


ERTMS PROGRAMME

NORWEGIAN ETCS SYSTEM COMPATIBILITY TEST

SPECIFICATION FOR STAGE 1 LINES

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1 INTRODUCTION

1.1 Purpose and validity of the document

The purpose of this document is to define the set of checks that is necessary to demonstrate ETCS System Compatibility (ESC) of a generic OBU with the Stage 1 lines of the Norwegian ERTMS Programme.

The approach to make evident that trackside and onboard subsystems are compatible incorporates, on the overall level, three steps:

1. Compatibility analysis
2. Compatibility lab tests
3. Complementary compatibility field tests (as required based on results from steps 1 and 2)

This document is primarily related to steps 2 and 3.

This document is based on best practice established by practical experiences made through compatibility analysis and testing of ETCS onboard systems versus Swedish and Norwegian ETCS trackside systems and specific applications.

Depending on the status of the trackside and onboard to be tested, not all of the test cases in this specification need to be performed. Based on this generic specification a consolidation of the test cases for a specific ETCS onboard to ETCS trackside combination shall be made through analysis.

The contents of the document shall not be treated as exhaustive in a specific ETCS onboard to ETCS trackside combination. It is instead mandatory that the scope of compatibility tests is agreed upon, by conducting an analysis, between the ETCS onboard and the ETCS trackside stakeholders. All test cases that are agreed as non-applicable shall be justified.

Based on this agreement each stakeholder is always responsible for actions, alterations, remedies, etc. for the ETCS onboard and the ETCS trackside respectively, even if no issues remain after fully conducting the agreed compatibility tests.

1.2 Scope

Bane NOR is conducting a national rollout of ERTMS on the entire Norwegian rail network. The trackside systems are developed in stages, and "Stage 1" is the first trackside GA (Generic Application) version to be used in the rollout.

"Stage 1 Lines" are the railway lines that use the Stage 1 GA version in operation, which will be Nordlandsbanen (northern part) and Gjøvikbanen (northern part). The test specification is designed to assess the compatibility of a generic ERTMS Onboard system with "Stage 1 Lines", but will be further adapted according to future development of the track side GA. The complete network is planned to operate under the same final GA version. The final trackside GA version will target ETCS SRS version 3.6.0.

1.3 Stage 1 Trackside Version Information

The Stage 1 trackside GA version that is tested by this specification implements Baseline 3 MR 1 (ETCS SRS version 3.4.0) plus change requests specifying GPRS functionality. The RBC reports system version 2.0 and it will support OBU that are compatible with this system version. OBU that cannot use the GPRS functionality (PS mode) will be supported in CS mode.

Test cases that require GPRS functionality are specified with "Baseline 3 R 2" in the Baseline Applicable field of the test case. These tests are considered not applicable for OBU that only support system version 2.0 / BL3 MR1.

1.4 Radio System Compatibility

No specific checks for radio system compatibility (RSC) are specified. Radio compatibility is checked indirectly through executing the ESC tests.

1.5 ESC and RSC Types

The ESC type assigned to the Stage 1 lines is ESC-NO-02.

Since no RSC checks are specified, the RSC type for Stage 1 lines is RSC-EU-0.

1.6 Bane NOR Contact Information

Entities applying for ESC Demonstration should contact Bane NOR at ERTMS-techman@banenor.no for further information.

1.7 Prerequisites

The tests are primarily designed as lab tests, but some tests may be performed in the field where the analysis considers this necessary. Lab tests can be performed using a specific application from a Stage 1 line or a generic test track designed for GA testing of Stage 1. Field tests can be performed on the ERTMS test line (Roa-Hønefoss) or on another Stage 1 line.

2 INTRODUCTION TO TEST SCENARIOS

This chapter describes the format and basic information related to the scenarios.

2.1 Conditions for the Test Scenarios

The basic scenarios are considered in separate steps for the RBC scenarios and are listed again in Chapter 2.4. Interlocking actions such as the route setting are described in individual test steps.

2.2 Test Scenario Template

The template contains two sections, the description of the scenario and the test scenario reporting information. The test scenario description contains the general test information (e.g. test case identifier, baseline, ...etc.), test conditions (starting conditions, ...etc.) and the description of the test steps.

Description of the test scenario:

NOR_ESC_TSXXX[1] – Title[2]

Test Objective(s) [3]	
Baseline applicable [4]	
Technical Signalling System Scenarios [5]	
Starting conditions [6]	
Additional starting conditions [7]	
Train status before Test [8]	

Step [9]	Actions [10]	RBC [11]	OBU [12]	Comments [13]

Table 1 Test Scenario Information

2.3 Explanation of the Test Scenarios Information

The following table provide clarifications and guidance to understand the information in the test scenarios.

Cell Nr.	Cell title	Cell description
[1]	Test Case - ID	Unique test case ID
[2]	Test Case - Title	Title defining univocally the test case, the title shall refer to the main functionality to be tested
[3]	Test Objective(s)	Purpose or goal of the test.
[4]	Baseline applicable	Required baseline for the scenario, generally BL3 MR1. Scenarios requiring GPRS are marked BL3 R2. Optionally references to the requirements (national or SRS) can be given.
[5]	Technical Signalling System Scenarios	ID of the underlying technical signalling system scenario, if there is one
[6]	Starting conditions	Starting conditions (ETCS level/mode) for the test. This condition is a prerequisite to perform the test, if it is not fulfilled the test cannot be performed. The tester can evaluate how to produce the correct starting conditions.
[7]	Additional starting conditions	Additional starting conditions of interest for performing the test, for instance, the location of the train at the track, signal aspects, track circuit status, national values stored on board, values of ETCS variables, classical signalling applicable, operational rules applicable, train type, train characteristics,...
[8]	Train status before Test	In order to be able to carry out certain scenarios, certain "basic scenarios" or test scenarios may have to be carried out. The basic scenarios are provided as guidance for achieving the preconditions in tests. They are not mandatory to execute if the train is already in the state specified in the preconditions.
[9]	Step	The number is mandatory and indicates the chronological order of the steps.
[10]	Actions	The Actions column of the test cases is for the execution of certain actions by the DRIVER, DISPATCHER, TRAIN or IL (INTERLOCKING). To stimulate the expected reactions.
[11]	RBC	The RBC column of the test cases is for the expected target reactions of the RBC.
[12]	OBU	The OBU column of the test cases is for the expected target reactions of the OBU.
[13]	Comments	Here you will find further information on the test steps, reactions and actions that may have to be observed. There are also notes on how to carry out the test case.

Table 2 Explanation Table of the Test Scenarios

2.4 Sequence Basic Scenarios

The test scenarios consider test sequences named “basic scenarios” which are used in many test cases, usually to set up the initial conditions for the test. If the initial conditions are already present (from the previous test case, for example) then the tester can decide to omit the basic scenario.

2.4.1 Basic Scenario 1 – Start of Mission with KNOWN position SoM3 (Valid Position Reported by OBU Not in Trusted Area)

Actions	RBC	OBU	comments
			Train in SB mode OBU: Driver ID invalid ERTMS/ETCS Level valid (Level2) RBC-ID and phone number valid Train position data valid Train data unknown
Driver opens the desk			
		OBU switches to SB	
Driver re-validates/re-enters his driver ID		Driver ID is "valid"	
		Stored position & stored level are valid	
		OBU in level 2	
		2 mobile Terminal are registered, in nominal case	

Actions	RBC	OBU	comments
		OBU contacts RBC	
		OBU sends M155 (Initiation of communication session)	
	Communication Session is started		
	RBC sends M32 "RBC System Version"		RBC: checks for duplicates and registers train with its ETCS ID
		OBU sends M159, including P2 listing the supported system versions	
	Communication session successfully established		
		OBU reports "valid" position to the RBC	
		OBU sends M157 "Start of mission position report" with Q_STATUS = 1 (Valid)	
	RBC sends M24 with P3 "National Values" with acknowledgment request to the train		
TRAIN: Position outside trusted area			
		OBU requests the Driver to select NL, SH or Train Data Entry	

Actions	RBC	OBU	comments
DRIVER selects Train Data Entry			
DMI requests the Driver to enter/revalidate "Train Data (including train running number)"		OBU sends valid "Train Data" to the RBC	
		OBU sends M129 (validated train data) with packet 0 and P11.	
	RBC sends message 8 "Acknowledgment of train data" with acknowledgment request to the train [M24 General Message {P3 National Values}]		
		DMI: "START" shown to the driver	

2.4.2 Basic Scenario 2 – Start of Mission with INVALID/UNKNOWN position SoM1

Actions	RBC	OBU	comments
			Train in NP mode or SB mode OBU: Driver ID unknown ERTMS/ETCS Level invalid (Level 2) RBC-ID and phone number invalid Train position data invalid Train data unknown
DRIVER powers the OBU and opens cab desk according to nominal direction requested			
DRIVER enters his driver ID		Driver ID is "valid"	
		Stored position is not valid & stored level is valid OBU requests Driver to enter/re-validate level	
DRIVER revalidates/reenters ERTMS/ETCS Level 2		ERTMS/ETCS Level valid	

Actions	RBC	OBU	comments
DRIVER checks/enters the Radio Network ID DRIVER re-validates/re-enters RBC-ID and phone number		RBC-ID and phone number valid	
		OBU contacts RBC	
		OBU sends M155 (Initiation of communication session)	
	RBC sends M32 "RBC System Version"		RBC: Checks for duplicates and registers train with its ECTS ID
		OBU considers communication session established.	
		OBU sends M159, including P2 listing the supported system versions	
	RBC considers communication session established with train		
		OBU evaluates validity of position Reports "invalid" or "unknown" position to the RBC	

Actions	RBC	OBU	comments
	RBC sends M24 "General message" with packets 57 "Movement authority request parameters", 58 "Position report parameters" with acknowledgment request		
		OBU sends M146 (Acknowledgement) related to M24	
		OBU sends M157 Start of mission position report, with either: Q_STATUS = 0 (Invalid) OR Q_STATUS = 2 (Unknown) and all location variables set to their unknown values)	
	RBC sends M41 (Train accepted)		
		OBU sends M146 (Acknowledgement) related to M41	
		OBU deletes stored "Train position" data OBU requests the Driver to select NL, SH or Train Data Entry	

Actions	RBC	OBU	comments
DRIVER: Select train data entry DRIVER enters/revalidates train data (including train running number)		OBU sends valid "Train Data" to the RBC OBU sends M129 (validated train data) with packet 0 and P11.	
	RBC sends message 8 "Acknowledgment of train data" with acknowledgment request to the train [M24 General Message {P3 National Values}]		
		OBU sends M146 (Acknowledgement) related to M8	
		DMI: "START" shown to the driver	

2.4.3 Basic Scenario 3 – Start of Mission with KNOWN position SoM4 (Valid Position Reported by OBU in Trusted Area)

Actions	RBC	OBU	comments
			Train in SB mode OBU: Driver ID invalid ERTMS/ETCS Level valid (Level2) RBC-ID and phone number valid Train position data valid Train data unknown
Driver opens the desk			
		OBU switches to SB	
Driver re-validates/re-enters his driver ID		Driver ID is "valid"	
		Stored position & stored level are valid	
		OBU in level 2	
		Mobile Terminal is registered	
		OBU contacts RBC	
		OBU sends M155 (Initiation of communication session)	
	Communication Session is started		

Actions	RBC	OBU	comments
	RBC sends M32 "RBC System Version"		RBC: Checks for duplicates and registers train with its ETCS ID
		OBU sends M159, including P2 listing the supported system versions	
	Communication session successfully established		
		OBU reports "valid" position to the RBC	
		OBU sends M157 "Start of mission position report" with Q_STATUS = 1 (Valid)	
	RBC sends M24 with P3 "National Values" with acknowledgment request to the train		
TRAIN: Position within trusted area			Position usable for MA
		OBU requests the Driver to select NL, SH or Train Data Entry	
Driver selects Train Data Entry			

Actions	RBC	OBU	comments
DMI requests the Driver to enter/re-validate "Train Data (including train running number)"		OBU sends valid "Train Data" to the RBC	
		OBU sends M129 (validated train data) with packet 0 and P11.	
	RBC sends message 8 "Acknowledgment of train data" with acknowledgment request to the train [M24 General Message {P3 National Values}]		
		DMI: "START" shown to the driver	

3 TEST SCENARIOS

The test scenarios listed in this chapter are based on the respective technical signalling system scenarios that were developed as part of Bane NOR's ERTMS Programme.

3.1 Test Scenarios for Start and End of Moving

3.1.1 NOR_ESC_TS001 - Awakening in a Parking Location - Level 2 with 2 trains

Test Objective(s)	To show the awakening procedure when the position is known. Awakening in a Parking Location - Level 2, 2 trains: train 1 connects with CS, train 2 connects with PS
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS2-3
Starting conditions	Train in SB mode L2
Additional starting conditions	Train 1 and 2 are not known in RBC. Both trains are located in different trusted areas (station or parking area). The data "Driver ID" and "Train Data" are invalid. Other data: "Level 2", "RBC ID/phone number", "Train Position" are still valid. Additional starting conditions includes "connection mode table specifies CS for train 1 and PS for train 2"
Train status before Test	Executed Basic Scenario 2

Step	Actions	RBC	OBU	comments
1	DRIVER Train1: Train 1 opens the desk.		OBU/DMI1 requests the driver to enter/re-validate driver ID. The driver ID is "valid". The OBU1 contacts the RBC.	

Step	Actions	RBC	OBU	comments
2	DRIVER Train2: Train 2 opens the desk.		OBU/DMI2 requests the driver to enter/re-validate driver ID. The driver ID is "valid". The OBU2 contacts the RBC.	
3			OBU1 sends M155 (Initiation of a communication session)	
4		Communication Session is started. RBC sends M32 (Configuration Determination)	OBU1 considers communication session established. OBU1 sends M159 (Session established)	
5		Communication session successfully established.	OBU1 evaluates validity of position. Valid" unambiguous train position is reported. Valid position in trusted area is reported. OBU1 sends M157 (SoM Position Report)	
6		RBC sends M24 (General Message)	OBU1 requests the driver to select NL, SH or Train Data Entry.	RBC: Position received and approved.

Step	Actions	RBC	OBU	comments
7	DRIVER: Enters "Train data (including train running number)"		<p>DMI1 requests the Driver to enter/revalidate "Train Data".</p> <p>OBU1 sends valid "Train Data" to the RBC.</p> <p>OBU1 sends M129 (validated train data)</p>	
8		Sends an acknowledgement to the train. RBC sends M8 (Acknowledgement of train data) and M24 (General Message)	"Start" button is shown on DMI of train1.	
9			OBU2 sends M155 (Initiation of a communication session)	
10		Communication Session is started. RBC sends M32 (Configuration Determination)	<p>OBU2 considers communication session established.</p> <p>OBU2 sends M159 (Session established)</p>	
11		Communication session successfully established.	<p>OBU2 evaluates validity of position.</p> <p>Valid" unambiguous train position is reported. Valid position in trusted area is reported.</p> <p>OBU2 sends M157 (SoM Position Report)</p>	
12		Position received and approved. RBC sends M24 (General Message)	OBU2 requests the driver to select NL, SH or Train Data Entry.	

Step	Actions	RBC	OBU	comments
13	DRIVER enters "Train data" (including train running number)		DMI2 requests the Driver to enter/revalidate "Train Data". OBU2 sends valid "Train Data" to the RBC. OBU2 sends M129 (validated train data)	
14		Sends an acknowledgement to the train. RBC sends M8 (Acknowledgement of train data) and M24 (General Message)	"Start" button is shown on DMI of train2.	

3.1.2 NOR_ESC_TS002 - Awakening after NP or SB - Level 2

Test Objective(s)	To show that the awakening procedure has to be performed after mode NP or SB.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS2-4
Starting conditions	Train in SB mode L2
Additional starting conditions	The Train is not known in RBC. The OBU is in NP-mode after a NOVRAM-reset. The data "Driver ID", "Train Data" and the "level 2 are deleted and "RBC ID/telephone number" is "Unknown" Hint: NP mode is not indicated in the EuroSuite. On powerup of the OBU the first mode indicated is SB.
Train status before Test	Executed Basic Scenario 2

Step	Actions	RBC	OBU	comments
1	DRIVER: Switches the power on and opens the desk.		OBU switches to SB and DMI requests the driver to enter driver ID.	
2	DRIVER enters "Train data" (including train running number)		The driver ID is "valid".	
3	Driver enters/re-validates level 2		Stored position & stored level are not valid. DMI requests the Driver to enter/re-validate level.	
4			OBU offers driver to enter Radio Network ID and requests Driver to enter RBC ID and phone number.	

Step	Actions	RBC	OBU	comments
5	Driver validated Data		<p>.</p> <p>OBU contacts RBC.</p> <p>OBU sends M155 (Initiation of a communication session)</p>	
6		<p>Communication Session is started.</p> <p>RBC sends M32 (Configuration Determination)</p>	<p>OBU considers communication session established.</p> <p>OBU sends M159 (Session established)</p>	
7		<p>Communication session successfully established.</p>	<p>OBU evaluates validity of position.</p> <p>Reports "invalid" or "unknown" position to the RBC</p> <p>OBU sends M157 (SoM Position Report)</p>	
8		<p>RBC is not able to confirm position.</p> <p>RBC accepts train without valid position</p> <p>RBC sends M41 (Train accepted)</p>	<p>OBU sends M146 (Acknowledgement)</p>	
9		<p>RBC sends M24 (General Message)</p>	<p>OBU deletes stored "Train position" data and requests the Driver to select NL, SH or Train Data Entry.</p>	
10	DRIVER: Selects Train Data Entry (including train running number.		<p>DMI requests the Driver to enter/revalidate "Train Data".</p>	

Step	Actions	RBC	OBU	comments
11			OBU sends valid "Train Data" to the RBC. OBU sends M129 (validated train data)	
12		Receives valid Train data. Sends an acknowledgement to the train. RBC sends M8 (Acknowledgement of train data) and M24 (General Message)	"Start" button is shown on DMI.	

3.1.3 NOR_ESC_TS003 - Start of Mission from Unknown Position 1 (SR to FS)

Test Objective(s)	To show that a Start of Mission "SOM" is possible from unknown position.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS2-5
Starting conditions	Train in SB mode L2
Additional starting conditions	A train is at standstill at a station or in a parking area
Train status before Test	Executed Basic Scenario 2

Step	Actions	RBC	OBU	comments
1	DRIVER: Selects "Start".		M132 MA Request	
2		Receives MA request with train position "not valid".		
3		No valid train position => RBC sends a SR authorization. Telegram: Request=0x03: SoM with invalid position		
4		[M2 SR Authorisation]	SR authorisation is received.	
5			OBU requests the Driver to acknowledge for SR-mode.	
6	DRIVER: Driver requests the Dispatcher to move in SR-mode.			

Step	Actions	RBC	OBU	comments
7	DISPATCHER: Gives written order to start moving in SR-mode and set Route for FS Mode.			
8	DRIVER: Driver accepts for SR. OBU switches to SR-mode.	Receives SR-mode	OBU sends M136 (Train Position Report)	
9	DRIVER: Starts moving the train and passes the SMB. Info: When the train passes the balise in front of the SMB, it is able to determine its position, which is then sent to the RBC.		OBU sends M136 (Train Position Report)	
10		Status and position received. FS-MA is fulfilled.		
11		RBC sends M3 or M33 MA with Shifted Location Reference P15 L2 MA for OS mode profil.		
13	TRAIN: Moves to the Signal in OS mode. TRAIN: Needs to pass the signal to obtain FS mode.			
14			OBU switches to FS-mode	
15			OBU sends M136 (Train Position Report)	

3.1.4 NOR_ESC_TS004 - Start of Mission from Known Position (OS to FS)

Test Objective(s)	To show that a Start of Mission "SOM" is possible from known position.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS2-7
Starting conditions	Train in SB mode L2
Additional starting conditions	Trainspeed 0 km/h (standstill) in a station or in a parking area The position is known. The train is at standstill. The DMI displays the Start button to the driver. Route for train is locked
Train status before Test	Executed Basic Scenario 3

Step	Actions	RBC	OBU	comments
1	DRIVER: Selects "Start".		OBU sends M132 MA Request	
2		Receives MA request with train position "valid"		
3		RBC sends an OS authorization (OS-MA) M3 or M33 MA with Shifted Location Reference (P15 L2 MA, P80 Mode Profile)		
4			OS authorisation (OS-MA) is received. OBU requests the Driver to acknowledge OS-mode.	
5	DRIVER: Acknowledges OS-mode		OBU switches to OS-mode.	

Step	Actions	RBC	OBU	comments
6		Receives OS-mode	OBU sends M136 (Train Position Report)	
7	TRAIN: moves in OS mode	RBC updates MA to FS starting at exit signal RBC sends M3 (MA)	OBU receives MA	
8			Train passes exit signal -> changes to FS mode OBU sends M136 (Train Position Report)	
9		Receives FS mode		

3.1.5 NOR_ESC_TS005 - Start with antenna over Balise

Test Objective(s)	To verify that the continued mission is not disturbed by a Start-of-Mission over a Balise group
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2 running on a train route
Additional starting conditions	Train is driving in L2 area in FS with a MA.
Train status before Test	Executed Basic Scenario 1 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DRIVER: Approach the EOA and stop the train with the Balise antenna aligned right over a Balise associated with the next signal board.			An observer is required to assist with stopping at correct location.
2	DRIVER: close the cab.			
3	DISPATCHER: Set a train route from the signal board ahead of the train.			A train route is locked.
4	DRIVER: Open the cab and enter train data (normal SoM procedure).	The train is registered in the RBC and indicated at expected position.	OBU enters in SB mode.	

Step	Actions	RBC	OBU	comments
5	DRIVER: Press "START". TRAIN: Switches to SR	RBC sends an FS MA wit OS mode profil (M3) according to the set route.	OBU sends M132 (MA request). OBU sends ACK related to M3. OBU switches to FS mode after passing the signal	
6	DRIVER: Run the train into the train route.	The position of the train is updated correctly.	OBU supervises the mission. Permitted speed and planning area is displayed correctly on the DMI.	

3.1.6 NOR_ESC_TS006 - CES Position configurable (shifted CES)

Test Objective(s)	To show conditional emergency stop (CES) configured with position configurable after signal replacement, causing a reject situation (CES rejected). The used scenario is a train with long FS MA passing onto the subsequent train route. The RBC performs a safety check for legitimate train route release by use of the CES method.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train has arrived at station and reported standstill Train in FS mode with long MA before the exit signal (exit signal in Proceed) and Balise Group
Additional starting conditions	The train is at standstill 50 m. approx. before the signal in FS Mode
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
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Step	Actions	RBC	OBU	comments
1	<p>DRIVER: Approach the exit signal at a very low speed 5 km/h.</p> <p>(The train passes onto next locked train route, i.e. occupying the 1st track section of next route.)</p>	<p>RBC sends M15 (Conditional Emergency Stop) when the exit signal replaces to stop.</p>	<p>OBU rejects CES with M147 (ACK to Conditional Emergency Stop) because the train has passed the emergency stop location.</p> <p>OBU does not brake and the OBU DMI displays no emergency stop.</p> <p>The train moves to the EOA.</p>	<p>Location As default value for shifting the stop location, the default distance between Balise signal group and signalling point (currently 7m with +13m/-2m) is used.</p> <p>Make sure that M15 is really sent!</p> <p>Note that the RBC may omit sending M15 if it gets a position report from the train with an LRBG confirming it is already inside the train route.</p>

3.1.7 NOR_ESC_TS007 - EoA override

Test Objective(s)	Test of a Start-of-Mission with a train reporting UNKNOWN position. Handling of "Stop if in SR" with and without an SR Authorization.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	The balise at the Signal Board is programmed with "stop if in SR" (P137).
Additional starting conditions	
Train status before Test	Executed Basic Scenario2:. Train located inside berth section with UNKNOWN position, with train front approx. 50m from the signal board. Note: Normally the OBU only reports "Invalid position" after a Power OFF → Power ON cycle. Special manipulation may be needed in OBU to force an Unknown position status (also the influence of an acting CMD function, if any, must be taken into account).

Step	Actions	RBC	OBU	comments
1	DRIVER: Select OVERRIDE		OBU switches to SR mode DMI displays the Override procedure as activated	Steps 1-5 is a reference test to confirm the complement of the function addressed in this test case
2	(wait at least 90s) (*)		DMI displays the Override procedure as concluded	*) T_NVOTRIP=90s
3	DRIVER: Move the train passing the signal board	The bg at the signal board produces P137	OBU switches to TRIP mode and applies the emergency brake	

Step	Actions	RBC	OBU	comments
4	When train at standstill: DRIVER: Acknowledge the trip	RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	OBU switches to POST TRIP mode and releases the emergency brake. OBU sends M136 (Position Report) with M_MODE=8 (POST TRIP)	
5	DRIVER: close the cab and power-off the OBU, then again execute Procedure 02 TOOL: Put the train at the same position as in step 1	RBC inter-acts with OBU accordingly	OBU performs End-of-mission according to normal procedure	(in BL2 it is needed to switch to SR mode before closing the cab!)
6	DISPATCHER: Set a train route in front of the train			
7	TRAIN: Is located in front of the locked route	RBC sends M24 with P72	OBU DMI displays the text	The dispatcher can associate the train position by command, to the start of route signal board
8	DRIVER: Press "START"		OBU sends M132 (MA request)	Q_MARQSTREASON=1
9	DRIVER: acknowledge SR mode	RBC sends M2 (SR authorization) including a list of balises corresponding to the route	OBU switches to SR mode OBU sends ACK related to the SR authorization	
10	DRIVER: Move the train until it reads the bg containing P137	RBC sends the MA with OS profile over the route in front of the train	OBU switches from OS → FS mode OBU sends ACK related to the MA	Make sure the train is not tripped due to P137

3.2 Test Scenarios for Train Movements

3.2.1 NOR_ESC_TS101 - Departure of One Train from a Station

Test Objective(s)	To show that the train runs in Level 2 mode FS.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS3-2
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is registered in L2 / FS at RBC. Train has arrived at station and reported standstill. The DMI displays FS-mode and Level 2.
Train status before Test	Executed Basic Scenario 3

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Sets a main route	RBC sends M3 (MA)	FS-MA is received. Departure procedure is performed.	
2	DRIVER: Starts moving the train.		Train runs in FS-MA OBU sends M136 (Train Position Report)	
3		Status and position received.	Train runs to EoA.	
4	DRIVER: Stops the train on approach to EoA.			

3.2.2 NOR_ESC_TS102 - Relocation of Vehicle via a Buffer Stop Track (Start with SHIFTED MA)

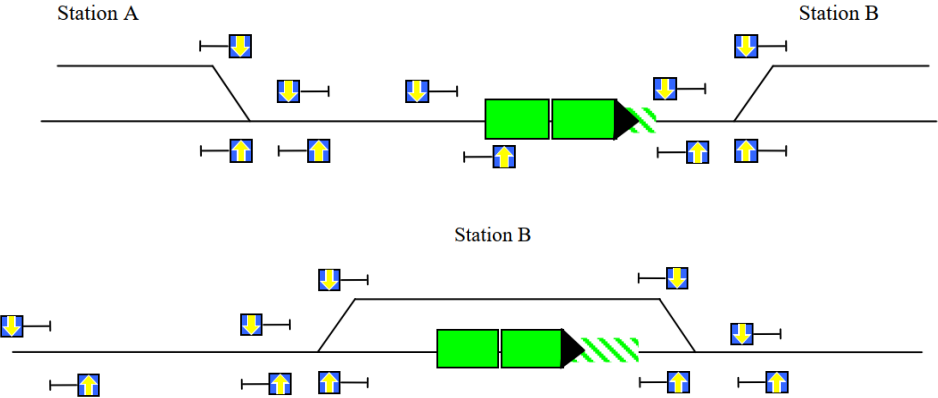
Test Objective(s)	To show relocation of a vehicle via a buffer stop track.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS3-16
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is registered with defined direction of travel. A vehicle stands still at a station. Train position is valid. The DMI displays Level 2, SB-mode. Start button is shown
Train status before Test	Executed Basic Scenario 3

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Sets a main route			
2	DRIVER: Selects Start		OBU sends M132 (MA Request)	
3		Receives MA request with train position "valid" MA with OS mode profile up to SMB is sent RBC sends M3 (MA with shifted Location Reference)	OBU switches to OS mode OBU sends ACK related to the MA OBU sends M136 (Train Position Report)	
4		Receives OS-mode RBC updates MA to FS starting at exit signal		

Step	Actions	RBC	OBU	comments
5		RBC sends M3 (MA)	OBU receives MA	
6			Train passes exit signal -> OBU changes to FS mode OBU sends M136 (Train Position Report)	
7		Receives FS mode		
8	Vehicle runs to destination track			Route releases as soon as the penultimate section is vacated.
9	DISPATCHER: Sets a new route based on former communication			Set new route in opposite direction based on former communication
10	Vehicle changes orientation. New Awakening.			
11	DRIVER: Closes the desk of front cab Engine A.		OBU Engine A changes to SB-mode	If there is a mission End of Mission is performed
12			OBU Engine B changes to SB-mode with the disappearance of remote control signal	

Step	Actions	RBC	OBU	comments
13	DRIVER: Opens Cab in Engine B		Remote control signal detected by the OBU of Engine A. OBU Engine A changes to SL-mode	
14	Basic Scenario 1 or 3 Will be performed			
15			DMI OBU (B) shows "Start" button	
16	DRIVER: Selects Start		OBU sends M132 (MA Request)	
17		OS-MA up to SMB is sent RBC sends M33 (MA)	OS-MA is received and acknowledged	
18			Train passes exit signal -> OBU changes to FS mode OBU sends M136 (Train Position Report)	
19				RBC: Receives FS mode

3.2.3 NOR_ESC_TS103 - One train arrives at a Station

Test Objective(s)	<p>To show that the train runs in Level 2 mode FS and stops at the end of an MA.</p> 
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS3-5
Starting conditions	Train in FS mode L2
Additional starting conditions	A train runs in FS-MA in a Level 2 area. Main route is locked in the direction towards station B. The train is at standstill at the border of station B. The DMI displays FS-mode and Level 2.
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set Route (Main)	MA generation. FS-MA for Train is fulfilled. RBC sends M3 (MA)	FS-MA is received. Departure procedure is performed.	

Step	Actions	RBC	OBU	comments
2	DRIVER: Starts moving the train and the trains runs in FS-MA into station B. TRAIN: Runs to EoA and reports complete standstill.	Stand Still Detection performed. Hint: Standstill detection is independent of the mode.	OBU sends M136 (Train Position Report)	Hint: Standstill Detection performed. Standstill detection is independent of the mode.
3			OBU sends M136 (Train Position Report)	

3.2.4 NOR_ESC_TS104 - OS-Route when Obstacle in Track

Test Objective(s)	To show that the train runs in Level 2 mode OS with an OS-Route.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS3-18
Starting conditions	Train in SB mode L2
Additional starting conditions	Train registered with defined direction of travel and operating in L2 SB-mode. A train stands still at a station. Train position is still valid. DMI displays Level 2. Start button is shown.
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DRIVER: Selects Start.		OBU sends M132 (MA Request)	
2	DISPATCHER: Sets an OS-route.	OS-MA is fulfilled.		
3		M3 or M33 with OS Mode profil (MA with Shifted Location Reference)	OS-authorization is received and acknowledged. OBU sends M136 (Train Position Report)	
4		Status and position received.	Driver starts moving the train and runs in OS-MA to EoA. OBU sends M136 (Train Position Report)	

3.2.5 NOR_ESC_TS105 - Main Route Extended with Shunting Route - SH Mode Profile

Test Objective(s)	To show that the OBU changes from Level 2 FS to Level SH when a shunting route is set.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS3-19
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is driving in L2 area in FS with a MA.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1		Status and position received.	Train is running in FS-MA. OBU sends M136 (Train Position Report)	
2	DISPATCHER: Extends main route with a shunting route.	New MA with SH-mode profile is sent. RBC sends M3 (MA) Hint: P49 List of balises for SH not used.	Mode profile received. Train enters SH acknowledge window. SH acknowledgement is requested on DMI.	
3	DRIVER: Acknowledges SH-mode.		OBU changes to SH-mode.	
4		Status and position received.	Train drives into the shunting route in SH-mode. Connection closes. OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
5		End of the "Communication Session" commanded. RBC sends M24 (General Message)	RBC orders to terminate session received. OBU initiates termination of [Communication Session]. OBU sends M156 (Termination of a communication session)	
6		RBC sends M39 (Acknowledgement of termination of a communication session)	OBU terminates session.	
7				Train runs in SH-mode.

3.2.6 NOR_ESC_TS106 - Nominal run on a long line in both directions

Test Objective(s)	To test nominal train operation over a long line, with several stations (at least 8-10). This will improve confidence in compatibility with railway lines.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2
Additional starting conditions	Train has arrived at station and re-reported standstill. The DMI displays FS-mode and Level 2.
Train status before Test	Executed Basic Scenario 1 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set all train routes of the selected test track in right direction.		OBU DMI displays MA correspondingly	
2	DRIVER: Run the train in FS mode over the selected test track in right direction, at permitted speed.			
3		RBC continuously sends M3 (extended MA) whenever conditions for extension are fulfilled	OBU sends ACK related to the MA OBU DMI extends MA correspondingly Train receives FS-MA.	

Step	Actions	RBC	OBU	comments
4	DRIVER: Stop the train at the end of the selected test track. Close the desk.		OBU sends M150 (End of Mission)	
5		RBC sends M24 (General Message) including P42 (Session Management) with variable: Q_RBC = 0; Q_SLEEPSESSION=0		
6			OBU sends M156 (Termination of a Communication Session)	
7		RBC sends M39 (ACK of Termination of a Communication Session)		
8	DRIVER: Change the cab Perform Start of Mission in left direction inside berth section of the opposing signal board.	RBC sends M33 (MA) with ACK request	OBU sends ACK related to the MA	
9	DISPATCHER: Set all train routes of the selected test track in left direction			
10	DRIVER: Run the train in FS mode over the selected test track in right direction, at permitted speed.	RBC continuously sends M3 (extended MA) whenever conditions for extension are fulfilled	OBU sends ACK related to the MA. OBU DMI displays MA correspondingly Train receives FS-MA.	

Step	Actions	RBC	OBU	comments
11	DRIVER: Stop the train at the end of the selected test track. Close the desk.		OBU sends M150 (End of Mission)	
12		RBC sends M24 (General Message) including P42 (Session Management) with variable: Q_RBC = 0; Q_SLEEPSESSION=0		
13			OBU sends M156 (Termination of a Communication Session)	
14		RBC sends M39 (ACK of Termination of a Communication Session)		

3.2.7 NOR_ESC_TS107 - Changing of train data in FS Mode, accepted by RBC

Test Objective(s)	Test of train data change in FS mode, causing shortening of MA
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2
Additional starting conditions	Train has arrived at station and re-reported standstill. The DMI displays FS-mode and Level 2.
Train status before Test	Executed Basic Scenario 1 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DRIVER: Change the TRAIN DATA about axle load [M_AXLELOADCAT]		OBU deletes its track descriptions, and the MA is shortened to train front. The new EoA is displayed on the DMI. OBU sends M129 (Validated Train Data) with P11 with the modified train data.	As alternative the train category could be changed.
2		RBC checks the validity of the new train data and sends M8 (ACK to validated train data).	OBU sends ACK related to M8.	

Step	Actions	RBC	OBU	comments
3		RBC sends M3 (MA) previously assigned to the train	OBU sends ACK related to M3. OBU accepts the MA and displays the extended MA on the DMI to the same location as before.	Note: Steps 2-3 are executed immediately, meaning that the shortened MA (step 1) is only visible on the DMI for a short period of time.
4	DRIVER: Move to EoA			

3.2.8 NOR_ESC_TS108 - Text message to a train with confirmation

Test Objective(s)	To test that OBU can handle a text message with confirmation required
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in SB mode L2
Additional starting conditions	A train is at standstill at a station or in a parking area not part of the RBC area
Train status before Test	Executed Basic Scenario 2 and NOR_ESC_TS002

Step	Actions	RBC	OBU	comments
1	DRIVER: Selects "Start".		M132 MA Request	
2		Receives MA request with train position "not valid".		
3		No valid train position => RBC sends a SR authorization. Telegram: Request=0x03: SoM with invalid position		
4		[M2 SR Authorisation]	SR authorisation is received.	
5			OBU requests the Driver to acknowledge for SR-mode.	
6	DRIVER: Driver requests the Dispatcher to move in SR-mode.			

Step	Actions	RBC	OBU	comments
7	DISPATCHER: Gives written order to start moving in SR-mode.			
8	DRIVER: Driver accepts for SR. OBU switches to SR-mode.	Receives SR-mode	OBU sends M136 (Train Position Report)	
9	DRIVER: Starts moving the train and passes the SMB. Info: When the train passes the Balise in front of the SMB, it is able to determine its position, which is then sent to the RBC, but the location is not controlled by the RBC.		OBU sends M136 (Train Position Report)	
10		RBC sends M24 (General message) with P72 with information about the position outside RBC area and an order to close the session with confirmation	OBU displays the message on the DMI and sends ACK related to M24	
11			OBU requests acknowledgment of Text message	
12	DRIVER: Acknowledges the message.		OBU sends M158 (Text Message Acknowledged by Driver)	
13		The text confirmation (M158) is received		

3.2.9 NOR_ESC_TS109 - Geographical positioning P79 from Balise

Test Objective(s)	To test that OBU can handle geographical positioning (packet 79) from Balise
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2
Additional starting conditions	A train is at standstill at a station. The DMI displays Level 2 and FS-mode
Train status before Test	Executed Basic Scenario 1 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set a sequence of routes in front of the train, through at least three stations with intermediate lines.	RBC sends M3 (MA) corresponding to the routes.	OBU displays extended MA.	
2	DRIVER: Toggle the geographical position symbol on the DMI to ON		OBU DMI activates the display of current km+m value	At this point the display could be empty if a BG with P79 has not yet been passed.
3	DRIVER: Run the train along the routes	At each Balise Group in the first fixdata Balise: The Balise produces P79 (Geographical info)	OBU DMI displays the current km+m value.	Cross-check with km values on drawings.

Step	Actions	RBC	OBU	comments
4	DRIVER: Stop the train, change direction, and perform SoM		OBU DMI still displays the current km+m value	Without power off
5	DISPATCHER: Set a sequence of routes in front of the train, at least passing one P79 BG	RBC sends M33 (MA) corresponding to the set routes.	OBU displays extended MA	
6	DRIVER: Start the train		OBU DMI displays the current km+m value.	Ensure the values changes in accordance with the new train orientation.
7	DRIVER: Run the train along the routes set.	At each Balise Group in the first fixdata Balise: The Balise produces P79 (Geographical info)	OBU DMI displays the current km+m value.	Cross-check with km values on drawings.

3.3 Test Scenarios for Shunting Movements

3.3.1 NOR_ESC_TS301 - Start and End of Shunting Movements in a TSA

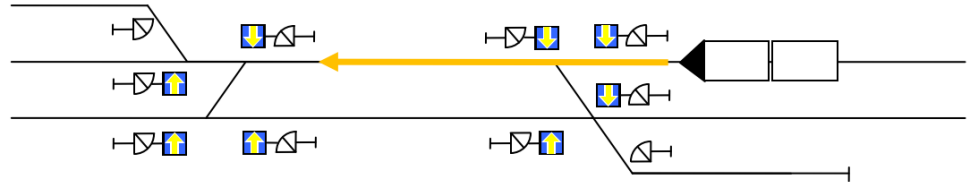
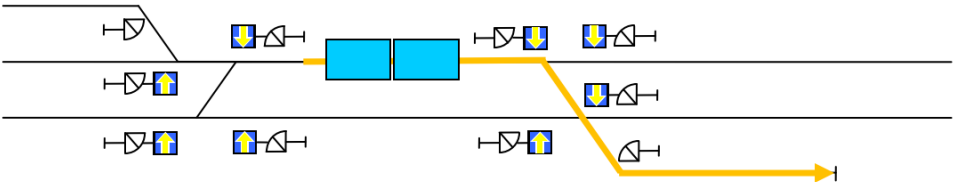
Test Objective(s)	To show start, end and performance of shunting movements in SH-mode in a TSA
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS5-3-1
Starting conditions	Train in SB mode L2
Additional starting conditions	Train has arrived at station and re-reported standstill. Train is registered in L2 area. The train is in SB mode. The DMI waits for the driver to select mode. "Start button" is shown.
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DRIVER: Informs the Dispatcher of his need for a TSA.			
2	DISPATCHER: Activates the TSA.			
3	DRIVER: Select "Shunting Request"		OBU sends M130 (SH request)	

Step	Actions	RBC	OBU	comments
4		Entry in SH (Manual) EndSession performed. Hint: RBC grants SH request due to activated TSA. A valid train position and the estimated front end have to be localized within the active TSA.		
5		Request for shunting is received. SH is permitted.		
6		RBC sends M28 (SH authorised)	Transition to SH. Shunting starts.	
7		Status and position received.	OBU sends M136 (Train Position Report)	
8		End of the "Communication Session" commanded.		
9		RBC sends M24 (General Message)	OBU sends M156 (Termination of a Comm. Session)	
10		RBC acknowledges termination of a communication session. RBC sends M39 (ACK of Termination of a Comm. Session)	OBU terminates session. Shunting movements until end of operation.	
11	DRIVER: Starts moving stops the vehicle in the TSA and exits SH-mode.			

Step	Actions	RBC	OBU	comments
12	DRIVER: Informs dispatcher that he has ended the shunting movement.			
13	DISPATCHER: Gives command for deactivating TSA.			
14	DISPATCHER: Deactivates the TSA.			

3.3.2 NOR_ESC_TS302 - Movements in Shunting Route

Test Objective(s)	<p>To show a shunting movement in a shunting route with optical signals in SH-mode.</p> <p>Movements in Shunting Route:</p> <p>Train enter the track in driving direction 1:</p>  <p>Train leaves the track in driving direction 2.</p> 
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS5-4-2
Starting conditions	Train in SB mode L2
Additional starting conditions	Train has arrived at station and re-ported standstill. The DMI waits for the driver to select mode. "Start button" is shown.
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DRIVER: Informs the dispatcher about the need for shunting route			

Step	Actions	RBC	OBU	comments
2	Driver requests shunting DISPATCHER: Sets a shunting route		OBU sends M130 (SH request)	RBC grants SH request due to shunting route in front of train.
3		Request for shunting is received. SH is permitted. RBC sends M28 (SH authorised)		
5			Transition to SH. Shunting starts. OBU sends M136 (Train Position Report)	
6		Status and position received. Terminate Session performed.	OBU has changed mode to SH. OBU sends M136 (Train Position Report)	
7		End of the "Communication Session" commanded. RBC sends M24 (General Message)	RBC orders to terminate session received. OBU initiates termination of Communication Session. OBU sends M156 (Termination of a communication session)	

Step	Actions	RBC	OBU	comments
8		RBC acknowledges termination of a communication session. RBC sends M39 (Acknowledgement of termination of a communication session)	OBU terminates session.	
9	DRIVER: Starts moving the train in the shunting route			
10	DISPATCHER: Prepares the new shunting route.			IL: New shunting route is locked. Start signal shows proceed with caution.
11	TRAIN: Reverses into the track. TRAIN: Stops in the track.			

3.3.3 NOR_ESC_TS303 - TSA With Shunting Signals

Test Objective(s)	To show shunting movements in a TSA with shunting signals.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS5-4-3
Starting conditions	Train in SB mode L2
Additional starting conditions	Train has arrived at station and reported standstill. Train is registered in L2 area. The train is in SB mode. The DMI waits for the driver to select mode. "Start button" is shown.
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DRIVER: Ends the mission and informs the dispatcher about the need for shunting route			
2	DRIVER: requests shunting DISPATCHER: Activates the TSA		OBU sends M130 (SH request)	RBC grants SH because train is in activated TSA.
3		Request for shunting is received. SH is permitted.		
5		RBC sends M28 (SH authorised)	Transition to SH. Shunting starts.	

Step	Actions	RBC	OBU	comments
6	DRIVER: Starts moving the train in the TSA			
7	DRIVER: stops the vehicle in the TSA and exits SH-mode			
8	DRIVER: Informs the dispatcher that he has ended the shunting movement DISPATCHER: Gives command for deactivating TSA			

3.3.4 NOR_ESC_TS304 - Enter in Shunting Route

Test Objective(s)	To show how to enter a PSA in mode SH.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS5-5-2
Starting conditions	Train in SB mode L2
Additional starting conditions	Train is at standstill in SB mode in front of an optical signal at the border of a PSA. The DMI displays Level 2. Driver ends the mission and informs the Dispatcher about the need for shunting route.
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Sets a route for shunting movements into the PSA.			
2	DRIVER: Requests SH.			
3		Entry in SH (Manual) EndSession performed. Hint: RBC grants SH request due to shunting route in front of train.		
4			OBU sends M130 (SH request)	
5		Request for shunting is received. SH is permitted.		

Step	Actions	RBC	OBU	comments
6		RBC sends M28 (SH authorized)	Transition to SH. Shunting starts. OBU sends M136 (Position Report) with M_MODE=3	
7		Status and position received.		
8		End of the "Communication Session" commanded. RBC sends M24 (General Message)	RBC orders to terminate session received. OBU initiates termination of Communication Session. OBU send M156 (Termination of a communication session)	
9		RBC sends M39 (ACK of Termination of a Communication Session)	OBU terminates session.	
10	TRAIN: Starts moving in the shunting route.		Train drives inside the border of PSA	

3.3.5 NOR_ESC_TS305 – Enter PSA in FS with Shunting Profile

Test Objective(s)	To show changing the mode from FS to SH when a route is set into PSA.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS5-5-3
Starting conditions	Train in FS mode L2
Additional starting conditions	No route is set into the PSA. Train is running in FS-mode near the border of a PSA.
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_004

Step	Actions	RBC	OBU	comments
1			OBU sends M136 (Train Position Report)	
2	DISPATCHER: Sets route into PSA.	RBC knows that end SMB of the main route is entry to a PSA and internally generates shunting aspect for this SMB. RBC sends M3 (MA) New MA with SH mode profile is sent.	Mode profile received. Train continues in route towards PSA.	
3	TRAIN: passes the balise group inside PSA		Train enters SH acknowledgement window. SH acknowledgement is requested. OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
4	DRIVER: Acknowledges SH-mode.		OBU switches immediately to SH-mode. OBU sends M150 (End of Mission)	
5		Status and position received. EoM performed. Hint: OBU was in FS-mode, has changed to SH-mode with a mission because there was an ongoing one.		IL: EoM information received. Release remaining route.
6		End of the "Communication Session" commanded. Terminate Session performed.	OBU has changed mode to SH. OBU sends M136 (Train Position Report)	
7		Status and position received. End of the "Communication Session" commanded. RBC sends M24 (General Message)	RBC orders to terminate session received. OBU initiates termination of Communication Session. OBU sends M156 (Termination of a communication session)	

Step	Actions	RBC	OBU	comments
8		RBC acknowledges termination of a communication session. RBC sends M39 (Acknowledgement of termination of a communication session)	OBU terminates session.	
9	TRAIN: Drives inside the border of PSA in SH mode.			

3.3.6 NOR_ESC_TS306 – Exit a PSA in OS/FS Mode

Test Objective(s)	To show changing the mode from SH to FS when a route is set from a PSA to Level 2 area.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS5-5-5
Starting conditions	Train in SH mode L2
Additional starting conditions	A train is at standstill in front of a marker board which is used as a starting point for a route out of the PSA. The DMI displays SH-mode. Position is valid because the train has passed a balise group.
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DRIVER: Ends shunting mission.			
2	DRIVER: Selects 'exit shunting' and train is at standstill. OBU and changes to SB-mode.		Awakening from SB is performed. 'Start button' is shown on the DMI.	
3		SoM (Valid position reported by OBU in trusted area performed)	OBU switches to SB. OBU requests the driver to enter/re-validate driver ID. Driver ID is "valid".	

Step	Actions	RBC	OBU	comments
4			Stored position & stored level are valid. OBU in level 2. Mobile Terminal is registered.	
5			OBU contacts RBC. OBU sends M155 (Initiation of a communication session)	
6		Communication Session is started. RBC sends M32 (Configuration Determination)	OBU considers communication session established. OBU sends M159 (Session established)	
7			OBU evaluates validity of position. OBU reports "valid" position to the RBC. OBU sends M157 (SoM Position Report)	
8		RBC accepts train with valid position. RBC sends (M24 General Message) Position within trusted area.	OBU requests the driver to select NL, SH or Train Data Entry.	

Step	Actions	RBC	OBU	comments
9	DRIVER: Selects Train Data Entry. Driver enters Train Data (including train running number)		DMI requests the Driver to enter/revalidate "Train Data". OBU sends valid "Train Data" to the RBC. OBU sends M129 (validated train data)	
10		Receives valid Train data. Sends an acknowledgement to the train. RBC sends M8 (Acknowledgement of train data) and M24 (General Message)	Start" button is shown	
11			Start button" is pressed and MA request is sent. OBU sends M132 (MA Request)	
12		Train registration. MA request received.		
13	DISPATCHER: Sets route from the PSA.	Generate FS-MA with OS mode profile. RBC sends M33 (MA with Shifted Location Reference)	OS-MA is received and acknowledged. OBU switches to OS-mode. OBU sends M136 (Train Position Report)	
14		Status and position received.		
15	DRIVER: Starts moving the train.		OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
16		RBC upgrades MA (according to the signal aspect). Train passes the signal position with its min safe front end. RBC sends M3 (MA)	OBU switches to FS-mode. OBU sends M136 (Train Position Report)	
17		Receives FS-mode.		
18	TRAIN: Moves and passes the marker board.	Status and position received.	OBU sends M136 (Train Position Report)	
19	TRAIN: Moves and passes the points and TVP sections.		Train continues driving to EoA.	

3.3.7 NOR_ESC_TS307 - Exit in OS/FS-Mode and Change of Orientation

Test Objective(s)	To show the procedure for an orientation change.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS5-7-4
Starting conditions	Train in SH mode L2
Additional starting conditions	A train end shunting at Siding. The DMI displays SH-mode. Train position is known due to balises in the PSA. The siding is a PSA and protected for automatic operation. Train cab A is active, oriented for driving forward out of the siding and into the station.
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DRIVER: Ends shunting mission.			
2	DRIVER: Selects "exit shunting" with train at standstill.		OBU changes to SB-mode. Awakening from SB is performed.	
3		SoM (Valid position reported by OBU in trusted area performed)	OBU switches to SB. OBU requests the driver to enter/re-validate driver ID.	

Step	Actions	RBC	OBU	comments
4	DRIVER: Revalidates driver ID.		<p>Driver ID is "valid".</p> <p>Stored position & stored level are valid.</p> <p>OBU in level 2.</p> <p>Mobile Terminal is registered.</p>	
5			<p>OBU contacts RBC.</p> <p>OBU sends M155 (Initiation of a communication session).</p>	
6		<p>Communication Session is started. RBC sends M32 (Configuration Determination).</p>	<p>OBU considers communication session established.</p> <p>OBU sends M159 (Session established)</p>	
7		<p>Communication session successfully established.</p>	<p>OBU evaluates validity of position.</p> <p>OBU reports "valid" position to the RBC.</p> <p>OBU sends M157 (SoM Position Report).</p>	
8		<p>RBC accepts train with valid position. RBC sends M24 (General Message)</p>		
9		<p>Position within trusted area.</p>	<p>OBU requests the driver to select NL, SH or Train Data Entry.</p>	

Step	Actions	RBC	OBU	comments
10	DRIVER: Selects Train Data Entry and enter Train Data (including train running number).		DMI requests the Driver to enter/revalidate "Train Data". OBU sends valid "Train Data" to the RBC. OBU sends M129 (validated train data)	
11		Receives valid Train data.		
12		Sends an acknowledgement to the train. RBC sends M8 (Acknowledgement of train data) and M24 (General Message).	"Start" button is shown.	
13	DRIVER: Start button" pressed.		OBU sends M132 (MA Request)	
14		MA request is received (with train position "valid").		
15	DISPATCHER: Sets a route from Siding.	Generate FS-MA with OS mode profile. RBC sends M33 (MA with Shifted Location Reference)	OS-MA is received and acknowledged. OBU switches to OS-mode. OBU sends M136 (Train Position Report)	
16		Status and position received.		

Step	Actions	RBC	OBU	comments
17	TRAIN: Starts moving.	RBC upgrades MA (according to the signal aspect). Train passes the signal position with its min safe front end. RBC sends (M3 MA).	OBU switches to FS-mode. OBU sends M136 (Train Position Report)	
18		Receives FS-mode.		
19	TRAIN: Moves and passes the points and TVP sections. Train stops outside trusted area.			
20	DRIVER: Closes the desk of front cab A.		OBU changes to SB-mode.	
21	DRIVER: Opens desk of cab B	SoM3 (Valid position reported by OBU not in trusted area) performed.	OBU remains in SB mode	
22			The OBU requests the driver to enter / re-validate driver ID, offers the driver the possibility to enter / re-validate the train running number and offers the driver the possibility to set / remove a Virtual Balise Cover.	

Step	Actions	RBC	OBU	comments
23			Driver ID is "valid". Stored position & stored level are valid. Mobile Terminal is registered. OBU sends M155 (Initiation of a communication session)	
24		Communication Session is started. RBC sends M32 (Configuration Determination)	OBU considers communication session established. OBU sends M159 (Session established)	
25		Communication session successfully established.	OBU evaluates validity of position. OBU reports "valid" position to the RBC. OBU sends M157 (SoM Position Report)	
26		Position outside trusted area. RBC sends M24 (General Message).	OBU requests the Driver to select NL, SH or Train Data Entry.	

Step	Actions	RBC	OBU	comments
27	DRIVER: Selects Train Data Entry and enter Train Data (including train running number).		DMI requests the Driver to enter/re-validate "Train Data". OBU sends valid "Train Data" to the RBC. OBU sends M129 (validated train data)	
28		Receives valid Train data.		
29		Sends an acknowledgement to the train. RBC sends M8 (Acknowledgement of train data) and M24 (General Message).	"Start" button is shown.	
30	DRIVER: press the Start button		OBU sends M132 (MA Request)	
31	TRAIN: Change to L2 SR mode			
32	DISPATCHER: Sets a route to next Station.	FS-MA with OS mode profile generated. RBC sends M33 (MA with Shifted Location Reference)	OS-authorization is received and acknowledged.	
33	DRIVER: Starts moving the train.		OBU sends M136 (Train Position Report)	
34		RBC upgrades MA (according to the signal aspect). Train passes the signal position with its min safe front end. RBC sends M3 (MA)	OBU switches to FS-mode. OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
35		Receives FS-mode.	The train runs in FS-MA to Station and EoA. OBU sends M136 (Train Position Report)	
36		Train position and status received.		

3.3.8 NOR_ESC_TS308 - Dispatcher Allows SH-mode

Test Objective(s)	To show that the Dispatcher has the possibility to allow transition to SH-mode.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS5-7-10
Starting conditions	Train not registered
Additional starting conditions	TSA activated
Train status before Test	Train is parked with no power outside trusted area.

Step	Actions	RBC	OBU	comments
1	DRIVER: Powers on the train and opens the desk Awakening procedure is performed and Driver selects level 2			
2		Basic Scenario 2 performed		
3	DRIVER: Selects SH-mode outside a TSA		OBU sends M130 (Request for Shunting)	
4		Conditions for grant of SH by RBC are not fulfilled => relay SH request to Dispatcher		

Step	Actions	RBC	OBU	comments
5	DISPATCHER: Receives a request for confirmation of SH mode DISPATCHER: allows SH-mode	SH granted RBC sends M28 (SH Authorised)	SH authorisation is received OBU sends M136 (Train Position Report)	The change to SH-Mode from SB-Mode is not considered as an EoM
6		Status and position received.		

3.4 Test Scenarios for Transitions and Interfaces

3.4.1 NOR_ESC_TS401 - Entrance to an ERTMS Area (NTC - L2, FS-Mode)

Test Objective(s)	To show level transition procedure from NTC to Level 2.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS6-2-1
Starting conditions	Train in SN mode NTC
Additional starting conditions	<p>Route is locked in both NTC and ERTMS areas. A train runs in SN mode in an NTC area. DMI displays STM - NO/SE Entrance to an ERTMS Area (NTC - L2, FS-Mode) Train in front of the balise group with the 'Level Transition Announcement':</p> <p>¹⁾ D_LEVELTR = distance to LTO BG + offset ²⁾ min. 1,5s @ line speed</p>
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	TRAIN: Passes the balise group GSM-R Registration.	Balise: sends Radio Network registration. P45 Radio Network registration	Connection to GSM-R network is performed. The train passes the balise group Session Management.	
2		Balise: sends Session management information.		
3		P42 Session Management P3 National Values	The train receives an order to connect to the RBC with a given ID (of OBU) and telephone number. OBU sends M155 (Initiation of a communication session)	
4		Initiates a communication session with the train. RBC sends M32 (RBC System Version)	OBU sends M159 (Communication session established)	
5		Session established.	OBU sends train data M136 (position report) and M129 (validated train data)	
6		Train data received. RBC sends M8 (Acknowledgement of train data)	Train data Ack received	

Step	Actions	RBC	OBU	comments
7		FS-MA is sent. RBC sends M3 (MA)	The FS-MA is stored onboard and will only be supervised when the transition has taken place.	
8	TRAIN: Passes the transition announcement balise group	Balise: sends transition announcement to level 2 P41 Level Transition Order		
9			OBU requests acknowledgment of Level 2 transition	
10	DRIVER: Acknowledges the level transition.	Balise: sends transition order to Level 2 P41 Level Transition Order	The train passes the level transition border and OBU switches to level 2 FS-MA.	
11		Information of Level transition and position received.	OBU sends M136 (Train Position Report)	
12		RBC sends M3 (MA)	Train receives MA (identical to the existing one). Train runs in FS-MA in Level 2 area. Train passes NTC balise "signal information.	

3.4.2 NOR_ESC_TS402 - Exit 1 from an ERTMS Area (L2 - NTC, SN-Mode)

Test Objective(s)	To show an area transition from ERTMS L2 area to NTC.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS6-2-2
Starting conditions	Train in FS mode L2
Additional starting conditions	<p>Train registered operating in L2 FS mode. Train is running with line speed.</p>
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set route to signalling system border.			

Step	Actions	RBC	OBU	comments
2		MA to the border is sent. RBC sends M3 (MA)	MA received. Train is running with line speed.	
3	INTERLOCKING: Entry signal in adjacent interlocking shows proceed => send signal aspect to RBC.	Entry signal in adjacent interlocking shows proceed => update LOA speed. RBC sends M3 (MA)	The OBU supervises the new LoA. The train passes the announcement balise group.	
4		Balise: sends transition announcement to level NTC. P41 (Level Transition Order) P3 (National Values)	OBU announces to driver that transition to Level NTC will take place. OBU sends M136 (Train Position Report)	
5		Position received.		
6			OBU requests acknowledgment of Level NTC transition.	Train passes NTC balise "speed restrictions ahead". The transition acknowledgement point is passed.
7	DRIVER: Acknowledges the level transition.			

Step	Actions	RBC	OBU	comments
8		Balise: sends transition order to level NTC. P41 (Level Transition Order)	The train passes the level transition border and OBU switches to level NTC.	Train passes NTC balise "signal information".
9		Orders the onboard to terminate the session. Terminate Session performed.	OBU has changed to Level NTC. OBU sends: M136 (Train Position Report)	Hint: Session termination initiated by mode change. Several modes are possible. Report mode change to RBC.
10		Status and position received. End of the "Communication Session" commanded. RBC sends M24 (General Message)	RBC orders to terminate session received. OBU initiates termination of [Communication Session]. OBU sends M156 (Termination of a communication session)	
11		RBC acknowledges termination of a communication session. RBC sends M39 (Acknowledgement of termination of a communication session)	OBU terminates session. Train runs in level NTC.	

3.4.3 NOR_ESC_TS403 - Exit from an ERTMS Area (L2 - L0, SH-Mode)

Test Objective(s)	To show an area transition from ERTMS L2 area to Level 0 in a PSA.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS6-2-3
Starting conditions	Train in FS mode L2
Additional starting conditions	Train registered operating in L2 FS mode. A train runs in FS-MA in a Level 2 area
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1		RBC determines that level transition announcement must be sent to train. RBC sends M24 (General Message)	OBU announces to driver that transition to Level 0 will be taking place.	
2		Target speed beyond the border (LoA) sent. RBC sends M3 (MA)	OBU supervises the new LoA.	
3			The transition acknowledgement point is passed. Onboard requests acknowledgment of Level 0 transition.	
4	DRIVER: Acknowledges the level transition.		The train passes the level transition border and OBU switches to level L0.	

Step	Actions	RBC	OBU	comments
5		Orders the OBU to terminate the session. Terminate Session performed.	OBU has changed to Level 0. OBU sends: M136 (Train Position Report)	Hint: Session termination initiated by mode change.
6		Status and position received. End of the "Communication Session" commanded. RBC sends M24 (General Message)	RBC orders to terminate session received. OBU initiates termination of [Communication Session]. OBU sends M156 (Termination of a communication session)	
7		RBC acknowledges termination of a communication session. RBC sends M39 (Acknowledgement of termination of a communication session)	OBU terminates session. Train runs in level 0.	

3.4.4 NOR_ESC_TS404 - Approaching LoA to NTC Area. Entrance Signal in Stop)

Test Objective(s)	To show the procedure for the target speed beyond the border in NTC area.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS6-2-4
Starting conditions	Train in FS mode L2
Additional starting conditions	Route is locked to the border to LoA. The train runs in FS-MA. DMI displays FS-mode and Level 2.
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1			DMI displays distance and speed information. OBU sends M136 (Train Position Report)	
2		Status and position received Target speed beyond the border (LoA) sent.	Train reaches indication limit. DMI indication shows that permitted speed will decrease.	
3	DRIVER: Decelerates the train.		OBU sends M136 (Train Position Report)	
4		Status and position received.	OBU supervises the LoA.	

Step	Actions	RBC	OBU	comments
5			<p>The transition acknowledgement point is passed.</p> <p>OBU requests acknowledgment of Level NTC transition or Level 0.</p>	
6	DRIVER: Acknowledges the level transition.		The train passes the level transition border and OBU switches to level NTC or Level 0.	
7		Terminate Session performed.	<p>OBU has changed to Level NTC or Level 0.</p> <p>OBU sends M136 (Train Position Report)</p>	
8		Status and position received.		
9		<p>End of the "Communication Session" commanded.</p> <p>RBC sends M24 (General Message with P42 Session Management (Q_RBC = 0))</p>	<p>OBU initiates termination of Communication Session.</p> <p>OBU sends M156 (Termination of a communication session)</p>	
10		<p>RBC acknowledges termination of a communication session.</p> <p>RBC sends M39 (Acknowledgement of termination of a communication session)</p>	<p>OBU terminates session.</p> <p>STM supervises the train to release speed according to NTC.</p>	

3.4.5 NOR_ESC_TS405 - Entrance to an ERTMS Area (Transition L0 -> L2)

Test Objective(s)	To show a normal area transition from level 0 to level 2.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in NTC mode UN / L0
Additional starting conditions	A train is at standstill at a station. The DMI displays NTC mode UN / L0
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	TRAIN: Passes the balise group GSM-R Registration.	Balise: sends Radio Network registration. P45 Radio Network registration	Connection to GSM-R network is performed. The train passes the balise group Session Management.	
2		Balise: sends Session management information.		
3		P42 Session Management P3 National Values	The train receives an order to connect to the RBC with a given ID (of OBU) and telephone number. OBU sends M155 (Initiation of a communication session)	

Step	Actions	RBC	OBU	comments
4		Initiates a communication session with the train. RBC sends M32 (RBC System Version)	OBU sends M159 (Communication session established)	
5		Session established.	OBU sends train data M136 (position report) and M129 (validated train data)	
6		Train data received. RBC sends M8 (Acknowledgement of train data)	Train data Ack received	
7		FS-MA is sent. RBC sends M3 (MA)	The FS-MA is stored onboard and will only be supervised when the transition has taken place.	
8	TRAIN: passes the transition announcement balise group	Balise: sends transition announcement to level 2 P41 Level Transition Order		
9			OBU requests acknowledgment of Level 2 transition	
10	DRIVER: Acknowledges the level transition.		The train passes the level transition border and OBU switches to level 2 FS-MA.	

Step	Actions	RBC	OBU	comments
11		Information of Level transition and position received.	OBU sends M136 (Train Position Report)	
12		RBC sends M3 (MA)	Train receives MA (identical to the existing one). Train runs in FS-MA in Level 2 area.	

3.4.6 NOR_ESC_TS406 - Transition system L NTC -> L2, in OS-mode

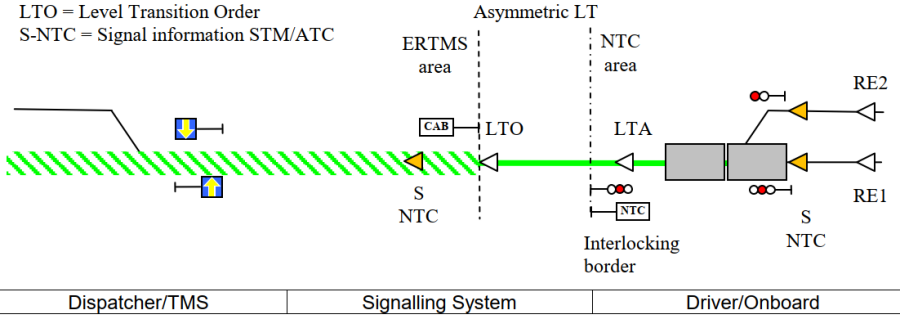
Test Objective(s)	To show level transition procedure from NTC to Level 2.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in SN mode NTC
Additional starting conditions	Route is locked in both NTC and ERTMS areas in OS- mode. A train runs in SN mode in an NTC area. DMI displays STM - NO/SE Entrance to an ERTMS Area (NTC - L2, FS-Mode) Train in front of the balise group with the 'Level Transition Announcement'
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC + Balise	OBU	comments
1	TRAIN: Passes the balise group GSM-R Registration.	Balise: sends Radio Network registration. P45 Radio Network registration	Connection to GSM-R network is performed. The train passes the balise group Session Management.	
2		Balise: sends Session management information.		
3		P42 Session Management P3 National Values	The train receives an order to connect to the RBC with a given ID (of OBU) and telephone number. OBU sends M155 (Initiation of a communication session)	

Step	Actions	RBC + Balise	OBU	comments
4		Initiates a communication session with the train. RBC sends M32 (RBC System Version)	OBU sends M159 (Communication session established)	
5		Session established.	OBU sends train data M136 (position report) and M129 (validated train data)	
6		Train data received. RBC sends M8 (Acknowledgement of train data)	Train data Ack received	
7		OS-MA is sent. RBC sends M3 (MA)	The OS-MA is stored onboard and will only be supervised when the transition has taken place.	
8	TRAIN: Passes the transition announcement balise group	Balise: sends transition announcement to level 2 P41 Level Transition Order		
9			OBU requests acknowledgment of Level 2 transition	
10	DRIVER: Acknowledges the level transition.			

Step	Actions	RBC + Balise	OBU	comments
11			OBU sends M136 (Position Report) with Mode OS and level 2 OBU DMI displays Level 2 and OS mode and a request for OS acknowledgement.	(Train performs the level transition to L2 based on LT announcement or LTO BG)
12	DRIVER: Acknowledge the OS mode			
13		RBC sends M3 including P80 with OS profile for the entrance area.	OBU sends ACK related to M3	

3.4.7 NOR_ESC_TS407 - Transition system L NTC -> L2, in FS-mode with TSR

Test Objective(s)	To show level transition procedure from NTC to Level 2 with an active TSR in the MA.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in SN mode NTC
Additional starting conditions	<p>Route is locked in both NTC and ERTMS areas. A train runs in SN mode in an NTC area. DMI displays STM - NO/SE Entrance to an ERTMS Area (NTC - L2, FS-Mode) Train in front of the balise group with the 'Level Transition Announcement':</p> <p>RE = Radio Establishment LTA = Level Transition Announcement LTO = Level Transition Order S-NTC = Signal information STM/ATC</p> 
Train status before Test	Executed Basic Scenario 1

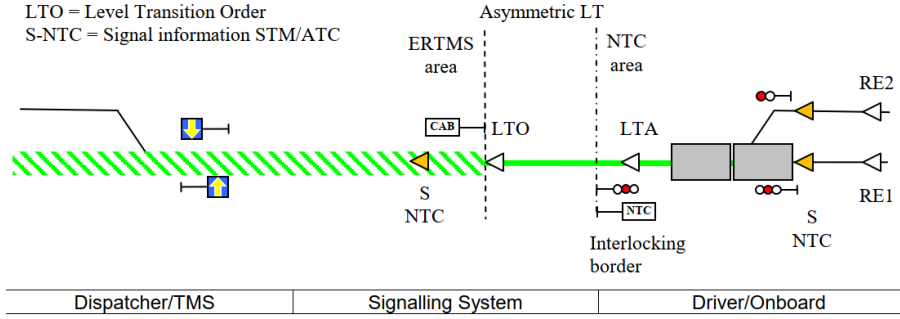
Step	Actions	RBC + Balise	OBU	comments
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Step	Actions	RBC + Balise	OBU	comments
1	TRAIN: Passes the balise group GSM-R Registration.	Balise: sends Radio Network registration. P45 Radio Network registration	Connection to GSM-R network is performed. The train passes the balise group Session Management.	
2	BALISE: Sends Session management information.			
3	DISPATCHER: Activate a TSR on the 1 st route in the ERTMS Area			
4	BALISE: Sends P42 Session Management and P3 National Values		The train receives an order to connect to the RBC with a given ID (of OBU) and telephone number. OBU sends M155 (Initiation of a communication session)	
5		RBC sends M32 (RBC System Version)	OBU sends M159 (Communication session established)	
6		Session established.	OBU sends train data M136 (position report) and M129 (validated train data)	

Step	Actions	RBC + Balise	OBU	comments
7		Train data received. RBC sends M8 (Acknowledgement of train data)	Train data Ack received	
8		RBC sends M3 (MA) with P65 (TSR)	OBU stores the TSR in the buffer OBU requests acknowledgment of Level 2 transition The FS-MA is stored onboard and will only be supervised when the transition has taken place.	
9	TRAIN: Passes the transition announcement balise group	Balise: sends transition announcement to level 2 P41 Level Transition Order		
10	DRIVER: Acknowledges the level transition.	Balise: sends transition order to Level 2 P41 Level Transition Order	The train passes the level transition border and OBU switches to level 2 FS-MA. The speed limitation due to the TSR is visible on the DMI.	
11		Information of Level transition and position received.	OBU sends M136 (Train Position Report)	

Step	Actions	RBC + Balise	OBU	comments
12		RBC sends M3 (MA) with P65 (TSR)	Train receives MA (identical to the existing one). Train runs in FS-MA in Level 2 area with TSR speed.	

3.4.8 NOR_ESC_TS408 - Transition system L NTC -> L2, with loss of connection

Test Objective(s)	To show level transition procedure from NTC to Level 2 with a loss of connection provoking an MA section timeout within the OBU.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in SN mode NTC
Additional starting conditions	<p>Route is blocked in both NTC and ERTMS areas. A train runs in SN mode in an NTC area. DMI displays STM - NO/SE Entrance to an ERTMS Area (NTC - L2, FS-Mode) Train in front of the balise group with the 'Level Transition Announcement':</p> <p>RE = Radio Establishment LTA = Level Transition Announcement LTO = Level Transition Order S-NTC = Signal information STM/ATC</p> 
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
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Step	Actions	RBC	OBU	comments
1	TRAIN: Passes the balise group GSM-R Registration.	Balise: sends Radio Network registration. P45 Radio Network registration	Connection to GSM-R network is performed. The train passes the balise group Session Management.	
2		Balise: sends Session management information.		
3		P42 Session Management P3 National Values	The train receives an order to connect to the RBC with a given ID (of OBU) and telephone number. OBU sends M155 (Initiation of a communication session)	
4		Initiates a communication session with the train. RBC sends M32 (RBC System Version)	OBU sends M159 (Communication session established)	
5		Session established.	OBU sends train data M136 (position report) and M129 (validated train data)	
6		Train data received. RBC sends M8 (Acknowledgement of train data)	Train data Ack received	

Step	Actions	RBC	OBU	comments
7		FS-MA is sent. RBC sends M3 (MA)	The FS-MA is stored onboard and will only be supervised when the transition has taken place.	
8	TRAIN: Passes the transition announcement balise group	Balise: sends transition announcement to level 2 P41 Level Transition Order		
9	DRIVER: Reduce the speed so that the shortened EoA can be respected (See step 11)			
10			OBU requests acknowledgment of Level 2 transition	
11	TOOL: Shut-down the connection between RBC and OBU (by interrupt Patch cable connection to the KBS)			
12	DRIVER: Acknowledges the level transition.		OBU sends M136 (Position Report) with Mode FS and level 2. OBU evaluates T_SECTIONTIMER, which has expired. OBU shortens the MA and regards the entry signal as EoA. OBU DMI displays Level 2 and FS mode.	(Train performs the level transition to L2 based on LT announcement or LTO BG)

Step	Actions	RBC	OBU	comments
13			OBU DMI displays the entry signal as the EoA	
14	DRIVER: Brake the train to standstill before the entry signal.			
15	TOOL: Restore the RBC-OBU connection	RBC sends M3 (extended MA) without time limitation	OBU sends ACK related to M3	
16	DRIVER: Start the train and pass the entry signal board.			

3.4.9 NOR_ESC_TS409 - Transition L2 -> system L NTC, from standstill, EXIT SIGNAL “PROCEED”

Test Objective(s)	To show an area transition from ERTMS L2 area to NTC where the train starts at the border and then the LTA information is sent from the RBC instead of a Balise Group
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train is at standstill and in SB, positioned right in front of the exit signal and there is no route locked in adjacent interlocking (System L). Note: The trackside system must be configured to produce an MA based on the border signal status
Additional starting conditions	
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	TRAIN: Is at standstill before the border signal and after the LTA BG with SoM procedure complete. DRIVER: Press “START”.		OBU sends M132 (MA request).	
2	DISPATCHER: Set the first adjacent route (starting at border signal) Exit signal shows “Proceed”	RBC sends M3 (extended MA) with EoA beyond the ERTMS border, including an LTA(P41).	OBU sends ACK related to M3 and DMI displays the extended MA beyond the border, with EoA corresponding to the end of the set route. OBU DMI displays the text/symbol informing about level transition	

Step	Actions	RBC	OBU	comments
3	DRIVER: Acknowledge the level transition			
4	DRIVER: Start the train.			
5			OBU sends M136 (Position Report) with mode National System OBU switches to STM supervision OBU DMI starts displaying ATC-related supervision information	(Train performs Level Transition to NTC)

3.4.10 NOR_ESC_TS410 - Transition L2 -> system L NTC, in OS

Test Objective(s)	To test a transition scenario from Level 2 to Level NTC, with train in OS mode.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in SB mode L2
Additional starting conditions	Train registered with defined direction of travel (direction to ATC Area) and operating in L2 SB-mode. A train stands still at a station. Train position is still valid. DMI displays Level 2. Start button is shown.
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DRIVER: Selects Start.		OBU sends M132 (MA Request)	
2	DISPATCHER: Sets an OS-route to signalling border system.	OS-MA is fulfilled.		
3		M3 or M33 with OS mode profil (MA with Shifted Location Reference)	OS-authorization is received and acknowledged. OBU sends M136 (Train Position Report)	
4		Status and position received.	Driver starts moving the train and runs in OS-MA to EoA. OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
5	INTERLOCKING: Entry signal in adjacent interlocking shows proceed => send signal aspect to RBC.	Entry signal in adjacent interlocking shows proceed => update LOA speed. RBC sends M3 with OS mode profil (MA)	The OBU supervises the new LoA. The train passes the announcement balise group.	
6		Balise: sends transition announcement to level NTC. P41 (Level Transition Order) P3 (National Values)	OBU announces to driver that transition to Level NTC will take place. OBU sends M136 (Train Position Report)	
7		Position received.		
8			OBU requests acknowledgment of Level NTC transition.	Train passes NTC balise "speed restrictions ahead". The transition acknowledgement point is passed.
9		Orders the onboard to terminate the session. Terminate Session performed.	OBU has changed to Level NTC. OBU sends: M136 (Train Position Report)	Hint: Session termination initiated by mode change. Several modes are possible. Report mode change to RBC.

Step	Actions	RBC	OBU	comments
10		Status and position received. End of the "Communication Session" commanded. RBC sends M24 (General Message)	RBC orders to terminate session received. OBU initiates termination of [Communication Session]. OBU sends M156 (Termination of a communication session)	
11		RBC acknowledges termination of a communication session. RBC sends M39 (Acknowledgement of termination of a communication session)	OBU terminates session. Train runs in level NTC.	

3.4.11 NOR_ESC_TS411 - Transition L2 -> system L NTC, in SR

Test Objective(s)	To show an area transition from ERTMS L2 area to NTC on SR-Mode.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2 up to the exit border
Additional starting conditions	A train is at standstill at a station close and in direction to the Level Transition. Train registered operating in L2 FS mode.
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DRIVER: Drive in FS according to Speed limitations and stop the train ahead of the LTA Balise. Then close the cab and perform a new SoM Procedure according to Basic Scenario 1		OBU sends M136 (Position Report) with mode SR	Check in advance the location of the LTA Balise to stop the train before reading it.
2	TRAIN: pass the LTA Balise DRIVER: Pass the Level Transition announcement Balise BALISE: Sends transition announcement to level NTC. P41 (Level Transition Order) P3 (National Values)		OBU announces to driver that transition to Level NTC will take place. OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
3		Position received.		
4			OBU requests acknowledgment of Level NTC transition.	Train passes NTC Balise "speed restrictions ahead". The transition acknowledgement point is passed.
5	DRIVER: Acknowledges the level transition.			
6		Balise: sends transition order to level NTC. P41 (Level Transition Order)	The train passes the level transition border and OBU switches to level NTC.	Train passes NTC Balise "signal information".
7		Orders the onboard to terminate the session. Terminate Session performed.	OBU has changed to Level NTC. OBU sends: M136 (Train Position Report)	Hint: Session termination initiated by mode change. Several modes are possible. Report mode change to RBC.

Step	Actions	RBC	OBU	comments
8		Status and position received. End of the "Communication Session" commanded. RBC sends M24 (General Message)	RBC orders to terminate session received. OBU initiates termination of Communication Session. OBU sends M156 (Termination of a communication session)	
9		RBC acknowledges termination of a communication session. RBC sends M39 (Acknowledgement of termination of a communication session)	OBU terminates session. Train runs in level NTC.	

3.5 Test Scenarios for Level Crossing

3.5.1 NOR_ESC_TS501- LX Activates When a Train Approaches (LX – nominal case)

Test Objective(s)	To show normal activation and deactivation of LX when a train approaches in FS-MA.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS7-2-1
Starting conditions	Train in FS mode L2
Additional starting conditions	A train is at standstill at a station. The DMI displays Level 2 and FS-mode
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set the train route over the LX	Generate FS-MA with LX re-striction RBC sends M3 MA and with P88 (LX information)	FS-MA is received.	
2	DRIVER: Run the train according to permitted speed and approach the LX			
3			Train reaches the LX activation zone	
4			OBU sends M136 (Train Position Report)	
5		Train detected in activation zone for LX.		

Step	Actions	RBC	OBU	comments
6		Remove LX restriction for train		
7		RBC sends M3 MA, P15 (L2/3 MA), P88 (LX information)		
8	TRAIN: Passes the level crossing (without stop at the LX)			
9	TRAIN: Passes the LX deactivation point		Train continues in FS-MA	

3.5.2 NOR_ESC_TS502 - Train Approaching a Detected Avalanche - Cooperative Shortening (text message to a train without confirmation)

Test Objective(s)	To show a train approaching a detected avalanche or landslide. Also tested the text message to a train without confirmation.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS7-4-1
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is at standstill at a station. The DMI displays Level 2 and FS-mode
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set the train route. Route is locked across slide area Driver starts moving the train.	Generate FS-MA RBC sends M3 MA	FS-MA is received.	
2	IL: An avalanche or landslide is reported by the detection system	OS area is activated as reaction to triggered avalanche detector Activation of OS area triggers cooperative shortening		
3		RBC sends M9 (Request to Shorten MA)	OBU accepts the shortened MA OBU sends M137 (Request to Shorten MA is granted)	

Step	Actions	RBC	OBU	comments
4		Request accepted Recalculation of MA based on OS area is done in RBC RBC sends M3 with OS Mode profil (MA)	Train receives a new MA with OS-mode profile	
5		Text area is activated as reaction to triggered avalanche detector RBC sends M24 (General message) with P72 Packet for sending plain text messages	OBU receives text message	Text message (packet 72) will be sent either attached to a message that is in this moment sent to train or in a separate general message, if no other message is sent.
6	DRIVER: Stops the train in front of the avalanche area.			In this step acknowledgement of OS mode may be given by driver.
7	DISPATCHER: Assesses the situation and gives permission to pass the slide area		According to the information from the Dispatcher the train continues in OS-mode profile OBU sends M136 (Train Position Report)	
8		Information of OS-mode received		

Step	Actions	RBC	OBU	comments
9			After passing the slide area the OS-mode profile ends and FS-MA is resumed OBU sends M136 (Train Position Report)	
10		Information of FS-mode received		
11			Train continues in FS-MA	

3.5.3 NOR_ESC_TS503 - LX – Status lost after “PROTECTED”

Test Objective(s)	To show normal activation and deactivation of LX when a train approaches in FS-MA.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS7-2-1
Starting conditions	Train in FS mode L2
Additional starting conditions	A train is at standstill at a station. The DMI displays Level 2 and FS-mode
Train status before Test	Executed Basic Scenario 1 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set the train route over the LX	Generate FS-MA with LX re-striction RBC sends M3 MA and with P88 (LX information)	FS-MA is received. Driver starts moving the train.	
2	DRIVER: Run the train according to permitted speed but limited to 50 km/h and approach the LX			Sped limitation included for Step 9
3			Train reaches the LX activation zone	
4			OBU sends M136 (Train Position Report)	
5		Train detected in activation zone for LX.		

Step	Actions	RBC	OBU	comments
6		RBC receives confirmation from IL about the LX protection (LX protected)		
7		RBC sends M3 MA, P15 (L2/3 MA), P88 (LX information)		
8	When the train is at least 500m before the LX: TOOL: remove the connection DCM-AC to simulate a LX failure	RBC sends M3 MA with P88 (LX info) and variable Q_LXSTATUS=1	OBU sends ACK related to the MA OBU DMI displays LX status "not protected", with permitted speed 40 km/h	The distance is just an example to ensure that the shortening request is accepted
9		The RBC starts cooperative shortening of the MA. RBC sends M9 (Request to shorten MA)	OBU checks its braking curves. OBU sends M137 (Request to shorten MA is granted)	If the co-operative shortening request is rejected since the train is already too close to the signal, an UES is sent to the train
10		.	OBU DMI displays a shortened MA, with new EoA (stop location 100 m. before LX)	
11	TRAIN: Stops at EoA		OBU reports standstill. OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
12		RBC sends M3 (MA)	OBU sends an M132 (MA request). OBU DMI displays an extended MA with maximum speed 40 km/h	
13	DRIVER: Pass the level crossing at permitted speed 40 km/h		When the train front end passes the area covered by L_LX, then the speed limitation of 40 km/h is removed	

3.5.4 NOR_ESC_TS504 - LX – LX closely ahead of a train doing start-of-mission

Test Objective(s)	To test the scenario of the train starting up in front of a level crossing.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2
Additional starting conditions	The train is at standstill just ahead of the closed Level Crossing. The DMI displays the Start button to the driver.
Train status before Test	Executed Basic Scenario 3

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set the train route over the LX			
2	DRIVER: Press "START"		OBU sends M132 (MA request)	
3		RBC sends M24 (General Message) with P88 (LX information)	OBU sends ACK related to M24	
4		RBC sends M3 (Movement Authority) with EoA beyond the LX and with P88 (LX information) attached		

Step	Actions	RBC	OBU	comments
5			OBU switches to FS mode and displays LX information (LX status "not protected") OBU indicates the permitted speed 40 km/h over the LX area OBU sends ACK related to the MA	
6	LX closes	RBC sends M24 (General message) with P88 (LX info)	OBU sends ACK related to M24 The LX indication is removed from the DMI	
7	DRIVER: Start the train and pass the level crossing		OBU sends M136 (Train Position Report)	
8	Train leaves the track section where the LX is located	RBC orders to open the LX barriers		

3.6 Test Scenarios for Interlocking Objects

No scenarios of this type are required in this stage.

3.7 Test Scenarios for Dispatcher Defined TSR

3.7.1 NOR_ESC_TS701 - Operation of Trains in a TSR (for this train category)

Test Objective(s)	To show a train receiving FS-MA with TSR and passing the TSR.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS9-3-5
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is driving in L2 area in FS. Train is running with line speed. TSR is activated for one train category.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set the train route over the TSR.	FS-MA generation. RBC sends M3 (MA)	OBU receives FS-MA including speed restriction from TSR.	
2	TRAIN: Runs toward to TSR.		When train reaches the start of the TSR, the train speed is supervised to the speed set for this area.	
3			When train has left the TSR, the train is allowed to resume line speed. Train continues to EoA.	

3.7.2 NOR_ESC_TS702 - Operation of Trains in a TSR (for another train category)

Test Objective(s)	To show that the train considers only TSR for its train category.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS9-3-5
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is driving in L2 area in FS. Train is running with line speed. TSR is activated for another train category as the Train.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set the train route over the TSR.	FS-MA generation. RBC sends M3 (MA) without TSR	OBU receives FS-MA	
2	TRAIN: Runs toward to TSR.		When train reaches the start of the TSR, the train speed is supervised to the line speed set for this area.	
3			Train continues to EoA.	

3.7.3 NOR_ESC_TS703- Multiple TSRs supervised by OBU

Test Objective(s)	To show that OBU can handle multiple TSR's
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS9-3-5-2
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is driving in L2 area in FS. Totally 11 TSRs (from dispatcher or maintainer) including TSR reason text need to be prepared, covering the routes in front of the train (to be included in the MA). The TSR's should be assigned with reason text "TSR for NOR_ESC_TS703_XX"
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Activate all the 11 TSR's			
2	DISPATCHER: Set the route(s) covering the activated TSR's.	RBC sends M24 (General Message) with 10 packets 65 (TSR) related to the first 10 TSR's	OBU sends ACK related to M24 with TSR's	
3		RBC sends M24 (General Message) with one more packet P65 (TSR) related to the 11th TSR	OBU sends ACK related to M24 with TSR's	
4		RBC sends M3 (MA) corresponding to the set route(s)	OBU sends ACK related to the MA	

Step	Actions	RBC	OBU	comments
5		No MA is sent (applies if all TSR's are covering the 1st train route)		Rule: Max 10 TSR in one M3.
6	DISPATCHER: Deactivate one TSR	RBC sends M3 (MA) with 10 P65 (TSR) related to the 10 active TSR's	OBU sends ACK related to M3 with TSR	
7		RBC sends 10 messages 24 (General Message) with P72 including the text "TSR for NOR_ESC_TS703_XX" with XX incrementing from 01 to 10	OBU DMI displays the text message "TSR for NOR_ESC_TS703_XX" with XX incrementing from 01 to 10	
8	DRIVER: Run the train depends on the TSR speed through the route(s) covering the active TSR's		While the train runs through the route: OBU DMI displays the permitted speed corresponding to each of the active TSR's	

3.7.4 NOR_ESC_TS704 - Track Work on a Station

Test Objective(s)	To show how to secure a Construction site at a station.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS9-6-1
Starting conditions	Train in SB mode L2
Additional starting conditions	WM (work machine) in SB
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	IL: Shunting signals providing border protection are already in stop. No action needed. Points and derailleurs required for border protection are moved to protective position		SaR in WA activates WA	Default for SH parameter is assumed to be "yes". Otherwise shunting has to be allowed explicitly by an additional command.
2	IL: Signal shows released for local operation. Release key locks. points and derailleurs not required for border protection are released. DISPATCHER: Set shunting mode allowed for the working area	WA activated		

Step	Actions	RBC	OBU	comments
3			SaR in WA receives the information and gives the permission to start the work	
4	DRIVER: Selects SH-mode		OBU sends M130 (Request for Shunting)	RBC grants SH request due to activated WA with SH allowed.
5		Request for shunting is received SH is permitted RBC sends M28 (SH Authorised)	Transition to SH. Shunting starts OBU sends M136 (Train Position Report)	
6		Status and position received.		
7		End of the "Communication Session" commanded RBC sends M24 (General Message with P42)	OBU initiates termination of Communication Session	
8			OBU sends M156 (Termination of a communication session)	
9		RBC acknowledges termination of a communication session	OBU terminates session	
10	DRIVER: Works until end of operation.		SaR in WA deactivates WA	
11	DISPATCHER: WA is deactivated			

Step	Actions	RBC	OBU	comments
12	IL: Revoke release for points and derailleurs not required for border protection. Revoke release of key locks. Shunting signals not providing border protection are set to stop. Signal shows stop.	WA deactivated		

3.7.5 NOR_ESC_TS705 - TSR "under the train"

Test Objective(s)	To show that OBU correctly supervises a TSR with a start location behind the train
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2
Additional starting conditions	A train is at standstill at a station. The DMI displays Level 2 and FS-mode. It should be noted that a dispatcher TSR is available for the station.
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004 (Train with KNOWN position in FS mode)

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Activate a TSR covering the whole station	RBC regards the TSR as activated		It is important that the TSR has an extension starting behind the current LRBG!
2	DISPATCHER: Set a sequence of train routes in front of the train	RBC sends M24 (General Message) with P65 (TSR)	OBU sends ACK related to the general message with TSR	
3		RBC extends the MA according to the set routes by sending M3 with reference to current LRBG	OBU DMI displays extended MA; the TSR is visible on the planning area with the correct extension	

Step	Actions	RBC	OBU	comments
4		RBC extends the MA according to the set routes by sending M3 including P65 (TSR) with reference to current LRBG,	OBU DMI displays extended MA; the TSR is visible on the planning area with the correct extension	
5		RBC sends the message 24 (General Message) with packet 72 including the text configured for the present TSR.	OBU DMI displays the text message related to the TSR	
6	DRIVER: Select SR with override		OBU DMI displays SR mode	
7	DRIVER: Press "Start"	An MA is sent with TSR.	OBU DMI displays FS mode with MA; the TSR is visible on the planning area with the correct extension	
8	DRIVER: Drive the train past the extension of the TSR		OBU supervises the TSR speed until the TSR extension plus train length is passed. Once the TSR is past the TSR is no more visible on OBU DMI	

3.7.6 NOR_ESC_TS706 - TSR handling in a "shifted location" situation

Test Objective(s)	To test that the OBU can handle TSRs while a "shifted location" situation.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in SB mode L2
Additional starting conditions	<p>Trainspeed 0 km/h (standstill) in a station. The position is known. The train is at standstill. The DMI displays the Start button to the driver. Route for train is locked. 5 TSRs (from dispatcher) including TSR reason text need to be prepared with an allocation between train front and the reference BG. At least two TSRs should extend beyond the reference BG. It is suggested that the TSR:s be designed to have incremental speed limitations in steps of 10 km/h, e.g. from 30 to 70 km/h, and without train length delay. The length of each TSR should be easy to verify, e.g. 100m. The TSR's should be assigned with reason text "TSR for NOR_ESC_TS706_XX" with [XX=01..05] to verify the TSRs.</p>
Train status before Test	Executed Basic Scenario 3; Train with KNOWN position referred to a BG beyond train front

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Activate all the TSR	RBC regards the 5 TSRs as activated		
2	DRIVER: Selects "Start".		OBU sends M132 MA Request	
3		Receives MA request with train position "valid"		
4		RBC sends an OS authorization M33 MA with Shifted Location Reference (P15 L2 MA, P80 Mode Profile). The MA also includes 5 packets 65 (TSR)		

Step	Actions	RBC	OBU	comments
5			OS authorisation (OS-MA) is received. OBU requests the Driver to acknowledge OS-mode.	
6	DRIVER: Acknowledges OS-mode		OBU switches to OS-mode.	
7		Receives OS-mode	OBU sends M136 (Train Position Report).	
8	DRIVER: Run train at low speed	RBC sends 5 messages 24 (General Message) with P72 including the text with XX a progressive ID from 01 to 05	OBU DMI displays the text message "TSR for NOR_ESC_TS706_XX" with XX incrementing from 01 to 05 OBU DMI continues displaying the permitted speed corresponding to each of the active TSR:s	
9		RBC updates MA to FS starting at exit signal. RBC sends M3 (MA).	OBU receives MA	
10			Train passes exit signal -> changes to FS mode OBU sends M136 (Train Position Report)	
11		Receives FS mode		

3.8 Test Scenarios for Degraded Situations

3.8.1 NOR_ESC_TS801 - Dispatcher Stops a Specific Train (UES scenario, with revocation by TMS)

Test Objective(s)	To show that an emergency stop message is sent to a single train
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS10-2-2
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is running on the line in FS mode, L2 Routes under and in front of train are locked.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Receives a report about an object in the track DISPATCHER: Initiates a UES to train	RBC sends M16 (Unconditional Emergency Message) and M24 (General Message)	OBU receives text message OBU changes to TR-mode and brakes the train to standstill. Full deletion of MA OBU sends M147 (ACK to the emergency stop)	
2			Train in TR mode	
3	When train at standstill: DRIVER: Acknowledge the trip		OBU changes to PT-mode OBU DMI displays a text message for train trip confirmation. OBU sends M136 (Position Report)	

Step	Actions	RBC	OBU	comments
4		Train in PT mode received RBC sends Recognition of exit from TRIP-mode RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	Message received	
5	DISPATCHER: Revokes the emergency message for train	RBC revokes Emergency Stop RBC sends M18 (Revocation of UES) with ACK request	OBU sends ACK related to M18 OBU acknowledges Revocation of emergency Stop OBU sends M146 (Acknowledgement)	
6		Ack of Revocation of ES received		
7			Train in PT mode and UES is revoked	

3.8.2 NOR_ESC_TS802 - SMB in Route Set to Stop (MA shortening at signal in front of a running train)

Test Objective(s)	To show signalling point set to stop.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS10-2-3
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is running on the line in FS mode, L2 Routes under and in front of train are locked.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set the signal in front of the train (next Signal in front of the train) to STOP. The train should be close to the Signal.	RBC sends M3 (shortened MA) with ACK request	OBU sends ACK related to the shortened MA OBU applies the service brake. OBU DMI displays the MA shortened, with EoA at next signal	
2			Train is tripped, brakes to standstill. OBU performs transition to Trip. OBU sends M136 (Train Position Report)	
3		TR mode is received.	OBU deletes MA and track data except for Track Conditions and rejects new data	

Step	Actions	RBC	OBU	comments
4	DRIVER: Requested to acknowledge Train Trip. DRIVER: Acknowledges Train Trip.		OBU performs transition to Post Trip. OBU sends M136 (Train Position Report)	
5		PT mode is received. RBC sends recognition of exit from Trip mode. RBC sends M6 (Recognition of exit from TRIP mode)	Recognition of exit from trip received.	

3.8.3 NOR_ESC_TS803 - Revocation of Emergency Stop Messages


Test Objective(s)	To show revocation of an emergency stop message and start up of train after exiting from trip mode.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS10-4
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is running on the line in FS mode, L2 Routes under and in front of train are locked.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Needs to stop train and sends an UES	RBC sends M16 (Unconditional Emergency Message) and M24 (General Message)	OBU receives text message OBU changes to TR-mode and brakes the train to standstill. Full deletion of MA OBU sends M147 (ACK to the emergency stop)	
2		Train in TR mode		
3	When train at standstill: DRIVER: Acknowledge the trip		OBU switches to PT-mode. OBU DMI displays a text message for train trip confirmation. OBU sends M136 (Position Report)	

Step	Actions	RBC	OBU	comments
4		Train in PT mode received RBC sends Recognition of exit from TRIP-mode RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	Message received	
5	DISPATCHER: Revokes the emergency message for train	RBC revokes Emergency Stop RBC sends M18 (Revocation of UES) with ACK request	OBU sends ACK related to M18 OBU acknowledges Revocation of emergency Stop OBU sends M146 (Acknowledgement)	
6		Ack of Revocation of ES received		
7	DRIVER: Press "START"		OBU sends M132 (MA Request)	
8		MA request is received (with train position "valid") RBC sends M2 (SR Authorisation)		
9	DRIVER: Acknowledges and OBU changes to SR mode Driver starts moving the train	Position is considered valid and train is associated with signal.	OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
10		RBC sends M3 (MA)	OBU switches to FS mode OBU sends ACK related to M3.	Hint: Mode may switch to OS, depending on where the train got tripped


3.8.4 NOR_ESC_TS804 – MA cancelled Route (movement authority is rejected)

Test Objective(s)	To show co-operative shortening of movement authority is rejected. 
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS10-9-2
Starting conditions	Train in FS mode L2
Additional starting conditions	Routes locked under and in front of train. Train moves in FS-MA, L2. MA given includes all set routes
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	TRAIN: Moves in Level 2 (FS) along its route.			
2	DISPATCHER: Set the signal of the second route in stop	The second route is cancelled by the interlocking. The RBC starts cooperative shortening of the MA. New MA issued for the signal (shorten MA to signal in stop). RBC sends M9 (Request to shorten MA)	Shorten MA request is rejected OBU sends M138 (Request to Shorten MA is rejected)	

Step	Actions	RBC	OBU	comments
3		Request rejected.		

3.8.5 NOR_ESC_TS805 – MA cancelled Route

Test Objective(s)	To show co-operative shortening of movement authority.
	
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS10-9-2
Starting conditions	Train in FS mode L2
Additional starting conditions	Routes locked under and in front of train. Train moves in FS-MA, L2. MA given includes all set routes
Train status before Test	Executed Basic Scenario 3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	TRAIN: Moves in Level 2 (FS) along its route.			
2	DISPATCHER: Cancels second route which is part of the MA.			

Step	Actions	RBC	OBU	comments
3		Start MA shortening. MA issued for signal, therefore train must be contacted RBC sends M9 (Request to Shorten MA) and M24 (General message)	New EoA accepted. OBU deletes information about Linking, MA, Mode Profile, Track data, Signalling related speed restrictions. OBU sends M137 (Request to Shorten MA is granted)	
4		Request accepted. Reply route Cancelling telegram must allow signal- not route-related request Route Cancellation Acknowledged.		
5	IL: Signal set to stop.	RBC sends M3 (MA)	New EoA shown on driver desk.	
6	TRAIN: Stops at new EoA		OBU reports standstill OBU sends M136 (Train Position Report)	
7		Stand Still Detection performed. Hint: Standstill detection is independent of the mode.	OBU sends M136 (Train Position Report)	
8			Train sends position report. OBU sends M136 (Train Position Report)	

Step	Actions	RBC	OBU	comments
9		Two position reports received with identical position and speed = 0. RBC reports train at standstill.		
10		Signal Reply: standstill TSS=1		

3.8.6 NOR_ESC_TS806 – Loss of Radio – Reconnection after T_NVCONTACT EXPIRATION (Failure in RBC Communication Onboard)

Test Objective(s)	To show loss of connection for a time longer than T_NVCONTACT (brake intervention expected).
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS10-16-3
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is driving in L2 area in FS with a long MA. The DMI displays existing communication session. Route in front of train is locked.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DRIVER: Run the train at low speed		OBU sends M136 Train Position Report	
2	TRAIN: A few seconds (2-4s) before the train is about to pass a signal point: TOOL: Simulate loss of RBC-OBU connection	Communication failure detected	RBC OBU communication failure occurs	

Step	Actions	RBC	OBU	comments
3	Wait T_NVCONTACT: 90		When T_NVCONTACT (_NVCONTACT: 90) has expired, service brakes are applied. OBU DMI displays a "connection lost" text message The train brakes to 0 km/h. Train stopped.	
4	Restore the RBC-OBU connection before the communication session is lost (i.e. within 5 minutes)		OBU reconnects with RBC OBU sends M136 (Train Position Report)	
5		Radio connection re-established. FS-mode is received		

3.8.7 NOR_ESC_TS807 – Loss of Radio – Reconnection before T_NVCONTACT EXPIRATION (Failure in RBC Communication Onboard)

Test Objective(s)	To show loss of connection for a time shorter than T_NVCONTACT (“no action” expected).
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS10-16-4
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is driving in L2 area in FS with long MA. The DMI displays existing communication session. Route in front of train is locked.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DRIVER: Run the train at low speed		OBU sends M136 Train Position Report	
2	TRAIN: A few seconds (2-4s) before the train is about to pass a signal point: TOOL: Simulate loss of RBC-OBU connection	Communication failure detected	RBC OBU communication failure occurs	
3	After approx. 30s since radio connection was disabled: TOOL: Restore RBC-OBU connection	RBC sends M3 (MA)	OBU sends ACK related to the MA	Other message than M3 might also be sent from the RBC

Step	Actions	RBC	OBU	comments
4	After 45 seconds since loss off radio link AND if connection not yet reestablished	Radio connection reestablished	Radio connection reestablished OBU DMI displays an icon "safe radio connection" OBU sends M136 (Train Position Report)	
5		FS-mode is received		

3.8.8 NOR_ESC_TS808 – Loss of communication session – Start a new communication session

Test Objective(s)	To show loss of connection for a time shorter than T_NVCONTACT (“no action” expected).
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	TS10-16-4
Starting conditions	Train in FS mode L2
Additional starting conditions	Train is driving in L2 area in FS-MA. The DMI displays existing communication session. Route in front of train is locked.
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DRIVER: Run the train at medium speed		OBU sends M136 Train Position Report	
2	A few seconds (2-4s) before the train is about to pass a signal point: TOOL: Simulate loss of RBC-OBU connection	Communication failure detected	RBC OBU communication failure occurs	
3			When T_NVCONTACT (T_NVCONTACT: 90) has expired, service brakes are applied. OBU DMI displays a “connection lost” text message	
4	TRAIN: Train stops		The train brakes to 0 km/h. Train stopped.	

Step	Actions	RBC	OBU	comments
5			OBU tries to reconnect with RBC for a period of 5 minutes	
6	After 5 minutes		OBU DMI displays "No communication session"	
7	TOOL: Restore the RBC-OBU connection			
8	DRIVER: Select "OVERRIDE EoA"		OBU switches to SR mode. OBU reconnects to RBC (with the purpose of reporting the mode change)	
9	DRIVER: Move the train in SR mode	Signal still in proceed and FS-MA is fulfilled		
10	TRAIN: Reads a new BG	Balise sends P42	OBU switches to FS-mode OBU sends M136 (Train Position Report)	
11	TRAIN: Continues to EoA in FS-MA			

3.8.9 NOR_ESC_TS809 – Emergency stop and MA shortening

Test Objective(s)	To show Co-operative MA shortening, with proposed EOA rather close to train front (granting scenario)
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2
Additional starting conditions	Train in FS mode with long MA and route under the train is LOCKED
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DRIVER: Move the train just ahead of a signal. TRAIN: Train still with long MA			The train must not come closer to the signal than the current confidence interval in OBU (D_DOUBTUNDER).
2	DISAPTCHER: When train at standstill, set signal in stop.			
3	DISPATCHER: Release the train route immediately in front of the train.	RBC sends M9 (Request to Shorten MA) with P15.	OBU checks its braking curves. OBU sends M137 (Request to shorten MA is granted)	

Step	Actions	RBC	OBU	comments
4		The requested train route is released.	OBU DMI displays a shortened MA, with EoA set to the start of next route in front.	
5	DISPATCHER: Set the subsequent train route	RBC sends M3 (MA) until the end of next route	OBU DMI displays an extended MA	

3.8.10 NOR_ESC_TS810 - CES accepted by train

Test Objective(s)	To show conditional emergency stop (CES), causing an acceptance and EOA update situation.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2 with a long MA
Additional starting conditions	
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	<p>DRIVER: Run the train slowly, without passing the start of route.</p> <p>Occupy the track section beyond start of route signal board.</p> <p>The signal changes to stop.</p>			
2		RBC sends M15 (Conditional Emergency Stop)	<p>OBU sends M147 (ACK to Conditional Emergency Stop)</p> <p>OBU accepted the CES</p> <p>OBU applies the brakes in order not to pass the requested stop position (signal board). A shortened MA is displayed on the DMI, including an emergency stop message.</p>	The displayed reaction on the DMI and the braking effort depends on the distance to stop in relation to current speed.

Step	Actions	RBC	OBU	comments
3	(Train comes to standstill)	RBC sends M18 (Revocation to the CES)	OBU sends ACK related to M18	
4		RBC sends M3 (Shortened MA) with EoA at signal just ahead of the track section unduly occupied	OBU sends ACK related to the MA	
5	DISPATCHER: Remove the track section occupancy			The system may be able to send MA extension (as expected in step 6) already here
6	(optionally, if MA is not extended in step 5) DISPATCHER: Release the train route in front of the train. DISPATCHER: Lock the same train route again.	The train route is released. The train route is locked. RBC sends M3 (extended MA) with ACK request	OBU sends ACK related to the extended MA	
7	DRIVER: Move the train in FS mode on the last track section of the next route (route under the train is locked) Occupy the track section beyond start of route signal board of next route	RBC sends M15 (Conditional Emergency Stop)	OBU sends M147 (ACK to Conditional Emergency Stop) with OBU applies the brakes in order not to pass the requested stop position (signal board). A shortened MA is displayed on the DMI, including an emergency stop message.	

Step	Actions	RBC	OBU	comments
8		RBC sends M16 (Unconditional Emergency Message)	<p>OBU sends M147 (ACK to the emergency stop) with variable:</p> <p>OBU switches to TRIP mode and it applies the emergency brake.</p> <p>OBU displays a text message for train trip confirmation.</p> <p>OBU switches to POST TRIP mode and it releases the emergency brake.</p> <p>OBU sends M136 (Position Report)</p>	<p>This will occur if the RBC considers this to be a violation of the front protection area.</p> <p>The OBU may display an acknowledge icon instead of a text</p>
9		Optional: RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to M6.	
10		RBC sends M18 (Revocation of CES) with ACK request	OBU sends ACK related to M18	
11		Optional: RBC sends M18 (Revocation of UES) with ACK request	OBU sends ACK related to M18	
12			Optional: OBU DMI enables the "START"	
13	<p>DISPATCHER: Release the train route in front of the train</p> <p>DISPATCHER: Lock the same train route again.</p>	<p>The train route is released.</p> <p>The train route is locked, but with the start signal point in stop.</p>		

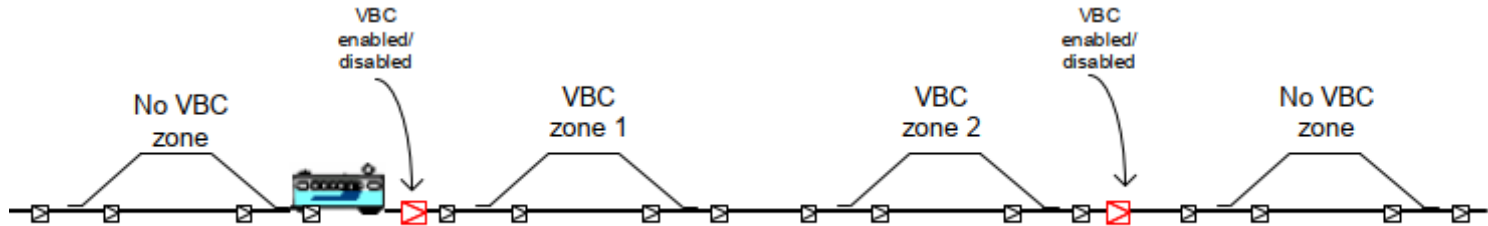
Step	Actions	RBC	OBU	comments
14	Remove the track section occupancy	The start signal point of the train route in front of the train is cleared (green indication)		
15	Optional (*): DRIVER: Press "START"	RBC sends M3 (MA) with an OS profile for the track up to the start signal point.	OBU sends M132 (MA Request) OBU switches to OS mode OBU sends ACK related to M3	Pressing START is only necessary if the train was tripped due to UES; otherwise the MA should be sent automatically.
16		Optional: RBC sends M24 "General message" with packets 57 "Movement authority request parameters", 58 "Position report parameters" with acknowledgment request	OBU sends ACK related to M24	
17	DRIVER: Start the train and pass the start signal point.		OBU switches to FS mode	

3.8.11 NOR_ESC_TS811 - CES rejected by train, while entering a locked train route

Test Objective(s)	To show conditional emergency stop (CES), causing a reject situation. The used scenario is a train with long FS MA passing onto the subsequent train route. The RBC performs a safety check for legitimate train route release by use of the CES method.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2 with a long MA
Additional starting conditions	
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DRIVER: Approach the end of a train route at a very low speed, 3-5 km/h. (The train passes onto next locked train route, i.e. occupying the 1st track section of next route.)	RBC sends M15 (Conditional Emergency Stop), giving a location which is equal to (start of the track section – [margin to compensate for min safe front end])	OBU rejects CES with M147 (ACK to Conditional Emergency Stop) OBU does not brake and the OBU DMI displays no emergency stop. The train moves to the EOA.	Make sure that M15 is really sent! Note that the RBC may omit sending M15 if it gets a position report from the train with an LRBG confirming it is already inside the train route. (It may be necessary to disable the BG at the signal.)

3.8.12 NOR_ESC_TS812 - VBC – normal case

Test Objective(s)	To show the basic VBC function. The train is supposed to ignore the information provided by BG:s in the active VBC.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	<p>At all entries to level 2 are a temporary balise group which activate in nominal direction the VBC with Packet 0 with NID_VBCMK=42.</p> 
Additional starting conditions	
Train status before Test	The train has an active cab, with OBU in level NTC or alternatively in Level 0, oriented towards zone 1 (from left in figure)

Step	Actions	RBC	OBU	comments
1	The temporary balise group Enable a VBC for zone 1 before the 1st bg of zone 1	VBC BG produces NID_VBCMK=42 in direction to zone 1		

Step	Actions	RBC	OBU	comments
2	DRIVER: Move the train forward passing the VBC and further into zone 1.		(there is no level change executed by OBU when passing balise groups within zone 1) OBU DMI continues displaying level NTC	

3.8.13 NOR_ESC_TS813 - Track condition: POWERLESS SECTION

Test Objective(s)	To test scenario with track condition of type "powerless section"
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode L2
Additional starting conditions	A train is at standstill. The DMI displays Level 2 and FS-mode
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set a train route beyond the signal where the current EoA is located. (There should be a powerless section on the route just locked)	RBC regards the route as FS proved		
2			OBU sends M132 (MA request)	
3		RBC sends M3 (extended MA) with EoA at the end signal of the route just locked including P68 with variable: M_TRACKCOND=9	OBU sends ACK related to the MA	
4	DRIVER: Run until the EoA		OBU DMI displays the powerless section	

3.8.14 NOR_ESC_TS814 - Linking failure (loss of entire BG

Test Objective(s)	To test the OBU behavior at loss of entire balise group(s). The OBU reaction is verified, including error reporting to RBC
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in L2 mode FS with long MA
Additional starting conditions	
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set a sequence of train routes in front of the train	MA is extended, corresponding to the set train route.	OBU DMI displays MA extension.	
2	DRIVER: Run the train into the new train route and reduce the speed while approaching the next BG.			

Step	Actions	RBC	OBU	comments
3	<p>TOOL: Simulate a loss of balise group (*)</p> <p>DRIVER: Continue running, passing the position where the bg is expected by the OBU linking supervision</p>	RBC displays an alarm on the D&M as a result of the received P4 OBU does not apply brakes.	<p>OBU does not apply brakes.</p> <p>OBU sends M136 (Position Report) with P4 containing M_ERROR=1</p>	*) Could be done either by moving the current train front across the balise group so that it is not injected to OBU, or by disabling the BG itself (choose the best method depending on the test environment capability)
4	DRIVER: Continue running and let the train pass the next BG		(no visible event) Check in logs that the LRBG has been updated.	
5	DRIVER: Continue running and reduce the speed while approaching the next bg.			
6	<p>TOOL: Simulate a loss of balise group (*)</p> <p>DRIVER: Continue running, passing the position where the BG is expected by the OBU linking supervision</p>	RBC displays an alarm on the D&M as a result of the received P4	<p>OBU does not apply brakes.</p> <p>OBU sends M136 (Position Report) with P4 containing M_ERROR=1</p>	*) See step 3
7	DRIVER: Continue running and reduce the speed while approaching the next bg.			

Step	Actions	RBC	OBU	comments
8	TOOL: Simulate a loss of balise group (*) DRIVER: Continue running, passing the position where the BG is expected by the OBU linking supervision	RBC displays an alarm on the D&M as a result of the received P4	OBU applies service brakes. OBU sends M136 (Position Report) with P4 containing M_ERROR=1	*) See step 3
9	(wait until train has stopped)		When the train comes to standstill the MA is shortened to train front.	
10	(wait until the MA is extended)	A new MA is sent to the OBU RBC sends M3 (MA)	OBU sends an M132 (MA request) OBU DMI displays MA extension.	
11	DRIVER: Start the train and continue running, passing the next bg.		(no visible event) Check in logs that the LRBG has been updated.	

3.8.15 NOR_ESC_TS815 - Circuit switched data communication

Test Objective(s)	Test that a circuit switched connection can be established.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	All 4 ISDN links are connected
Additional starting conditions	
Train status before Test	A train in L2 SB is registered in the GSM-R network.

Step	Actions	RBC	OBU	comments
1	DRIVER: Selects level request and enters valid data (including Train running Number).		The OBU establishes a circuit switched connection to the RBC.	

3.8.16 NOR_ESC_TS816 - Packet switched data communication (over GPRS)

Test Objective(s)	Test that a packet switched OBU - RBC connection can be established.
Baseline applicable	Baseline 3 R 2
Technical Signalling System Scenarios	
Starting conditions	Both ethernet links RBC - GPRS are connected.
Additional starting conditions	
Train status before Test	A train in L2 SB is registered in the GSM-R network.

Step	Actions	RBC	OBU	comments
1	DRIVER: Selects level request and enters valid data (including Train running Number).		The OBU establishes a packet switched connection to the RBC.	

3.8.17 NOR_ESC_TS817 - Connection set-up towards a malfunction DNS

Test Objective(s)	To test various cases of OBU not getting all needed information from the ETCS-DNS when connecting to an RBC that offers PS connection (GPRS). In this case the OBU is supposed to set up a CS connection to the RBC. The various failure modes in the connection establishment scenario are listed below under "Degraded conditions"
Baseline applicable	Baseline 3 R 2
Technical Signalling System Scenarios	
Starting conditions	OBU is powered-off
Additional starting conditions	RBC needs to be enabled for using CS-connections. A DNS-server must be configured and in operation. A sim-card must be prepared to call the DNS. The OBU is supposed to get the relevant RBC ETCS-ID/phone number from Transmission mode table (cached) information at power-up. OBU is presumed to do a "GPRS-attach" and according to the APN/PDP context, ask for the IP address of the ETCS-DNS.
Train status before Test	

Step	Actions	RBC	OBU	DNS	comments
1	<p>TOOL: for each iteration (1-4) of the test case, manipulate the DNS as follows:</p> <ol style="list-style-type: none"> 1. No answer from DNS. 2. Empty answer from DNS. 3. Answer with no IP address and TXT-field containing txm=cs. 4. Answer with IP address which does not address any RBC 				

Step	Actions	RBC	OBU	DNS	comments
2	DRIVER: Power ON the OBU (start a manual timer at this moment; to be stopped at step 5)				Receives P42 and P45
3			Connects to GPRS network. Sends an RBC FQDN query to the DNS.	Receives the FQDN query, and acts according to current failure condition 1-4	see OBU-log or GSM-R log for information
4			Expected action depending on the current failure condition: 1. Try CS-mode 2. Try CS-mode 3. Try CS-mode 4. Try PS-mode		See OBU log or GEM for information. Actions 5+6 are only possible with expected action 1,2 and 3. And expected action 4 ends with Step 4 and deadlock.
5	(wait a few seconds until connection is established, then stop the manual timer; see step 2)	Receives a call setup, session is established.	OBU connects to RBC in CS-mode		See OBU log or GEM for information.
6	DRIVER: Continue driving the train		ETCS performs relevant supervision		See OBU log or GEM for information.

3.8.18 NOR_ESC_TS818 – TSR immediately to OBU (deleted)

Not relevant – test case cannot be executed in Stage 1.

3.8.19 NOR_ESC_TS819 - Permitted speed depending on train category

Test Objective(s)	To test that train categories are managed by OBU as expected, both regarding train data entry and deduction from SSP.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in FS mode inside a berth section. Train routes shall be set long enough so that the EoA does not influence the indicated permitted speed. The used train routes shall be parameterized with a variety of cant deficiencies. Ensure the berth is also covered with the same parameterization, or alternatively, move the train into the track section where cant deficiencies are applied in the SSP.
Additional starting conditions	The train is stand still
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
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Step	Actions	RBC	OBU	comments
1	DRIVER: Initiate a train data entry procedure and select entry for a train category		OBU DMI displays a list of different train categories	Depending on parameterization of the onboard regarding train data the list presented for train category may not be exhaustive. Verify that the name standard according to ERA DMI (ERA_ERTMS_015560) is used. (The speed related to train category should be visible on the track drawings)
2	DRIVER: Modify a train category and finish the train data entry	RBC revalidates the train data.	OBU DMI displays permitted speed corresponding to the selected train category	Repeat step 1 and 2 for at least the train categories PASS3, TILT5 and FP3

3.8.20 NOR_ESC_TS820 - MA shortening to a train at standstill with shifted location

Test Objective(s)	To show that a train with shifted location correctly handles a shortened MA. This is the ordinary method applied towards a train having shifted location when an authorized train route need to be released. The scenario used is: Train is located in a station. It exits beyond the station border, then changes the orientation. While having shifted location it gets an MA for entrance to the station, then the MA is shortened (due to train route release), and then extended again (due to new train route)
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in L2 FS mode
Additional starting conditions	
Train status before Test	Executed Basic Scenario3 and NOR_ESC_TS004

Step	Actions	RBC	OBU	comments
1	DISPATCHER: Set a train route out of the station	RBC sends OS-MA to the train	OBU DMI displays a request for OS acknowledgement	
2	DRIVER: Acknowledge OS DRIVER: Run the train out of the station and stop after the entry signal at the next station.		OBU enters OS mode Having passed the signal board of the train route, OBU switches to FS	
3	DRIVER: Deactivate the cabin		OBU sends M150 (End of Mission)	
4		RBC orders disconnection of the radio connection	OBU disconnects the radio	

Step	Actions	RBC	OBU	comments
5	DRIVER: Activate the other cabin, to run in the opposite direction (back to the origin station)		OBU establishes a new radio communication session with the RBC	
6	DISPATCHER: Set a train route to back to the origin station		OBU DMI displays a request for OS acknowledgement	
7	DRIVER: Press "start" DRIVER: Acknowledge OS	RBC sends M33 (OS-MA with shifted location), ending at the origin station. The location reference is the BG at the entry signal	OBU DMI displays a request for OS acknowledgement OBU enters OS mode OBU DMI displays permitted speed 40 km/h	
8	DISPATCHER: Release the train route	RBC sends a new M33 (OS-MA with shifted location), ending at the train front	OBU DMI displays permitted speed 0, due to the shortened distance to run (0 m) Ensure trip mode is not entered!	Train need to be at standstill to allow train route release
9	DISPATCHER: Set a train route to track 2 at the station	RBC sends M33 (OS-MA with shifted location)	OBU DMI displays permitted speed 40 km/h	

3.8.21 NOR_ESC_TS821 - Shunting across “Danger for Shunting”/Trip at border of TSA

Test Objective(s)	To show start, end and performance of shunting movements in SH-mode in a TSA
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train in SB mode L2
Additional starting conditions	Train has arrived at station and re-reported standstill. Train is registered in L2 area. The train is in SB mode. The DMI waits for the driver to select mode. "Start button" is shown. One Temporary Shunting Area (TSA) is engineered- The TSA is deactivated
Train status before Test	Executed Basic Scenario 1

Step	Actions	RBC	OBU	comments
1	DRIVER: Informs the Dispatcher of his need for a TSA.			
2	DISPATCHER: Activates the TSA.			
3	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
4		Entry in SH (Manual) EndSession performed. Hint: RBC grants SH request due to activated TSA. A valid train position and the estimated front end have to be localized within the active TSA.		

Step	Actions	RBC	OBU	comments
5		Request for shunting is received. SH is permitted.		
6		RBC sends M28 (SH authorised)	Transition to SH. Shunting starts.	
7		Status and position received.	OBU sends M136 (Train Position Report)	
8		End of the "Communication Session" commanded.		
9		RBC sends M24 (General Message)	OBU sends M156 (Termination of a Comm. Session)	
10		RBC acknowledges termination of a communication session. RBC sends M39 (ACK of Termination of a Comm. Session)	OBU terminates session. Shunting movements until end of operation.	
11	DRIVER: Move the train forward		When train passes BG inside the TSA: No brake intervention imposed by OBU	

Step	Actions	RBC	OBU	comments
12	DRIVER: Continue moving outside TSA		When train passes BG at the TSA. Border, OBU switches to TRIP mode and applies the emergency brake	The test can be also performed with "Danger For shunting" scenario: After passing the relevant BG is producing "Danger for shunting" and the OBU switches to TRIP mode

3.8.22 NOR_ESC_TS822 - SL mode and LT in SL mode

Test Objective(s)	To show that the train reads Euro balises in SL mode, both at level transition and when moving in the L2 area.
Baseline applicable	Baseline 3 MR 1
Technical Signalling System Scenarios	
Starting conditions	Train is outside the L2 area, mode SL
Additional starting conditions	The OBU has unknown position due to reset or cold movement detected. The train is in sleeping mode. Cab A is active.
Train status before Test	

Step	Actions	RBC	OBU	comments
1	DRIVER: With the train in SL mode, move the train into the L2 area and stop in a trusted area in a station track where a SoM would normally be performed.		If the test environment allows, check that Eurobalises are read by the OBU.	This step simulates a train entering the L2 line as train 2 in a double trainset.
2	Exit SL mode and deactivate cab A.		OBU enters SB	
3	DRIVER: activate cab B, the cab in the opposite direction of the train movement from step 1.			By changing directions, the formerly rear trainset becomes the front trainset.
4	Execute a SoM with known position in a trusted area, Basic Scenario 1		The OBU reports the correct LRBG to the RBC.	

4 MESSAGES

This chapter defines the content of messages necessary for the ERTMS/ETCS functions in Norway. Only one test case identifier is ever listed, but the message can also appear in other test cases.

4.1 Train to Track Radio Messages

In this section, the radio messages are identified with the corresponding message ID, which are considered in the defined test cases. A test case is always listed here as an example for each message (even if other test cases also provide evidence).

Message Identifier	Message Name	Test case identifier
129	Validated Train Data	NOR_ESC_TS405
130	Request for Shunting	NOR_ESC_TS704
132	MA Request	NOR_ESC_TS307
136	Train Position Report	NOR_ESC_TS003
137	Request to shorten MA is granted	NOR_ESC_TS007
138	Request to shorten MA is rejected	NOR_ESC_TS804
146	Acknowledgement	NOR_ESC_TS801
147	Acknowledgement of Emergency Stop	NOR_ESC_TS801
149	Track Ahead Free Granted	
150	End of Mission	NOR_ESC_TS820
153	Radio infill request	
154	No compatible version supported	
155	Initiation of a communication session	NOR_ESC_TS001
156	Termination of a communication session	NOR_ESC_TS704
157	SoM Position Report	NOR_ESC_TS307
158	Text message acknowledged by driver	NOR_ESC_TS108

159	Session Established	NOR_ESC_TS001
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4.2 Track to Train Radio Messages

In this section, the radio messages are identified with the corresponding message ID, which are considered in the defined test cases. A test case is always listed here as an example for each message (even if other test cases also provide evidence).

Message Identifier	Message Name	Test case identifier
2	SR Authorisation	NOR_ESC_TS803
3	Movement Authority	NOR_ESC_TS803
6	Recognition of exit from TRIP mode	NOR_ESC_TS810
8	Acknowledgement of Train Data	NOR_ESC_TS306
9	Request to Shorten MA	NOR_ESC_TS804
15	Conditional Emergency Stop	NOR_ESC_TS810
16	Unconditional Emergency Stop	NOR_ESC_TS810
18	Revocation of Emergency Stop	NOR_ESC_TS810
24	General message	NOR_ESC_TS001
27	SH Refused	
28	SH Authorised	NOR_ESC_TS704
32	RBC/RIU System Version	NOR_ESC_TS405
33	MA with Shifted Location Reference	NOR_ESC_TS003
34	Track Ahead Free Request	
37	Infill MA	
39	Acknowledgement of termination of a communication session	NOR_ESC_TS403
40	Train Rejected	
41	Train Accepted	NOR_ESC_TS002
43	SoM position report confirmed by RBC	

5	Assignment of coordinate system	
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5 DOCUMENT INFORMATION

5.1 Document change history

Rev.	Description of change	Date	Created by
000-1	Draft version for internal review	07.01.2022	PRJO
000	For issue to EUAR. The content of reference [1] was incorporated into the main document. Reviewers' comments were implemented.	13.01.2022	PRJO
001	Updated to address comments from EUAR. Added section 1.3 and edited section 1.2 to better describe the trackside version. Changed ESC type to ESC-NO-02. Changed applicable baseline of NOR_ESC_TS816 and NOR_ESC_TS817 Edited description of applicable baseline in section 2.3. Removed empty section for interlocking tests. Editorial improvements, primarily correcting non-sequential numbering and table of contents.	03.02.2022	PRJO

5.2 Terminology

ATC2	Automatic Train Control
CS	Circuit Switched (GSM-R mode)
ERTMS	European Rail Traffic Management System ³
ERA	European Railway Agency
ESC	ETCS System Compatibility
ETCS	European Train Control System
EuroSuiteDAT	Test tool suite from Siemens
GA	Generic Application
IL	Interlocking
L2	ETCS level 2
LNTC	ETCS level NTC
OBU	On-board unit
OTS	Operational Test Scenario
PS	Packet Switched (GSM-R mode)
PSA	Permanent Shunting Area
RSC	Radio System Compatibility
SMB	Stop Marker Board
STM	Specific Transmission Module
TMS	Traffic management system
TS	Technical Signalling System Scenario
TSA	Temporary Shunting Area
VBC	Virtual Balise Cover
SaR	Safety Application Rules
WA	Working Area
WM	work machine

5.3 Reference list

- [1] 2000000346 rev 002, ERTMS Programme - ETCS System Compatibility (ESC) Test Specification