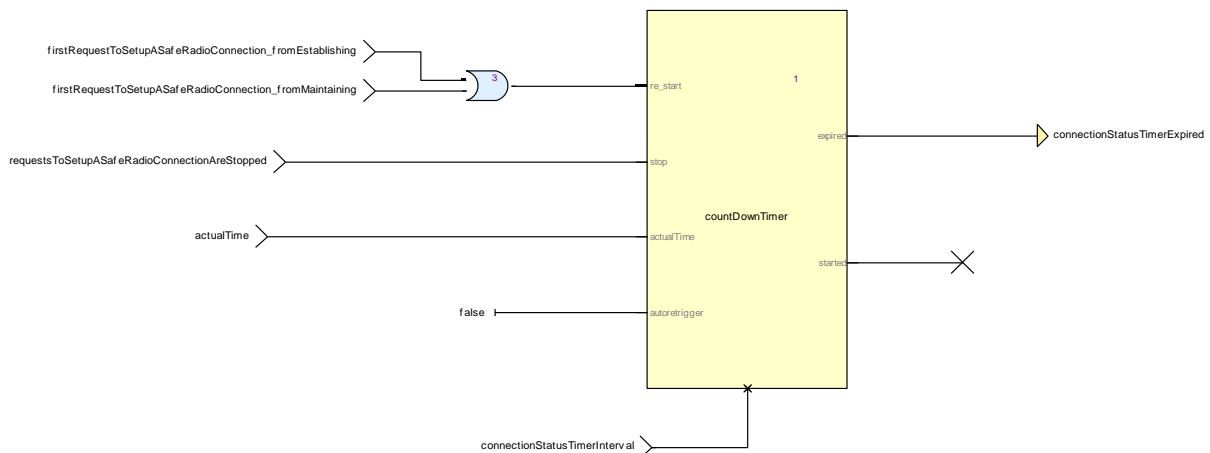
Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> connectionStatus_SM:ConnectionLost_SetupFailed <b>Target:</b> connectionStatus_SM:NoConnection	2	<b>Condition:</b> condition_ID_3	
<b>Source:</b> connectionStatus_SM:ConnectionLost_SetupFailed <b>Target:</b> connectionStatus_SM:ConnectionUp	1	<b>Condition:</b> condition_ID_4	
<b>Source:</b> connectionStatus_SM:NoConnection <b>Target:</b> connectionStatus_SM:ConnectionLost_SetupFailed	2	<b>Condition:</b> condition_ID_1 or condition_ID_2	
<b>Source:</b> connectionStatus_SM:NoConnection <b>Target:</b> connectionStatus_SM:ConnectionUp	1	<b>Condition:</b> condition_ID_4	
<b>Source:</b> connectionStatus_SM:ConnectionUp <b>Target:</b> connectionStatus_SM:ConnectionLost_SetupFailed	2	<b>Condition:</b> condition_ID_2	
<b>Source:</b> connectionStatus_SM:ConnectionUp <b>Target:</b> connectionStatus_SM:NoConnection	1	<b>Condition:</b> condition_ID_5 or condition_ID_6 or condition_ID_7	

### 3.1.14.3.2. View of diagram\_safeRadioConnectionIndication\_2



**Figure 32: View of diagram\_safeRadioConnectionIndication\_2**

### 3.1.14.3.3. View of diagram\_safeRadioConnectionIndication\_3



**Figure 33: View of diagram\_safeRadioConnectionIndication\_3**

### 3.1.14.4. Interface

**Table 80: Inputs of safeRadioConnectionIndication**

Name	Type	Comments/Annotations
startOfMissionProcedureIsGoingOn	bool	<b>Comments:</b> 3.5.7.5 [1]
finalAttemptToSetupTheSafeRadioConnectionFailed	bool	<b>Comments:</b> 3.5.7.5[1]
requestsToSetupASafeRadioConnectionAreStopped_unsuccessfulReason	bool	<b>Comments:</b> 3.5.7.5[3], 3.5.7.5[6]



Name	Type	Comments/Annotations
requestsToSetupASafeRadioConnectionAreStopped	bool	<b>Comments:</b> 3.5.7.4
safeRadioConnection_Setup	bool	<b>Comments:</b> 3.5.7.5[4]
safeRadioConnection_Released	bool	<b>Comments:</b> 3.5.7.5[5]
safeRadioConnection_Lost	bool	<b>Comments:</b> 3.5.7.5[6], 3.5.7.5[7]
trainfrontIsInsideAnAnnouncedRadioHole	bool	<b>Comments:</b> 3.5.7.5[7]
actualTime	time_Type	
firstRequestToSetupASafeRadioConnection_fromEstablishing	bool	<b>Comments:</b> 3.5.7.3a)
firstRequestToSetupASafeRadioConnection_fromMaintaining	bool	<b>Comments:</b> 3.5.7.3a)
connectionStatusTimerInterval	time_Type	<b>Comments:</b> 3.5.7.2

**Table 81: Outputs of safeRadioConnectionIndication**

Name	Type	Comments/Annotations
connectionStatus	safeRadioConnectionStatusValid_Type	<b>Comments:</b> 3.5.7.1

### 3.1.14.5. Locals

**Table 82: Locals of safeRadioConnectionIndication**

Name	Type	Comments/Annotations
connectionStatus_local	safeRadioConnectionStatus_Type	
connectionStatusTimerExpired	bool	<b>Comments:</b> 3.5.7.5[2]
condition_ID_1	bool	<b>Comments:</b> 3.5.7.5[1]
condition_ID_2	bool	<b>Comments:</b> 3.5.7.5[2]
condition_ID_3	bool	<b>Comments:</b> 3.5.7.5[3]
condition_ID_4	bool	<b>Comments:</b> 3.5.7.5[4]
condition_ID_5	bool	<b>Comments:</b> 3.5.7.5[5]
condition_ID_6	bool	<b>Comments:</b> 3.5.7.5[6]
condition_ID_7	bool	<b>Comments:</b> 3.5.7.5[7]

### 3.1.15. terminateAndEstablishSession Operator

Declared as **private node**

#### 3.1.15.1. Comments and Information

##### **terminateAndEstablishSession Comments:**

- Subset 096, REQ 3.5.3.5.2
- Determines, if an establishing or established session has to be terminated due to a new order that request a session with a different RBC.
- Initiates the termination, waits til the termination is achieved and initiates the new session.

**Table 83: terminateAndEstablishSession Annotations**

Note Name	Attribute	Value
Remark_1	Description	<ul style="list-style-type: none"><li>- Name: terminateAndEstablishSession</li><li>- Description: Terminates the actual session and establishes a new one, if required.</li><li>- Copyright Siemens AG, 2013</li><li>- Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )</li><li>- Gist URL: ---</li><li>- Cryptography: No</li><li>- Author(s): Uwe Steinke</li></ul> <p>The use of this software is limited to non-vital applications. It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OHER KIND OF USE.</p>

#### 3.1.15.2. Node Hierarchy

state-machine : [SM1](#)

state : [NoTerminationInProgress](#)

state : [TerminationInProgress](#)

state : [EstablishNewSession](#)

### 3.1.15.3. Graphical Views

#### 3.1.15.3.1. View of diagram\_terminateAndEstablishSession\_1

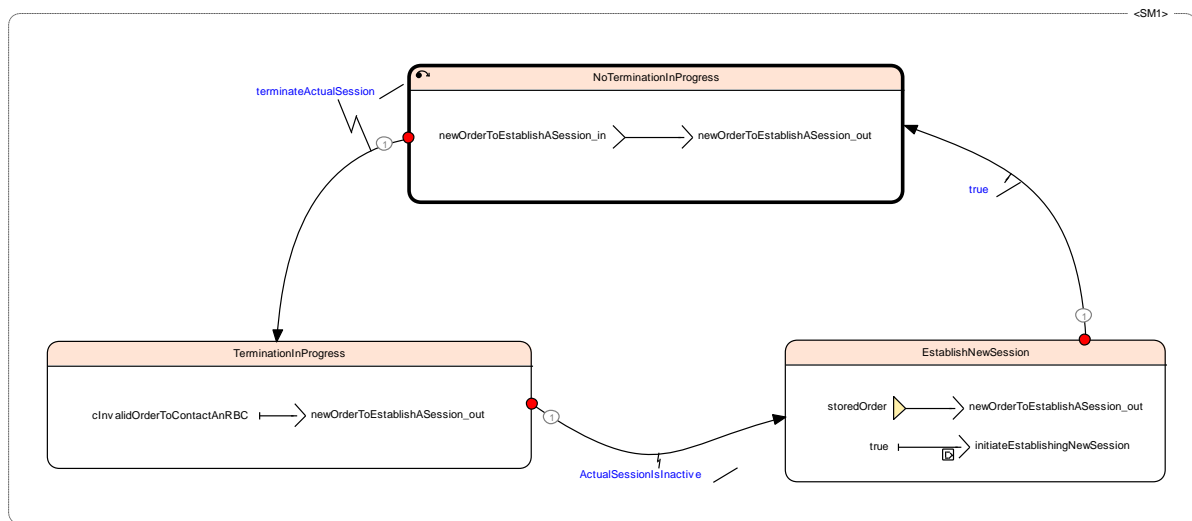
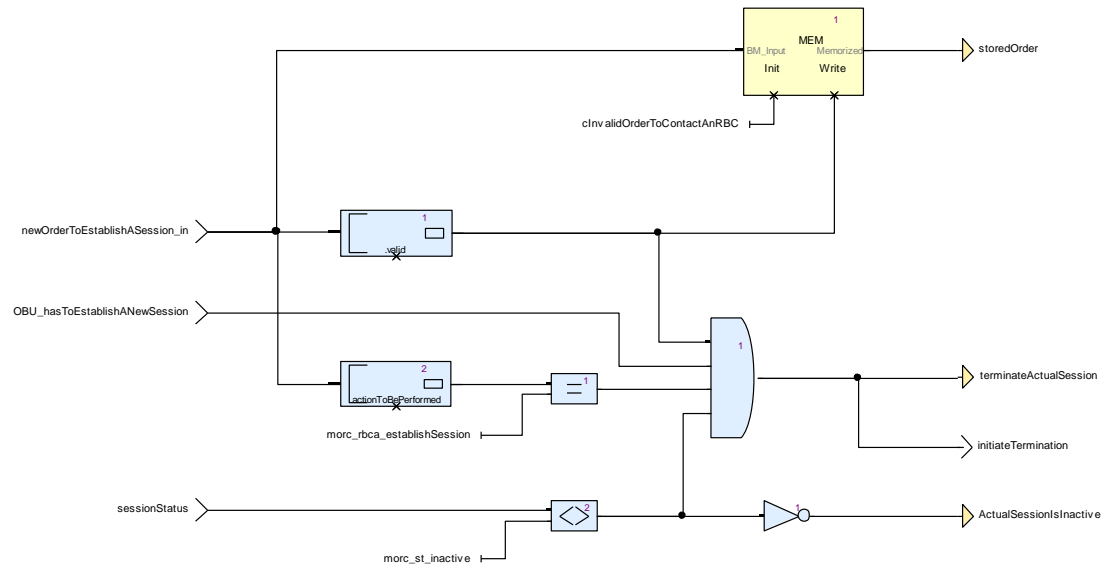


Figure 34: View of diagram\_terminateAndEstablishSession\_1

Table 84: States of diagram\_terminateAndEstablishSession\_1

State	Comments/Annotations
SM1:NoTerminationInProgress	
SM1:TerminationInProgress	
SM1:EstablishNewSession	

**Table 85: Transitions of diagram\_terminateAndEstablishSession\_1**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> SM1:NoTerminationInProgress <b>Target:</b> SM1:TerminationInProgress	1	<b>Condition:</b> terminateActualSession	
<b>Source:</b> SM1:TerminationInProgress <b>Target:</b> SM1:EstablishNewSession	1	<b>Condition:</b> ActualSessionIsInactive	
<b>Source:</b> SM1:EstablishNewSession <b>Target:</b> SM1:NoTerminationInProgress	1	<b>Condition:</b> true	

#### 3.1.15.4. Interface

**Table 86: Inputs of terminateAndEstablishSession**

Name	Type	Comments/Annotations
newOrderToEstablishASession_in	orderToContactAnRBC_Type	<b>Comments:</b> 3.5.5.1a)
sessionStatus	sessionStatus_Type	
OBU_hasToEstablishANewSession	bool	<b>Comments:</b> 3.5.3.5.2

**Table 87: Outputs of terminateAndEstablishSession**

Name	Type	Properties	Comments/Annotations
initiateTermination	bool		
initiateEstablishingNewSession	bool	default false	
newOrderToEstablishASession_out	orderToContactAnRBC_Type		<b>Comments:</b> 3.5.5.1a)

#### 3.1.15.5. Locals

**Table 88: Locals of terminateAndEstablishSession**

Name	Type	Comments/Annotations
terminateActualSession	bool	
storedOrder	orderToContactAnRBC_Type	
ActualSessionIsInactive	bool	

#### 3.1.16. terminating\_a\_CommunicationSession Operator

Declared as **private node**

### 3.1.16.1. Comments and Information

#### **terminating\_a\_CommunicationSession Comments:**

- Subset 096, REQ 3.5.5.2
- Implements the termination of a communication session.

**Table 89: terminating\_a\_CommunicationSession Annotations**

Note Name	Attribute	Value
Remark_1	Description	<p>- Name: terminating_a_CommunicationSession - Description: Terminates the communication session. - Copyright Siemens AG, 2013 - Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> ) - Gist URL: --- - Cryptography: No - Author(s): Uwe Steinke</p> <p>The use of this software is limited to non-vital applications. It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OTHER KIND OF USE.</p>

### 3.1.16.2. Node Hierarchy

state-machine : [TerminateTheCommunicationSession\\_SM](#)

state : [Idle](#)

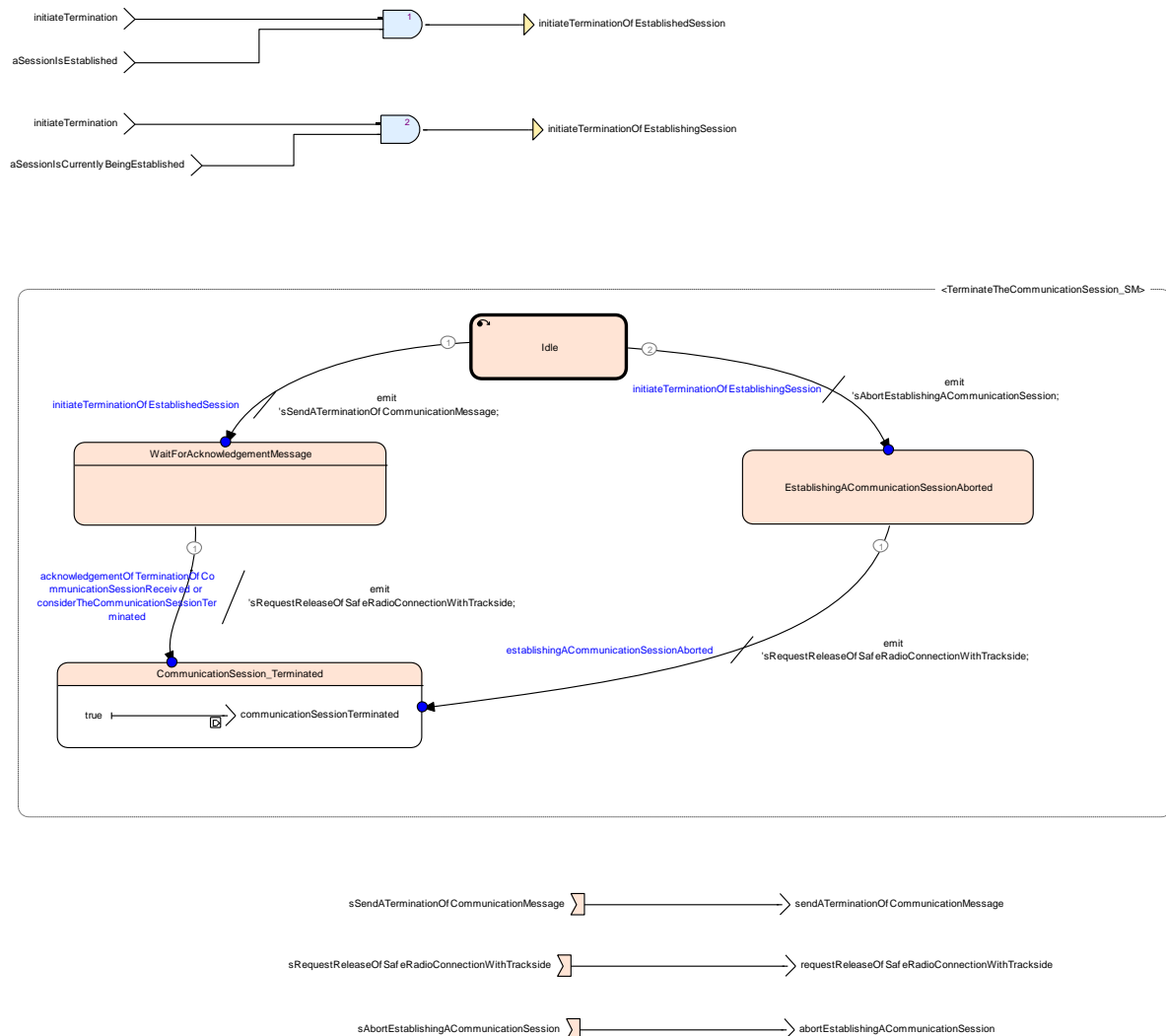
state : [WaitForAcknowledgementMessage](#)

state : [CommunicationSession\\_Terminated](#)

state : [EstablishingACommunicationSessionAborted](#)

### 3.1.16.3. Graphical Views

#### 3.1.16.3.1. View of diagram\_terminating\_a\_CommunicationSession\_1



**Figure 35: View of diagram\_terminating\_a\_CommunicationSession\_1**

**Table 90: State Machines of diagram\_terminating\_a\_CommunicationSession\_1**

State Machine	Comments/Annotations
TerminateTheCommunicationSession_SM	<b>Comments:</b> 3.5.5.2

**Table 91: States of diagram\_terminating\_a\_CommunicationSession\_1**

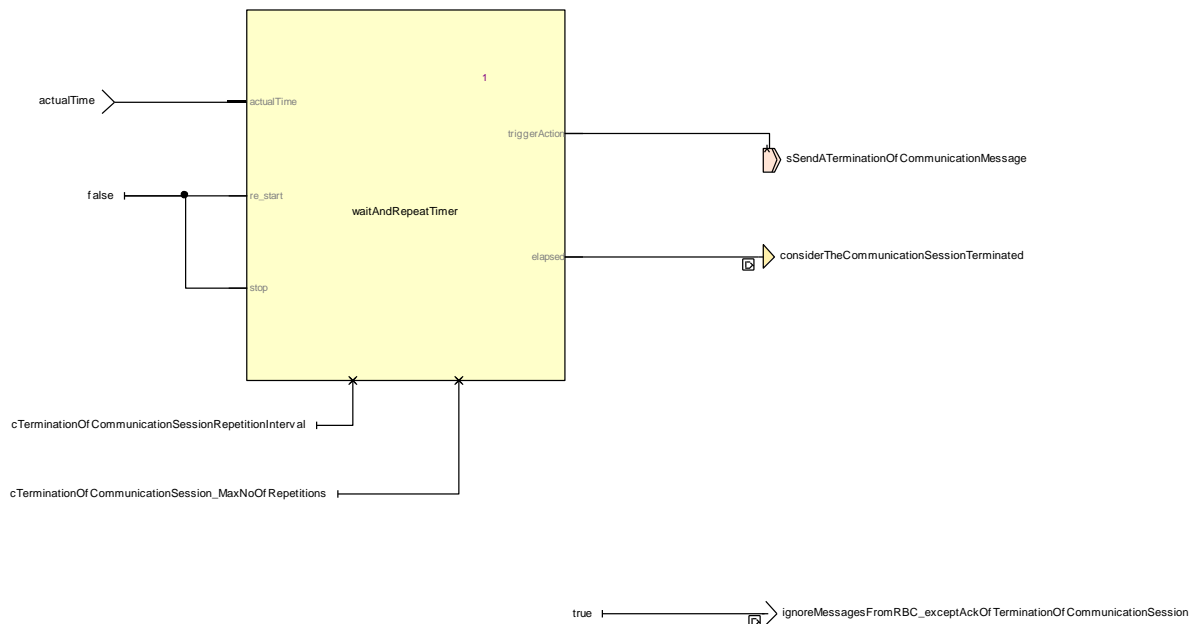
State	Comments/Annotations
TerminateTheCommunicationSession_SM:Idle	
TerminateTheCommunicationSession_SM:WaitForAcknowledgementMessage	
TerminateTheCommunicationSession_SM:CommunicationSession_Terminated	<b>Comments:</b> 3.5.5.3.2,

State	Comments/Annotations
TerminateTheCommunicationSession_SM:EstablishingACommunicationSessionAborted	<b>Comments:</b> 3.5.5.7

**Table 92: Transitions of diagram\_terminating\_a\_CommunicationSession\_1**

Source/Target	#	Conditions/Actions	Comments/Annotations
<b>Source:</b> TerminateTheCommunicationSession_SM:Idle <b>Target:</b> TerminateTheCommunicationSession_SM:WaitForAcknowledgementMessage	1	<b>Condition:</b> initiateTerminationOfEstablishedSession <b>Actions:</b> emit 'sSendATerminationOfCommunicationMessage;	<b>Comments:</b> 3.5.5.2a)
<b>Source:</b> TerminateTheCommunicationSession_SM:WaitForAcknowledgementMessage <b>Target:</b> TerminateTheCommunicationSession_SM:CommunicationSession_Terminated	1	<b>Condition:</b> acknowledgementOfTerminationOfCommunicationSessionReceived or considerTheCommunicationSessionTerminated <b>Actions:</b> emit 'sRequestReleaseOfSafeRadioConnectionWithTrackside;	<b>Comments:</b> 3.5.5.2c), 3.5.5.3.2
<b>Source:</b> TerminateTheCommunicationSession_SM:Idle <b>Target:</b> TerminateTheCommunicationSession_SM:EstablishingACommunicationSessionAborted	2	<b>Condition:</b> initiateTerminationOfEstablishingSession <b>Actions:</b> emit 'sAbortEstablishingACommunicationSession;	<b>Comments:</b> 3.5.5.7
<b>Source:</b> TerminateTheCommunicationSession_SM:EstablishingACommunicationSessionAborted <b>Target:</b> TerminateTheCommunicationSession_SM:CommunicationSession_Terminated	1	<b>Condition:</b> establishingACommunicationSessionAborted <b>Actions:</b> emit 'sRequestReleaseOfSafeRadioConnectionWithTrackside;	<b>Comments:</b> 3.5.5.7

### 3.1.16.3.2. View of diagram\_WaitForAcknowledgementMessage\_1 (TerminateTheCommunicationSession\_SM:WaitForAcknowledgementMessage:)



**Figure 36: View of diagram\_WaitForAcknowledgementMessage\_1  
(TerminateTheCommunicationSession\_SM:WaitForAcknowledgementMessage:)**

### 3.1.16.4. Interface

**Table 93: Inputs of terminating\_a\_CommunicationSession**

Name	Type	Comments/Annotations
initiateTermination	bool	<b>Comments:</b> Intended to be fed by "initiateTerminatingASession"
aSessionIsEstablished	bool	<b>Comments:</b> 3.5.5.2
acknowledgementOfTerminationOfCommunicationSessionReceived	bool	<b>Comments:</b> 3.5.5.2c)
aSessionIsCurrentlyBeingEstablished	bool	<b>Comments:</b> 3.5.5.7
actualTime	time_Type	
establishingACommunicationSessionAborted	bool	<b>Comments:</b> 3.5.5.7 Intended to be fed by "Establishing_a_CommunicationSession".

**Table 94: Outputs of terminating\_a\_CommunicationSession**

Name	Type	Properties	Comments/Annotations
sendATerminationOfCommunicationMessage	bool		<b>Comments:</b> 3.5.5.2a), 3.5.5.3.1
requestReleaseOfSafeRadioConnectionWithTrackside	bool		<b>Comments:</b> 3.5.5.2c)



Name	Type	Properties		Comments/Annotations
ignoreMessagesFromRBC_exceptAckOfTerminationOfCommunicationSession	bool	default	false	<b>Comments:</b> 3.5.5.3.6
abortEstablishingACommunicationSession	bool			<b>Comments:</b> 3.5.5.7
communicationSessionTerminated	bool	default	false	

### 3.1.16.5. Locals

**Table 95: Locals of terminating\_a\_CommunicationSession**

Name	Type	Properties		Comments/Annotations
initiateTerminationOfEstablishedSession	bool			<b>Comments:</b> 3.5.5.2
considerTheCommunicationSessionTerminated	bool	default	false	<b>Comments:</b> 3.5.5.3.2
initiateTerminationOfEstablishingSession	bool			<b>Comments:</b> 3.5.5.7

**Table 96: Signals of terminating\_a\_CommunicationSession**

Name	Comments/Annotations
sSendATerminationOfCommunicationMessage	<b>Comments:</b> 3.5.5.2a), 3.5.5.3.1
sRequestReleaseOfSafeRadioConnectionWithTrackside	<b>Comments:</b> 3.5.5.2c)
sAbortEstablishingACommunicationSession	

### 3.1.17. waitAndRepeatTimer Operator

Declared as **private node**

#### 3.1.17.1. Comments and Information

**waitAndRepeatTimer Comments:**

- Implements a timer for a triggering an action a limited number of times in configured intervals.
- Repeats triggerAction maxNoOfRepetition times in intervals of repeatInterval.
- triggerAction is activated at the beginning of each interval.
- elapsed is activated after the last interval.

Note Name	Attribute	Value
Remark_1	Description	<ul style="list-style-type: none"> <li>- Name: waitAndRepeatTimer</li> <li>- Description: Implements a timer for a triggering an action a limited number of times in configured intervals</li> <li>- Copyright Siemens AG, 2013</li> <li>- Licensed under the EUPL V.1.1 ( <a href="http://joinup.ec.europa.eu/software/page/eupl/licence-eupl">http://joinup.ec.europa.eu/software/page/eupl/licence-eupl</a> )</li> <li>- Gist URL: ---</li> <li>- Cryptography: No</li> <li>- Author(s): Uwe Steinke</li> </ul> <p>The use of this software is limited to non-vital applications. It has not been developed for vital operation purposes and must not be used for applications which may cause harm to people, physical accidents or financial loss. THEREFORE, NO LIABILITY WILL BE GIVEN FOR SUCH AND ANY OHER KIND OF USE.</p>

The diagram illustrates a state machine for a countdown timer. It features several inputs and outputs, and a central state machine block labeled 'countDownTimer'.

- Inputs:**
  - `re_start`: A signal that can trigger a reset or start action.
  - `stop`: A signal to stop the timer.
  - `actualTime`: A signal representing the current time.
  - `true`: A boolean signal.
  - `repeatInterval`: A signal representing the interval between repetitions.
- Outputs:**
  - `elapsed`: A signal indicating the time elapsed.
  - `triggerAction`: A signal indicating when an action should be triggered.
- State Machine Logic:**
  - The state machine is labeled **countDownTimer** and has states **1** (initial), **elapsed**, and **stop**.
  - Transitions are triggered by inputs like `re_start`, `stop`, and `actualTime`.
  - Internal logic includes a **maxNoOfRepetitions** block and a **countDownTimer** block.
  - There are feedback loops and decision points (e.g., `≥ 1`) that control the flow between states.

Name	Type	Comments/Annotations
actualTime	time_Type	
re_start	bool	
stop	bool	
repeatInterval	time_Type	
maxNoOfRepetitions	int	

**Table 99: Outputs of waitAndRepeatTimer**

Name	Type	Comments/Annotations
triggerAction	bool	
elapsed	bool	

End of document.