ERTMS Programme

Norwegian ETCS System Compatibility Test Specification

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01E	For implementation	29.06.2020	PRJO	TARO	KJHO
00E	For implementation	23.10.2017	PRJO	TARO	MAGHEG
Revision	Reason for issue	Date	Created by	Contr. by	Appr. by

Title: **ERTMS Programme** **Norwegian ETCS System Compatibility Test Specification**	Pages: **138**		
	Produced by:	**Bane NOR SF Digitalisering og teknologi**	
	Prod.doc.no.:		Rev:
	Replaces:		
	Replaced by:		
Project: ERTMS Programme Area: Generic documentation all systems	Document number: **ERP-00-Q-00054**	Revision: **01E**	
BANE NOR	Operator's document no.:	Operator's rev.:	

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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 Norwegian ERTMS Pilot Line, Østfoldbanens Østre Linje.

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

This document is a high-level test specification for the interface between the existing Baseline 2 Norwegian RBC (from Bombardier) and a generic ERTMS onboard system with a Norwegian ATC2-STM.

The messages and packets covered in this test specification can be found in chapter **4**.
This test specification does not test the quality or performance of the OBU (e.g. Odometer).

1.3 Radio System Compatibility

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

1.4 Bane NOR Contact Information

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

1.5 Prerequisites

The tests shall be carried out against the following trackside product:

- BaneNOR's ERTMS Level 2 System on Østfoldbanens Østre Linje, SR7 (see ref[3])

All tests are meant to be carried out in a lab environment or the field.

If the lab environment (e.g. onboard test equipment limitations) does not support the required functionality for a specific test case, these test cases need to be performed in field.

1.6 Remarks

This chapter describes some remarks that apply in general to the test cases.

1. Some test steps describes that a message from RBC should be acknowledged by the Onboard ATP (msg 146). This might occur also in situations where this is not expected.
2. Some behaviors of the RBC/OBU are regarded as optional, because they are not specifically requested in the SRS. For the case where this kind of behavior is mentioned in this specification, the steps are marked as optional, and should not influence the result of the test case (i.e. the step can be considered as passed regardless of whether the expected results occur or not). No specific behavior is required for steps marked as optional.

Expected results **written in bold** should be used as the primary source for verification. Other results should be seen as informative, and can be used as guidance for troubleshooting.

2 PROCEDURES

This section lists generic procedures for the active cab of the train in order to perform initial conditions of scenarios.

Procedure 01 details the procedure for a SoM with a valid position from SB mode in order to register the train with a known position.

Procedure 02 details the procedure for a SoM with an invalid position from NP mode in order to register the train with an approximate position.

Procedure 03 details the procedure for a SoM for a train registration in the ATC area.

2.1 Procedure 01 – Start of Mission with KNOWN position

Actions	RBC	OBU
		Train in SB mode OBU: Driver ID invalid ERTMS/ETCS Level valid (Level 2) RBC-ID and phone number valid Train position data valid Train data unknown
Driver opens cab desk according to active cab requested		
		DMI: Cab is active and in SB mode 
Driver re-validates/re-enters his driver ID		OBU: Driver ID valid
		OBU sends the message 155 (Initiation of communication session)
	RBC checks for duplicates and registers train with its ETCS ID RBC sends message 32 “Configuration determination”	
		Optional[1] :OBU sends message 146 (related to message 32)
		OBU sends message 159
	RBC considers communication session established with train	
		OBU sends message 157 “Start of mission position report” with Q_STATUS = 1 (Valid)

[1] Depending on the M_ACK flag given by the RBC, which may be different.

Actions	RBC	OBU
	RBC sends message 24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	
		OBU sends the message 146 (Acknowledgement) related to the message 24
	RBC sends message 24 with packet 3 “National Values” with acknowledgment request to the train	
		OBU sends the message 146 (Acknowledgement) related to the message 24 with packet 3
Driver selects train data entry Driver enters/revalidates train data (including train running number)		OBU sends the message 129 (validated train data) with packet 0 and packet 11 with variable: NID_PACKET = 11 L_PACKET = 122 NID_OPERATIONAL = variable NC_TRAIN = variable L_TRAIN = variable V_MAXTRAIN = variable M_LOADINGGAUGE = 0 M_AXLELOAD = variable M_AIRTIGHT = variable N_ITER = variable M_TRACTION(1) = variable N_ITER = variable NID_STM(1) = variable
	RBC sends message 8 “Acknowledgment of train data” with acknowledgment request to the train	
		OBU sends the message 146 (Acknowledgement) related to the message 8
		DMI: **“Start” button shown to the driver**

2.2 Procedure 02 - Start of Mission with INVALID/UNKNOWN position

Note: Normally it does not matter if the OBU replies with INVALID or UNKNOWN status. But, if a test case states a specific precondition, the OBU supplier must ensure the expected status is provided by the OBU. The method to achieve this is not specified in this document.

Actions	RBC	OBU
		Train in NP 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		OBU: Driver ID valid
Driver re-validates/re-enters ERTMS/ETCS Level 2		OBU: ERTMS/ETCS Level valid
Driver checks/enters the Radio Network ID Driver re-validates/re-enters RBC-ID and phone number		OBU: RBC-ID and phone number valid
		DMI: Cab is active and in SB mode 
		OBU sends the message 155 (Initiation of communication session)

Actions	RBC	OBU
	RBC checks for duplicates and registers train with its ECTS ID RBC sends message 32 “Configuration determination”	
		Optional: OBU sends message 146 (related to message 32)
		OBU sends message 159
	RBC considers communication session established with train	
	RBC sends message 24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	
		OBU sends the message 146 (Acknowledgement) related to the message 24
		OBU sends message 157 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 the message 41 (Train accepted)	
		OBU sends the message 146 (Acknowledgement) related to the message 41

Actions	RBC	OBU
Driver selects train data entry Driver enters/revalidates train data (including train running number)		OBU sends the message 129 (validated train data) with packet 0 and packet 11 with variable: NID_PACKET = 11 L_PACKET = 122 NID_OPERATIONAL = variable NC_TRAIN = variable L_TRAIN = variable V_MAXTRAIN = variable M_LOADINGGAUGE = 0 M_AXLELOAD = variable M_AIRTIGHT = variable N_ITER = variable M_TRACTION(1) = variable N_ITER = variable NID_STM(1) = variable
	RBC sends the message 24 with packet 72 (text message) including the text “Ukjent position”	
	RBC sends message 8 “Acknowledgment of train data” with acknowledgment request to the train	
		OBU sends the message 146 (Acknowledgement) related to the message 8
		DMI displays text “Ukjent position”
		DMI: **“Start” button shown to the driver**

2.3 Procedure 03 - Start of Mission from STM area

Actions	RBC	OBU
OBU unpowered and located in ATC area		**Train in NP mode** OBU: Driver ID unknown ERTMS/ETCS Level invalid (Level STM) RBC-ID and phone number invalid Train position data invalid Train data unknown
Dispatcher lock the ATC route on adjacent IL		
Driver powers the OBU and opens cab desk according to nominal direction requested		DMI: **Cab is active and in SB mode** 
Driver re-validates/re-enters his driver ID		OBU: Driver ID valid
Driver confirms Level NTC (ATC STM)		**OBU: ERTMS/ETCS Level valid**
Driver selects ATC-2		
Driver selects Train data entry		
Driver enters/re-validates train data, including Train Running Number		**OBU: Train data valid**
Driver selects “Start”		
Driver acknowledges SN-mode		**DMI:** SN mode

Actions	RBC	OBU
Train passed "RE" BG		**OBU: stores identity of the GSM-R Network (data from packet 45)** **RBC-ID and phone number valid (data from packet 42)** **Train position data valid**
		OBU sends the message 155 (Initiation of communication session)
	RBC checks for duplicates and registers train with its ECTS ID RBC sends message 32 "Configuration determination"	
		OBU sends message 146 (related to message 32)
		OBU sends message 159
		OBU sends the message 129 (validated train data) with packet 0 and packet 11 with variable: NID_PACKET = 11 L_PACKET = 122 NID_OPERATIONAL = variable NC_TRAIN = variable L_TRAIN = variable V_MAXTRAIN = variable M_LOADINGGAUGE = 0 M_AXLELOAD = variable M_AIRTIGHT = variable N_ITER = variable M_TRACTION(1) = variable N_ITER = variable NID_STM(1) = variable

Actions	RBC	OBU
	RBC sends message 24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	
		OBU sends the message 146 (Acknowledgement) related to the message 24
	RBC sends message 8 “Acknowledgment of train data” with acknowledgment request to the train	
		OBU sends the message 146 (Acknowledgement) related to the message 8
	RBC receives position report from train ERTMS CTC shows train in SN	

3 TEST SPECIFICATION

3.1 TC_COMP_01 – MA IN FS (ROLL-IN CLEAR)

Brief description	**Train located inside berth section with roll-in clear and assignment of MA in FS**
Degraded conditions	**No**
Starting condition	**ROLL-IN Clear on the signal in front of the train and train's NID_ENGINE stored by RBC**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets an FS train route in front of the train			
2	Driver press "START" button		OBU sends the message 132 (MA request)	
3		RBC sends the message 24 (General Message) with packet 72 including the text "Startanmodning mottatt"	**OBU DMI displays the text message "Startanmodning mottatt"**	
4		RBC sends the message 3 (MA) in FS including the route in front of the train	**OBU switches to FS mode.** OBU sends ACK related to the MA	

3.2 TC_COMP_02 – MA OS-FS AND TAF GRANTED

Brief description	**Train located inside berth section and assignment of MA in OS-FS then TAF granted**
Degraded conditions	**No**
Starting condition	**ROLL-IN not clear**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets one or more FS train routes in front of the train			
2	Driver press “START” button		OBU sends the message 132 (MA request)	
3		RBC sends the message 24 (General Message) with packet 72 including the text “Startanmodning mottatt”	**OBU DMI displays the text message “Startanmodning mottatt”**	
4		RBC sends the message 3 (MA) with OS profile covering the berth section and FS profile over the locked routes in front of the train	**OBU switches to OS mode.** OBU sends ACK related to the MA	Before mode change the driver needs to confirm by pressing an icon on the DMI
5		RBC sends the message 34 (TAF request)		Msg 34 is sent directly after MA, although not visible on the DMI until the TAF window is reached)
6	Driver runs inside TAF window	msg 34 already sent		The TAF window is normally 150m ahead of the signal board.

Step	Actions	RBC	OBU	Reference or comment
7			**OBU DMI displays "TAF Request" symbol**	
8	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	
9		RBC sends the message 3 (MA) with FS profile covering the berth section and the next routes	**OBU switches to FS mode.**	

3.3 TC_COMP_03 – MA OS-FS AND TAF NOT GRANTED

Brief description	**Train located inside berth section and assignment of MA in OS-FS then TAF NOT granted**
Degraded conditions	**No**
Starting condition	**ROLL-IN not clear**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Driver presses “START” button		OBU sends the message 132 (MA request)	
2		RBC sends the message 24 (General Message) with packet 72 including the text “Startanmodning mottatt”	**OBU DMI displays the text message “Startanmodning mottatt”**	
3	Dispatcher sets an FS train route in front of the train			
4		RBC sends the message 3 (MA) with OS profile covering the berth section and FS profile over the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	Before mode change the driver needs to confirm by pressing an icon on the DMI
5		RBC sends the message 34 (TAF request)		
6	Driver runs inside TAF window		**OBU DMI displays “TAF Request” symbol**	
8	Driver moves the train without confirming the TAF and it passes the signal		**OBU switches to FS mode**	

3.4 TC_COMP_04 – MA OS-FS (TRAIN OUT OF BERTH SECTION)

Brief description	**Train located outside berth section and assignment of MA in OS-FS then TAF granted**
Degraded conditions	**No**
Starting condition	**ROLL-IN not clear**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets an FS train route in front of the train			
2	Driver press “START” button		OBU sends the message 132 (MA request)	
3		RBC sends the message 2 with D_SR = 0m	**OBU switches to SR mode**	
4	Driver selects OVERRIDE		**OBU displays the Override Active symbol on the DMI**	This action is needed to extend the SR distance.
5	Driver moves the train inside berth section	RBC sends the message 3 (MA) with OS profile covering the berth section and FS profile over the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	Before mode change the driver needs to confirm by pressing an icon on the DMI
6		RBC sends the message 34 (TAF request)		
7	Driver run inside TAF window		**OBU DMI displays “TAF Request”**	
9	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	
10		RBC sends the message 3 (MA) with FS profile covering the berth section and the next route	**OBU switches to FS mode**	

3.5 TC_COMP_05 – POSITION APPROXIMATION OF TRAIN WITH UNKNOWN POSITION

Brief description	**Dispatcher selects approximation of position to a train with UNKNOWN position (Operational checklist point 3.3)**
Degraded conditions	**No**
Starting condition	**Train with UNKNOWN position. A balise group is located between the train front and the Marker Board**
Train status before test	**Executed Procedure 02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher releases the route under the train, if any, sets an FS train route in front of the train			
2	Dispatcher sets the train position to the start of the locked train route and activates level crossing, if any.	RBC sends msg 24 with packet 72, including the text “Posisjonering gjennomført”	**OBU DMI displays the text “**Posisjonering gjennomført**”**	Position train using POS command. Note any TSR in the area and issue written order 07 to driver.
3	Driver selects “START”		OBU sends the message 132 (MA request)	
4		RBC sends the message 2 (SR authorization) including a list of balises corresponding to the route	**OBU switches to SR mode** OBU sends ACK related to the SR authorization	

Step	Actions	RBC	OBU	Reference or comment
5	Driver moves the train until it reads a new balise group	RBC sends the MA with OS profile covering the berth section and FS profile over the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	OS mode profile is only applicable if the BG is located a distance before the start-of-route. Note that balises with message “Stop if in SR” (last BG before each MB) require “override” before passing.
6		RBC sends the message 34 (TAF request)		See comm. step 5
7	Driver run inside TAF window		**OBU DMI displays “TAF Request”**	See comm. step 5
9	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	See comm. step 5
10		RBC sends the message 3 (MA) MA with FS profile covering the berth section and the next route	**OBU switches to FS mode**	

3.6 TC_COMP_06 – MA OS-FS TO A TRAIN WITH INVALID POSITION, ROUTE SET

Brief description	**Train located inside berth section with INVALID position. Start and assignment of MA OS-FS. (NB, this test case is the same as the previous, but with different start condition).**
Degraded conditions	**No**
Starting condition	**Train with INVALID position**
Train status before test	**Executed Procedure 02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets an FS train route in front of the train			
2	Dispatcher sets the train position	RBC sends packet 72 including the text “Posisjonering gjennomført”	**OBU DMI display the text “Posisjonering gjennomført”**	
3	Driver selects Start	RBC sends the message 2 (SR authorization)	**OBU switches to SR mode**	
4	Driver moves the train until it reads a new balise group	RBC sends the MA with OS profile covering the berth section and FS profile over the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	Only applicable if the BG is located a distance before the start-of-route
5		RBC sends the message 34 (TAF request)		See comm. step 4
6	Driver runs inside TAF window		**OBU DMI displays “TAF Request” symbol**	See comm. step 4
7	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	See comm. step 4
8		RBC sends the message 3 (MA) MA with FS profile covering the berth section and the next route	**OBU switches to FS mode**	

3.7 TC_COMP_07 – MA OS-FS TO A TRAIN WITH INVALID POSITION, ROUTE NOT SET

Brief description	**Train located inside berth section with INVALID position. Assignment of SR Authorisation which is then upgraded to OS MA and finally FS MA.**
Degraded conditions	**No**
Starting condition	**Train with INVALID position and the route in front of the train is not set. Train route is set after selection of Start**
Train status before test	**Executed Procedure 02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets the train position	RBC sends packet 72 including the text “Posisjonering gjennomført”	**OBU DMI display the text “Posisjonering gjennomført”**	
2	Driver selects Start	RBC sends the message 2 (SR authorization) with D_SR = 0	**OBU switches to SR mode**	
3	Dispatcher sets an FS train route in front of the train	RBC sends the message 2 (SR authorization) with D_SR <> 0		
4	Driver moves the train until it reads a new balise group	RBC sends the MA with OS profile covering the berth section and FS profile over the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	
5		RBC sends the message 34 (TAF request)		
6	Driver runs inside TAF window		**OBU DMI displays “TAF Request” symbol**	
7	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	

Step	Actions	RBC	OBU	Reference or comment
8		RBC sends the message 3 (MA) MA with FS profile covering the berth section and the next route	**OBU switches to FS mode**	

3.8 TC_COMP_08 – SHIFTED MA OS-FS

Brief description	**Train with KNOWN position shall be capable of receiving an MA with shifted location.**
Degraded conditions	**No**
Starting condition	**Train located inside berth section with KNOWN position referred to a BG beyond train front end and located in the train route to be locked**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets an FS train route in front of the train			
2	Driver presses “START” button		OBU sends the message 132 (MA request)	
3		RBC sends the message 24 (General Message) with packet 72 including the text “Startanmodning mottatt”	**OBU DMI displays text message “Startanmodning mottatt”**	
4		RBC sends the message 33 (shifted MA) with OS profile covering the berth section and FS profile over the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	
5	Driver runs into the locked train route		**OBU switches to FS mode**	
6	Driver runs until the train reads a new balise group	RBC sends the message 3 (MA) without shifted location		This may occur before step 5, depending on the balise position in relation to the start-of-route (in this case a TAF request would also be issued).

3.9 TC_COMP_09 – TSR REVOCATION DUE TO THE MA SHORTENING

Brief description	**MA assignment with TSR and then TSR revoked because MA shortening**
Degraded conditions	**Yes (due to operational issue)**
Starting condition	**Train with KNOWN position referred** **TSR activated on the second route in front of the train**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets a TSR covered by the second route in front of the train Dispatcher sets TSR reason “TSR for TC_COMP_9” during the TSR definition Dispatcher sets at least three FS routes in front of the train	RBC regards the TSR as activated		
2	Driver press “START” button		OBU sends the message 132 (MA request)	
3		RBC sends the message 24 (General Message) with packet 72 including the text “Startanmodning mottatt”	**OBU DMI displays text message “Startanmodning mottatt”**	
6		RBC sends the message 3 (MA) with OS profile covering the berth section and FS profile over the route in front of the train and packet 65 (TSR)	**OBU switches to OS mode** OBU sends ACK related to the MA	
7		RBC sends the message 24 (General Message) with packet 72 including the text “TSR for TC_COMP_9”	**OBU DMI displays the text message “TSR for TC_COMP_9”**	

Step	Actions	RBC	OBU	Reference or comment
8		RBC sends the message 34 (TAF request)		
9	Driver run inside TAF window		**OBU displays "TAF Request" symbol on the DMI**	
10	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	
11		RBC sends the message 3 (MA) with FS profile covering the berth section and the subsequent route		
12	Dispatcher sets to STOP the signal protecting the route included in the TSR	RBC sends the message 3 (MA) with EoA at the signal just set to STOP	OBU sends ACK related to the MA	
13		RBC sends the message 24 (General Message) with packet 72 including the text "Kjøretillatelse (MA) forkortet"	**OBU DMI displays the text message "Kjøretillatelse (MA) forkortet**" (as the MA is shortened ahead of the TSR on the DMI planning area the TSR is also erased.)	
14		RBC sends the message 24 (General Message) with packet 66 (TSR revocation)	OBU sends ACK related to the general message with TSR revocation OBU removes the TSR (not visible on the DMI)	
15		RBC sends the message 24 (General Message) with packet 72 including the text "Midlertidig nedsatt kjørehastighet (TSR) opphevet"	**OBU DMI displays the text message "Midlertidig nedsatt kjørehastighet (TSR) opphevet"**	

3.10 TC_COMP_10 – TSR VALID FOR THE FULL LENGTH OF THE TRAIN

Brief description	**MA assignment with TSR valid for the full length of the train**
Degraded conditions	**No**
Starting condition	**Train with KNOWN position referred** **Maintenance TSR activated on the route in front of the train including TSR reason text and valid for the FULL length of the train**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Maintainer sets a TSR covered by the route in front of the train Maintainer sets TSR reason “TSR for TC_COMP_10” during the TSR definition Maintainer sets the TSR with validity for the full length of the train			
2	Dispatcher activates the TSR Dispatcher sets an FS train route in front of the train	RBC regards the TSR as activated		
3	Driver press “START” button		OBU sends the message 132 (MA request)	

Step	Actions	RBC	OBU	Reference or comment
4		RBC sends the message 24 (General Message) with packet 72 including the text “Startanmodning mottatt”	**OBU DMI displays text message “Startanmodning mottatt”**	
7		RBC sends the message 3 (MA) with OS profile covering the berth section and FS profile over the route in front of the train, with packet 65 (TSR) including the variable: Q_FRONT=0	**OBU switches to OS mode** OBU sends ACK related to the MA	
8		RBC sends the message 24 (General Message) with packet 72 including the text “TSR for TC_COMP_10”	**OBU DMI displays the text message “TSR for TC_COMP_10**”	
9		RBC sends the message 34 (TAF request)		
10	Driver run inside TAF window		**OBU DMI displays “TAF Request” symbol**	
11	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	
12		RBC sends the message 3 (MA) with FS profile covering the berth section and the subsequent route		
13	Driver runs on the subsequent route inside TSR extension			
14	Driver stops the train with the train front beyond the signal regarded as ending point of the TSR The train tail is still located inside the TSR extension		**OBU DMI still displays the permitted speed related to the TSR**	

Step	Actions	RBC	OBU	Reference or comment
15	Dispatcher deactivates the TSR under the train	RBC sends the message 24 (General Message) with packet 66 (TSR revocation)	OBU sends ACK related to the general message with TSR revocation	
16		RBC sends the message 24 (General Message) with packet 72 including the text “Midlertidig nedsatt kjørehastighet (TSR) opphevet”	**OBU DMI displays the text message “Midlertidig nedsatt kjørehastighet (TSR) opphevet”** **OBU removes the TSR from the DMI**	

3.11 TC_COMP_11 – ELEVEN TSRs IN THE MA FROM POST TRIP

Brief description	**MA with 11 TSRs: assignment and re-evaluation**
Degraded conditions	**No**
Starting condition	**Train with KNOWN position** **Totally 11 TSRs (from dispatcher or maintainer) including TSR reason text activated on the routes in front of the train (to be included in the MA)** **Note that the distance ahead for display of informative text must be set so as to achieve that all texts can be shown simultaneously (and not sequentially along with the train approaching each of the TSR:s)**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Maintainer and dispatcher set totally 11 TSRs covered by the routes in front of the train to be included in the MA All the TSR are set with reason “TSR for TC_COMP_11_XX” with XX a progressive ID from 1 to 11			
2	Dispatcher activates all the TSRs (Maintenance)	RBC regards the 11 TSRs as activated		
3	Driver press “START” button		OBU sends the message 132 (MA request)	
4		RBC sends the message 24 (General Message) with packet 72 including the text “Startanmodning mottatt”	**OBU DMI displays text message “Startanmodning mottatt”**	

Step	Actions	RBC	OBU	Reference or comment
5	Dispatcher sets an FS train route in front of the train	No MA is sent (applies if all TSR:s are covering the 1st train route)		Rule: Max 10 TSR in one message 3. If one or more TSR:s are in the next routes the MA will be sent for the 1st route only, including the TSR:s covered by this route.
6	For Dispatcher deactivates one TSR	RBC sends the message 3 (MA) with 10 packet 65 (TSR) related to the 10 active TSR:s	**OBU switches to OS mode** OBU sends ACK related to message 3 with TSR	
7		RBC sends 5 messages 24 (General Message) with packet 72 including the text "TSR for TC_COMP_11_XX" with XX a progressive ID from 01 to 5	**OBU DMI displays the text message "TSR for TC_COMP_11_XX" with XX a progressive ID from 01 to 5**	The OBU may limit the number of displayed texts because the text display capacity limit is exceeded.
8		RBC sends the message 34 (TAF request)		
9	Driver run inside TAF window			Drive at slow speed, so that the train can be stopped before the marker board
10			**OBU DMI displays "TAF Request" symbol**	
11	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	
12		RBC sends the message 3 (MA) with FS covering the berth section and the subsequent routes	**OBU switches to FS mode**	

Step	Actions	RBC	OBU	Reference or comment
13	Before the train has reached any of the TSRs: Dispatcher selects the NST command for the train	RBC sends the message 16 (Unconditional Emergency Message)	OBU sends the message 147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2 **OBU switches to TRIP mode and applies the emergency brake**	
14	Train at standstill		**OBU displays a text message for train trip confirmation.** **OBU switches to POST TRIP mode and it releases the emergency brake.** OBU sends the message 136 (Position Report) with M_MODE=8 (POST TRIP)	The OBU may display an acknowledge icon instead of a text
15		RBC sends the message 6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to the message 6	
16	Dispatcher command NSTF for the train	RBC sends the message 18 (Revocation of UES) with ACK request	OBU sends ACK related to the message 18 **OBU activates the "START" button**	
17		Optional: RBC sends message 24 "General message" with packets 57 "Movement authority request parameters", 58 "Position report parameters" with acknowledgment request	OBU sends ACK related to the message 24	

Step	Actions	RBC	OBU	Reference or comment
18	Driver selects the “START” button		OBU sends the message 132 (MA Request)	
19		RBC sends the message 3 (MA) with 10 packets 65 (TSR) related to the 10 active TSR:s	**OBU switches to OS mode** OBU sends ACK related to the MA	Before mode change the driver needs to confirm by pressing an icon on the DMI. When testing it is presumed only 10 TSR:s are active (see step 6).
20		RBC sends 5 messages 24 (General Message) with packet 72 including the text “TSR for TC_COMP_11_XX” with XX a progressive ID from 01 to 5	**OBU DMI displays the text message “TSR for TC_COMP_11_XX” with XX a progressive ID from 01 to 5**	The OBU may limit the number of displayed texts because the text display capacity limit is exceeded.

3.12 TC_COMP_12 – FIVE TSRs IN THE D_REF OF A MA FROM PT

Brief description	**Shifted MA with 5 TSRs in the shifted location: assignment and re-evaluation**
Degraded conditions	**No**
Starting condition	**Train with KNOWN position referred to a BG beyond train front end** **Totally 5 TSRs (from dispatcher or maintainer) including TSR reason text activated between train front end and the reference BG. At least two TSR:s should extend beyond the reference BG. If this is not practically possible, be aware that the TSR:s which are already passed in step 8 may not reappear in steps 13-14.**
Train status before test	**Executed Procedure 01**

Note: This test should be executed twice: 1st without UES command (omitting steps 8-14), observing thoroughly both TSR:s and texts, then another time with the entire scenario.

Step	Actions	RBC	OBU	Reference or comment
1	TSR:s are prepared according to starting conditions All the TSR are set with reason “TSR for TC_COMP_12_XX” with XX a progressive ID from 1 to 05			
2	Dispatcher activates all the TSR (Maintenance)	RBC regards the 05 TSR as activated		
3	Driver press “START” button		OBU sends the message 132 (MA request)	
4		RBC sends message 2 with a permitted distance D_SR = 0m.	**OBU switches to SR mode**	

Step	Actions	RBC	OBU	Reference or comment
5		RBC sends the message 24 (General Message) with packet 72 including the text “Startanmodning mottatt”	**OBU DMI displays text message “Startanmodning mottatt”**	
6	Dispatcher sets an FS train route in front of the train	RBC sends the message 33 (shifted MA) with OS profile covering the berth section and FS profile over the route in front of the train. The MA includes also 5 packets 65 (TSR)	**OBU switches to OS mode** OBU sends ACK related to the MA	Before mode change the driver needs to confirm by pressing an icon on the DMI
7	Run train at slow speed, without passing a BG			1st test: Go directly to step 15!
8	Dispatcher selects the UES command for the train	RBC sends the message 16 (Unconditional Emergency Message)	OBU sends the message 147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2 **OBU switches to TRIP mode and it applies the emergency brake**	
9	Train at standstill		**OBU displays a text message for train trip confirmation** **OBU switches to POST TRIP mode and it releases the emergency brake** OBU sends the message 136 (Position Report) with M_MODE=8 (POST TRIP)	The OBU may display an acknowledge icon instead of a text
10		RBC sends the message 6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to the message 6	

Step	Actions	RBC	OBU	Reference or comment
11	Dispatcher selects the UES revocation command for the train	RBC sends the message 18 (Revocation of UES) with ACK request	OBU sends ACK related to the message 18 **OBU DMI enables the ”START” button**	
12		Optional: RBC sends message 24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	OBU sends ACK related to the message 24	
13	Driver selects the “START” button		OBU sends the message 132 (MA Request)	
14		RBC sends the message 33 (shifted MA) with OS profile covering the berth section and FS profile over the route in front of the train. The MA includes also 05 packets 65 (TSR)	**OBU switches to OS mode** OBU sends ACK related to the MA	Under certain conditions the RBC may give MA without OS profile.
15	Run train at slow speed, and pass a BG	RBC sends 5 messages 24 (General Message) with packet 72 including the text “TSR for TC_COMP_12_XX” with XX a progressive ID from 01 to 05	**OBU DMI displays the text message “TSR for TC_COMP_12_XX” with XX a progressive ID from 01 to 05**	

3.13 TC_COMP_13 – MA EXTENSION WITH FRONT PROTECTION OCCUPIED

Brief description	**Extension of the MA over a train route protected by front protection object (point) with a front protection area unduly occupied: OS profile covering the last 200m of the MA**
Degraded conditions	**Yes: Front protection unduly occupied**
Starting condition	
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher locks an FS route beyond the signal where the current EoA is located. The front protection area of this route is unduly occupied.	RBC still regards the route as FS proved since it ends with a point in protective position		
2			OBU sends the cyclic message 132 (MA request)	
3		RBC sends the message 3 (extended MA) with EoA at the end signal of the route just locked and with OS profile covering the last 200m of the MA with variables: D_DP=0 V_RELEASEDP=15km/h	OBU sends ACK related to the MA	
4	Driver runs according to permitted speed towards the EoA		**Approximately 600m before EOA: OBU DMI displays the OS confirmation request as soon as the train enters the OS acknowledgement window**	Train speed must have reduced to 40 km/h

Step	Actions	RBC	OBU	Reference or comment
5	Driver confirms the OS		**OBU switches to OS mode**	

3.14 TC_COMP_14 – CO-OP. MA SHORTENING, IMMEDIATELY IN FRONT OF THE TRAIN /ACCEPTED

Brief description	**Co-operative MA shortening, immediately in front of the train /accepted by train**
Degraded conditions	**No**
Starting condition	**Train in FS mode with long MA and route under the train is LOCKED**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Driver moves the train just ahead of a signal. Train still with long MA			The train must not come closer to the signal than the current confidence interval in OBU (D_DOUBTUNDER).
2	Train at standstill			
3	Dispatcher gives the command to release the route immediately in front of the train	RBC sends the message 9 (Request to Shorten MA) with packet 15 including the variable: L_ENDSECTION= distance to the signal in front of the train Q_DANGERPOINT=0	OBU checks its braking curves	
4			**OBU DMI displays a shortened MA, with EoA set to the marker board of next route in front.** OBU sends the message 137 (Request to shorten MA is granted)	
5		The requested train route is released.		

Step	Actions	RBC	OBU	Reference or comment
6	Dispatcher locks the subsequent route for FS	RBC sends the message 3 (MA) with FS profile until the EoA		

3.15 TC_COMP_15 – CO-OP. MA SHORTENING, FURTHER BEYOND THE TRAIN /REJECTED

Brief description	**Co-operative MA shortening, not immediately in front of the train /rejected by train**
Degraded conditions	**No**
Starting condition	**Train running at high speed in FS mode with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sends the command to release a route inside MA	RBC sends the message 9 (Request to Shorten MA) with packet 15 including the variable: L_ENDSECTION= close ahead of train front end Q_DANGERPOINT=0	OBU checks the braking curve and it has a negative result	
2			**OBU DMI does not display a shortened MA.** OBU sends the message 138 (Request to shorten MA is rejected)	
3	Driver moves to the EoA	The requested train route to be released stays locked.		The EoA remains unchanged

3.16 TC_COMP_16 – AUTOMATIC END OF ROUTE RELEASE UNDER THE TRAIN

Brief description	**Automatic end-of-route release under the train**
Degraded conditions	**No**
Starting condition	**Train in FS mode with MA ending on a signal where the automatic end of route release is defined**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Driver moves to the EoA and stops the train within 30m from the next signal. Train at standstill			
2		RBC activates its internal timer T_STANDSTILL=10s		
3		After timer expiration, RBC sends the message 9 (Request to Shorten MA) with packet 15 including the variable: L_ENDSECTION= at train front end Q_DANGERPOINT=1 D_DP=L_DOUBTUNDER m		
4			OBU checks its braking curves . **OBU DMI displays a shortened MA , with EoA set to the train front.** OBU sends the message 137 (Request to shorten MA is granted)	

Step	Actions	RBC	OBU	Reference or comment
5	Dispatcher locks the subsequent route for FS	RBC sends the message 3 (MA) with FS profile until the EoA		
6	Driver moves to the new EoA			

3.17 TC_COMP_17 – CHANGING OF TRAIN DATA IN FS MODE, ACCEPTED BY RBC

Brief description	**Changing of train data in FS mode which causes shortening of MA in OBU, new train data accepted by RBC**
Degraded conditions	**No**
Starting condition	**Train in FS mode with MA. Window for display of current train data for the train is presented on the CMI**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Train at standstill. Driver changes the TRAIN DATA and inserts acceptable values M_AXLELOAD		OBU deletes its track descriptions and the MA is shortened to train front. **The new EoA is displayed on the DMI** OBU sends the message 129 (Validated Train Data) with packet 11 with the modified train data	As alternative the train category may be changed.
2		RBC checks the validity of the new train data and sends the message 8 (ACK to validated train data). **The changed train data can be seen on the CMI.**	OBU sends ACK related to the message 8	
3		RBC sends the message 3 (MA) previously assigned to the train	OBU sends ACK related to the message 3. OBU accepts the MA **and displays the extended MA on the DMI to the same location as before.**	Note that steps 2-3 are executed immediately, meaning that the shortened MA (step 1) is only visible on the DMI for a short while.
4	Driver moves to EoA			

3.18 TC_COMP_18 – Deleted

3.19 TC_COMP_19 – CES ACCEPTED BY TRAIN

Brief description	**Undue occupancy of the track section just in front of the train causing CES**
Degraded conditions	**Yes**
Starting condition	**Train in FS mode with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02 with route under the train NOT LOCKED**

Step	Actions	RBC	OBU	Reference or comment
1	Run the train slowly, without passing the start of route Occupy the track section beyond start of route marker board (using a simulated method)			
2		RBC sends the message 15 (Conditional Emergency Stop)	OBU sends the message 147 (ACK to Conditional Emergency Stop) with Q_EMERGENCYSTOP=0 **OBU applies the brakes in order not to pass the requested stop position (marker board).** **A shortened MA is displayed on the DMI, including an emergency stop message.**	The displayed reaction on the DMI and the braking effort depends on the distance to stop in relation to current speed.
3	Train comes to standstill	RBC sends the message 18 (Revocation to the CES)	OBU sends ACK related to the message	

Step	Actions	RBC	OBU	Reference or comment
			18	
5	The track section occupancy is removed	RBC sends the message 3 (extended MA) with ACK request	OBU sends ACK related to the extended MA	
6	Train moves 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 marker board of next route	RBC sends the message 15 (Conditional Emergency Stop)	OBU sends the message 147 (ACK to Conditional Emergency Stop) with Q_EMERGENCYSTOP=0 **OBU applies the brakes in order not to pass the requested stop position (marker board).** **A shortened MA is displayed on the DMI, including an emergency stop message.**	
7		Optional: RBC sends the message 16 (Unconditional Emergency Message)	OBU sends the message 147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2. **OBU switches to TRIP mode and it applies the emergency brake.** **OBU displays a text message for train trip confirmation.** **OBU switches to POST TRIP mode and it releases the emergency brake.** OBU sends the message 136 (Position Report) with M_MODE=8 (POST TRIP)	This will occur if the RBC considers this to be a violation of the front protection area. The OBU may display an acknowledge icon instead of a text
8		Optional: RBC sends the message 6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to the message 6.	
9		RBC sends message 18 (Revocation of CES) with ACK request	OBU sends ACK related to the message 18	

Step	Actions	RBC	OBU	Reference or comment
10		Optional: RBC sends message 18 (Revocation of UES) with ACK request	OBU sends ACK related to the message 18	
11			Optional: **OBU DMI enables the ”START” button**	
12	Optional: Driver selects “START”		OBU sends the message 132 (MA Request)	
13		Optional: RBC sends message 24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	OBU sends ACK related to the message 24	
14	The track section occupancy is removed Dispatcher sets more than 2 FS routes in front of the train	RBC sends the message 3 (MA) in FS mode	**OBU switches to FS mode** OBU sends ACK related to the message 3	

3.20 TC_COMP_20 – MA SHORTENED BECAUSE OF ESA ACTIVATION

Brief description	**Train with long MA; ESA (Emergency Stop Area) activation; shortening of the MA**
Degraded conditions	**Yes (due to operational issue)**
Starting condition	**Dispatcher activates an ESA in the MA assigned to a train in FS mode and RBC sends the shortened MA. The train is located before the ESA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
2	Dispatcher activates an ESA included in the MA assigned to the train	RBC sends message 15 (Conditional Emergency Stop)	OBU sends the message 147 (ACK to Conditional Emergency Stop) with Q_EMERGENCYSTOP=0	
3			**OBU DMI displays the new EoA, corresponding to the border of the activated ESA.**	
4		RBC sends the message 24 (General Message) with packet 72 including text “Nødstopp fra RBC”	**OBU DMI displays the message “Nødstopp fra RBC**”	The text may also contain a reference to the specific ESA
5	Driver moves to the EoA			
6	Dispatcher deactivates the ESA (Emergency Stop Area)	RBC sends the message 3 (extended MA) with ACK request	OBU sends ACK related to extended MA. **OBU DMI displays an extended MA to the same location as before.**	

3.21 TC_COMP_21 – MA FROM POST TRIP AFTER ESA ACTIVATION

Brief description	**Train with long MA; ESA activation; UES to the train; re-evaluation of the MA**
Degraded conditions	**Yes (due to operational issue)**
Starting condition	**Dispatcher activates an ESA including the route where the train is in FS mode and RBC sends the UES**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher activates an ESA (Emergency Stop Area) covering the route where the train is	RBC sends the message 16 (Unconditional Emergency Message)	OBU sends the message 147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2. **OBU switches to TRIP mode and applies the emergency brake**	
2			**OBU DMI displays a text message for train trip confirmation.** **OBU switches to POST TRIP mode and it releases the emergency brake**. OBU sends the message 136 (Position Report) with M_MODE=8 (POST TRIP)	The OBU may display an acknowledge icon instead of a text
3		RBC sends the message 6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to the message 6	
4		RBC sends the message 18 (Revocation of UES) with ACK request	OBU sends ACK related to the message 18	
5		RBC sends the message 24 (General Message) with packet 72 including the	**OBU displays on the DMI the message "Nødstopp fra RBC"**	The text may also contain a reference to the specific ESA

Step	Actions	RBC	OBU	Reference or comment
		text “Nødstopp fra RBC”	**OBU DMI enables the ”START” button**	
6	Driver selects “START”		OBU sends the message 132 (MA Request)	
7		Optional: RBC sends message 24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	OBU sends ACK related to the message 24	
8		Optional: RBC sends message 2 with a permitted distance D_SR = 0m.	**OBU switches to SR mode**	
9	Dispatcher deactivates the ESA			
10		RBC sends the message 3 (MA) in FS mode	**OBU switches to FS mode** OBU sends ACK related to the message 3. **OBU DMI displays an extended MA to the same location as before.**	Mode may switch to OS, depending on where the train got tripped (if a Marker board was passed while braking, the roll-in supervision might not allow continued running in FS)

3.22 TC_COMP_22 – OVERRIDE WITHOUT EMERGENCY BEING REVOKED

Brief description	**Train in Post Trip; driver performs override before emergency revoking**
Degraded conditions	**No**
Starting condition	**Train with MA in FS located out of berth section**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Driver runs the train slowly, without entering the berth section of next route. Dispatcher selects the Emergency Stop Command for the train	RBC sends the message 16 (Unconditional Emergency Message)	OBU sends the message 147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2. **OBU switches to TRIP mode and applies the emergency brake**	
2			**OBU displays a text message for train trip confirmation**	The OBU may display an acknowledge icon instead of a text
3	Driver acknowledges the trip		**OBU switches to POST TRIP mode and it releases the emergency brake** OBU sends the message 136 (Position Report) with M_MODE=8 (POST TRIP)	
4		RBC sends the message 6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to the message 6	

Step	Actions	RBC	OBU	Reference or comment
5	Driver selects “OVERRIDE”		**OBU switches to SR mode (*)** OBU sends the message 136 (Position Report) with M_MODE=2	Note! For a BL2 system, the OBU might still consider the emergency message as not revoked, as long as the radio connection is established. It might therefore be necessary to disconnect the radio when selecting Override (*) If the OBU issues an MA request due to this Override, the RBC will send an SR Authorisation with 0m distance.
6		RBC regards the emergency as “revoked” for the train		
7	Driver selects “START”		OBU sends the message 132 (MA Request)	
9		RBC sends message 3 (FS MA *) with ACK request	**OBU switches to FS/OS mode** OBU sends ACK related to the message 3	*) Conditions may not be enough for FS; if so, an OS profile is added.
11	Driver runs the train past next signal board		**OBU switches to FS mode** (if not already in FS mode)	

3.23 TC_COMP_23 – SHUNTING REQUEST FROM OS MODE

Brief description	**Train in On-Sight requires shunting movement**
Degraded conditions	**No**
Starting condition	**Train with MA in OS**
Train status before test	**Executed Procedure 01 and train in OS mode**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher: release train route, if any, and lock a TSA at the train's position			Locked TSA is necessary for approval of SH request by RBC.
2	Driver selects "Shunting Request"		OBU sends the message 130 (SH request)	
3		RBC sends the message 28 (SH authorised)	**OBU switches to SH mode** OBU sends the message 136 (Position Report) with M_MODE=3	
4			OBU sends the message 150 (End of Mission)	
5		RBC sends the message 24 (General Message) including packet 42 (Termination of a Communication Session) with variable: Q_RBC = 0; Q_SLEEPSESSION=0		
6			OBU sends the message 156 (ACK of Termination of a Communication Session)	
7		RBC sends the message 39 (ACK of Termination of a Communication Session)		

3.24 TC_COMP_24 – SHUNTING REQUEST FROM SR MODE WITH KNOWN POSITION

Brief description	**Train in Staff Responsible and known position requires shunting movement**
Degraded conditions	**No**
Starting condition	**Train in SR mode and known position, located in activated TSA**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Driver selects “OVERRIDE”		**OBU switches to SR mode.** OBU sends message 136 (Position Report) with M_MODE=2	
2	Driver selects “Shunting Request”		OBU sends the message 130 (SH request)	Locked TSA is necessary for approval of SH request by RBC.
3		RBC sends message 28 (SH authorised) including packet 3 (National Values)	**OBU switches to SH mode**. OBU sends message 136 (Position Report) with M_MODE=3	
4			OBU sends message 150 (End of Mission)	
5		RBC sends message 24 (General Message) including packet 42 (Termination of a Communication Session) with variable: Q_RBC = 0; Q_SLEEPSESSION=0		
6			OBU sends message 156 (Termination of a Comm. Session)	

Step	Actions	RBC	OBU	Reference or comment
7		RBC sends message 39 (ACK of Termination of a Communication Session)		

3.25 TC_COMP_25 – LEVEL CROSSING INSIDE BERTH SECTION

Brief description	**Train located inside berth section including also the level crossing**
Degraded conditions	**No**
Starting condition	**Train in SR inside berth section**
Train status before test	**Executed Procedure 01**

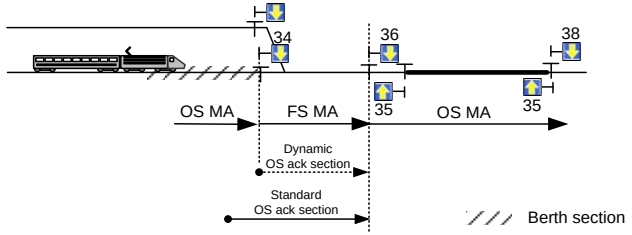
Step	Actions	RBC	OBU	Reference or comment
1	Train located inside berth section and just ahead of the level crossing			
2	Dispatcher sets the route in front of the train			
3	Driver selects “START”		OBU sends the message 132 (MA request)	
5		RBC sends the message 3 (MA) with packet 65 (TSR) L_TSR=LX area length D_TSR=distance to LX area	**OBU switches to FS mode** **OBU DMI displays a TSR (20 km/h) related to the LX** OBU sends ACK related to the MA	
7	LX closes (with more delay due to the not enough time)	RBC sends the message 24 (General message) with packet 66 (TSR revocation)	OBU sends ACK related to the message 24 **The TSR is removed from the DMI**	
8	Train passes the level crossing			
9	Train leaves the track section where the LX is located	RBC orders to open the LX barrier		

3.26 TC_COMP_26 – TEXT MESSAGE TO TRAIN IN FS

Brief description	**Train in Full Supervision and dispatcher sends a text message**
Degraded conditions	**No**
Starting condition	**Train in FS**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher selects the command to send a text message to the train: The text used is “MSG IN FS 0123456789”	RBC sends the message 24 (General Message) including packet 72 with variable: X_TEXT coded as the used text M_ACK=1	**OBU displays the message on the DMI reporting the text:** **“MSG IN FS 0123456789”**	
2			OBU sends ACK related to the message 24	
3	Dispatcher selects the command to send a text message with Norwegian characters to the train: The text used is “ÆØÅæøå”	RBC sends the message 24 (General Message) including packet 72 with variable: X_TEXT coded as the used text M_ACK=1	**OBU displays the message on the DMI reporting the text: “**ÆØÅæøå**”**	
4			OBU sends ACK related to the message 24	

3.27 TC_COMP_27 – TWO OS PROFILES IN THE SAME MA

Brief description	**Train in FS ahead of two OS profiles with an OS-Ack-window between them**
Degraded conditions	**No**
Starting condition	**Train in SB mode located in a berth section to a signal section; Roll-in not clear** **Track section occupied in the second signal section in front of the train, see figure:**  **NB: the FS MA shall be shorter than 450 m (which is the standard OS ack section distance)**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher locks an OS train route (2nd route in figure above)	Requested train route is locked.		The route is not yet proven (signal point red)
2	Dispatcher confirms the route for OS (command KOS)	The route is indicated for OS on the CMI.		
3	Dispatcher locks an FS train route (1st route in figure above)	Requested train route is locked.		

Step	Actions	RBC	OBU	Reference or comment
4	Driver selects “START”		OBU sends the message 132 (MA request)	
5		RBC sends the message 3 (MA) including packet 80 (Mode Profile) with variables: First OS profile: D_MAMODE=0; M_MAMODE=0 L_MAMODE=[distance between LRBG and the joint of next route] L_ACKMAMODE=450m Second OS profile: D_MAMODE=[distance between LRBG and the joint of second OS route] M_MAMODE=0 L_MAMODE=[distance between signal protecting the OS route and the end point of second OS route L_ACKMAMODE=[distance equal to FS MA]	**OBU DMI displays an OS ack request** OBU sends ACK related to the message 3	
6	Driver confirms the OS mode		**OBU switches to OS mode** and it sends the message 136 (Position Report) with M_MODE=1	
7		RBC sends the message 34 (TAF request)		
8	Driver runs inside TAF window			

Step	Actions	RBC	OBU	Reference or comment
9			**OBU displays the "TAF Request" symbol on DMI**	
10	Do not confirm the TAF request			
11	Train passes signal 34		**OBU switches to FS mode** and it sends the message 136 (Position Report) with M_MODE=0 **OBU DMI displays an OS ack request**	The OBU may stay in OS mode even after entering the FS train route, because it directly enters the OS acknowledgement window for the next OS profile. OBU BL3 may not display an OS ack request because the train is already in OS.
12	Driver confirms the OS mode		**OBU switches to OS mode** and it sends the message 136 (Position Report) with M_MODE=1	

3.28 TC_COMP_28 – ENTERING A LOCKED TRAIN ROUTE, CES REJECTED BY TRAIN

Brief description	**Train with long FS MA passes onto the subsequent train route. the RBC performs a safety check for legitimate train route release by use of the CES method.**
Degraded conditions	**No**
Starting condition	**Train in FS mode with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Driver approaches 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 the message 15 (Conditional Emergengy Stop), giving a location which is equal to (start of the track section – [margin to compensate for min safe front end])	OBU sends the message 147 (ACK to Conditional Emergency Stop) with Q_EMERGENCYSTOP=1 (CES ignored) **OBU does not brake and the OBU DMI displays no emergency stop.**	

3.29 TC_COMP_29 – TRANSITION ATC -> L2, IN FS-MODE

Brief description	**Train starts from ATC area and enters to ERTMS area in FS mode** **Note: this test case shall be executed at different speeds, e.g. low speed (30 km/h) and full line**
Degraded conditions	**No**
Starting condition	**Train starts from ATC area, in level STM/NTC. The test site used must be parameterized in the RBC not to require the track ahead free method.**
Train status before test	**Executed Procedure 03**

Step	Actions	RBC	OBU	Reference or comment
1	Train in SN mode connected to RBC	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	The DMI indication is a result from the starting condition
2	Train reads the LTA BG		OBU sends the message 136 (Position Report) containing the NID_BG of the LTA BG **OBU DMI displays announcement of level transition.**	
3		RBC sends the entry MA with a section timer defined for the end-section. Packet 3 (National Values) is included in the MA. This MA is repeated every 10 seconds	OBU stores the new MA in the buffer **Approx. 10-15s before level transition a request for acknowledge is displayed.**	Depending on the current site, it may be needed to pass another balise which is tagged in the RBC to trigger sending of an MA.
4	Driver acknowledges the level transition			

Step	Actions	RBC	OBU	Reference or comment
5	Train performs the level transition to L2 based on: LT announcement or LTO BG		OBU sends the message 136 (Position Report) with Mode FS and level 2. **OBU DMI displays Level 2 and FS mode.**	
6		national values already sent in step 4	OBU sends ACK related to the message 24 with packet 3	
7		RBC sends the message 3 (MA without time limitation)	OBU sends ACK related to the message 3	

3.30 TC_COMP_30 – TRANSITION ATC -> L2, IN OS-MODE

Brief description	**Train starts from ATC area and enters to ERTMS area in OS mode**
Degraded conditions	**No**
Starting condition	**Train starts from ATC area. Note that the test case is written according to a border engineered with no track ahead free balise (cTAF). If such border is not available it is possible to use a border with cTAF balise in which case step 3 will deviate.** **The first track section of the first L2 route shall be set occupied**
Train status before test	**Executed Procedure 03**

Step	Actions	RBC	OBU	Reference or comment
1	Train in SN connected to RBC	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	The DMI indication is a result from the starting condition
2	Train reads the LTA BG		OBU sends the message 136 (Position Report) containing the NID_BG of the LTA BG **OBU DMI displays announcement of level transition.** **Approx. 10-15s before level transition a request for acknowledge is displayed.**	

Step	Actions	RBC	OBU	Reference or comment
3		RBC sends the entry MA with a section timer defined for the end-section, including packet 80 with OS mode profile. Packet 3 (National Values) is included in the MA This MA is repeated every 10 seconds	OBU stores the new MA in the buffer	Depending on the current site, it may be needed to pass another balise which is tagged in the RBC to trigger sending of an MA in case of an occupancy in the route.
4	Driver acknowledges the level transition to level 2			
5	Train performs the level transition to L2 based on: LT announcement or LTO BG		OBU sends the message 136 (Position Report) with Mode OS and level 2 **OBU DMI displays Level 2 and OS mode and a request for OS acknowledgement.**	
7	Driver acknowledges the OS mode			
8		RBC sends the message 3 (MA without time limitation) including packet 80 with OS profile for the entrance area.	OBU sends ACK related to the message 3	
9	Train passes the Start-of-Route Marker Board		**OBU switches to FS mode**	

3.31 TC_COMP_31 – TRANSITION ATC -> L2, IN FS-MODE WITH TSR

Brief description	**Train starts from ATC area and enters to ERTMS area in FS mode with TSR**
Degraded conditions	**No**
Starting condition	**Train starts from ATC area, in level STM/NTC. Note that the test case is written according to a border engineered with no track ahead free balise (cTAF). If such border is not available it is possible to use a border with cTAF balise in which case step 3 will deviate.**
Train status before test	**Executed Procedure 03**

Step	Actions	RBC	OBU	Reference or comment
1	Train in SN connected to RBC	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	
2	Dispatcher activates a TSR on the 1st route in the ERTMS area			
3	Train reads the LTA BG		OBU sends the message 136 (Position Report) containing the NID_BG of the LTA BG **OBU DMI displays announcement of level transition.** **Approx. 10-15s before level transition a request for acknowledge is displayed.**	
6		RBC sends the message 3 (MA) with packet 65 (TSR) and packet 3 (National Values) This message is repeated every 10 sec.	OBU stores the new MA and TSR in the buffer	

Step	Actions	RBC	OBU	Reference or comment
7	Driver acknowledges the level transition to level 2			
8	Train performs the level transition to L2 based on: LT announcement or LTO BG		OBU sends message 136 (Position Report) with Mode FS and level 2 **OBU DMI displays Level 2 and FS mode.** **The speed limitation due to the TSR is visible on the DMI.**	
12		RBC sends message 3 (MA without time limitation) with packet 65 (TSR)	OBU sends message 146 (ACK) related to message 3	

3.32 TC_COMP_32 – TRANSITION ATC -> L2, WITH LOSS OF CONNECTION

Brief description	**Train starts from ATC area and receives the entry MA then connection lost**
Degraded conditions	**Yes**
Starting condition	**Train starts from ATC area. Note that the test case is written according to a border engineered with no track ahead free balise (cTAF). If such border is not available it is possible to use a border with cTAF balise in which case step 3 will deviate.**
Train status before test	**Executed Procedure 03**

Step	Actions	RBC	OBU	Reference or comment
1	Train in SN connected to RBC	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	
2	Train reads the LTA BG		OBU sends the message 136 (Position Report) containing the NID_BG of the LTA BG. **OBU DMI displays announcement of level transition.**	
3		RBC sends the entry MA with a section timer defined for the end-section. Packet 3 (National Values) is included in the MA This MA is repeated every 10 seconds	OBU stores the new MA in the buffer	
4	Shut-down the connection between RBC and OBU			

Step	Actions	RBC	OBU	Reference or comment
5	Driver acknowledges the level transition to level 2. Train performs the level transition to L2 based on: LT announcement or LTO BG		OBU sends the message 136 (Position Report) with Mode FS and level 2. OBU evaluates T_ SECTIONTIMER of 2nd MA section, which has expired. OBU shortens the MA and regards the entry signal as EoA**.** **OBU DMI displays Level 2 and FS mode.**	Driver acknowledges the level transition
6			**OBU DMI displays the entry signal as the EoA**	The entry signal board is located a distance beyond the LTO BG (60-200m, site dependent)
7	Driver brakes the train to standstill before the entry signal.			
8	Restore the RBC-OBU connection	RBC sends the message 3 (extended MA) without time limitation	OBU sends ACK related to the message 3	
9	Driver starts the train and passes the entry signal board.			

3.33 TC_COMP_33 – Deleted

3.34 TC_COMP_34 – TRANSITION L2 -> ATC, IN FS

Brief description	**Train starts from L2 area and exits to ATC area with FS MA**
Degraded conditions	**No**
Starting condition	**Train in FS; No route locked in adjacent interlocking (ATC)**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Train with FS MA up to the ATC border, but at standstill before the LTA BG.		**OBU DMI displays EoA at the ATC border**	
2	Dispatcher sets the 1st route in adjacent interlocking (starting at the border)	RBC sends the message 3 (extended MA) with EoA beyond the ERTMS border	OBU sends ACK related to the message 3 **OBU DMI displays the extended MA beyond the border, with EoA corresponding to the end of the set route.**	This route locking requires access to the adjacent interlocking, which might otherwise be achieved by simulated methods
3	Driver starts the train. Train reads the LTA BG		**OBU DMI displays the text/symbol informing about level transition**	At this point, the STM starts to read ATC balise information
4	Driver acknowledges the level transition			

Step	Actions	RBC	OBU	Reference or comment
5	Train performs the level transition to NTC (ATC STM) based on: LT announcement or LTO BG		OBU sends the message 136 (Position Report) with mode SN OBU switches to STM supervision **OBU DMI starts displaying ATC-related supervision information**	The ATC supervision shall correspond to the signaling information produced by the ATC balises passed during the level transition area
6			OBU sends the message 136 (Position Report) with D_LRBG localizing the train completely outside ERTMS area	
7		RBC sends the message 24 (General Message) including packet 42 (Termination of a Communication Session) with variable: Q_RBC = 0 Q_SLEEPSESSION=0	OBU sends the message 156 (Termination of a Communication Session)	
8		RBC sends the message 39 (ACK of Termination of a Communication Session)	**OBU DMI displays the radio connection as OFF.**	

3.35 TC_COMP_35 – TRANSITION L2 -> ATC, IN OS

Brief description	**Train starts from L2 area and exits to ATC area with OS MA**
Degraded conditions	**No**
Starting condition	**Train in FS standing at the end of an FS train route before the last marker board towards the border.** **The last train route towards the border has a track circuit occupancy ;** **No route locked in adjacent interlocking (ATC area)**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets the train route to the border (containing an occupancy) and confirms running in OS.		**OBU DMI displays a request for acknowledge of OS mode**	
2	Driver acknowledges the OS		OBU sends the message 136 (Position Report) with OS mode **OBU DMI displays OS MA** (EoA is extended to the ATC border, however not visible on DMI)	
3	Dispatcher sets the 1st route in adjacent interlocking (starting at the border)	RBC sends the message 3 (extended MA) with EoA beyond the ERTMS border	OBU sends ACK related to the message 3 **OBU issues an audio info ("beep") that MA is extended** (EoA not visible on DMI)	
4	Driver starts the train. Train reads the LTA BG		**OBU DMI displays the text/symbol informing about level transition**	At this point, the STM starts to read ATC balise information

Step	Actions	RBC	OBU	Reference or comment
5	Driver acknowledges the level transition			
6	Train performs the level transition to NTC (ATC STM) based on: LT announcement or LTO BG		OBU sends the message 136 (Position Report) with mode STM OBU switches to STM supervision **OBU DMI starts displaying ATC-related supervision information**	The ATC supervision shall correspond to the signaling information produced by the ATC balises passed during the level transition area
7			OBU sends the message 136 (Position Report) with D_LRBG localizing the train completely outside ERTMS area	
8		RBC sends the message 24 (General Message) including packet 42 (Termination of a Communication Session) with variable: Q_RBC = 0 Q_SLEEPSESSION=0	OBU sends the message 156 (Termination of a Communication Session)	
9		RBC sends the message 39 (ACK of Termination of a Communication Session)	**OBU DMI displays the radio connection as OFF.**	

3.36 TC_COMP_36 – TRANSITION L2 -> ATC, IN SR

Brief description	**Train starts from L2 area and exits to ATC area in SR mode**
Degraded conditions	**No**
Starting condition	**Train in FS with MA up to the exit border**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Train with FS MA up to the ATC border, but at standstill before the LTA BG.		**OBU DMI displays EoA at the ATC border**	
2	Driver starts the train. Train reads the LTA BG		**OBU DMI displays the text/symbol informing about level transition**	At this point, the STM starts to read balise information
3	Driver acknowledges the level transition			
4	Driver stops the train ahead of the exit signal (which is at stop) Driver performs “OVERRIDE”		OBU sends the message 136 (Position Report) with mode SR **OBU DMI displays SR mode**	
5	Driver starts the train. Train performs the level transition to NTC (ATC STM) based on LTO BG		OBU sends the message 136 (Position Report) with mode STM **OBU DMI starts displaying ATC-related supervision info (*)**	(*) A BL3 compliant OBU may erase any ATC data read in the level transition area before the override button was pressed by the driver.
6	Driver acknowledges the level transition			

Step	Actions	RBC	OBU	Reference or comment
7			OBU sends the message 136 (Position Report) with D_LRBG localizing the train completely outside ERTMS area	
8		RBC sends the message 24 (General Message) including packet 42 (Termination of a Communication Session) with variable: Q_RBC = 0 Q_SLEEPSESSION=0	OBU sends the message 156 (Termination of a Communication Session)	
9		RBC sends the message 39 (ACK of Termination of a Communication Session)	**OBU DMI displays the radio connection as OFF.**	

3.37 TC_COMP_37 – LEVEL CROSSING – NOMINAL CASE

Brief description	**Train passes over a level crossing with FS MA.** **This test case shall be executed at different V_MAXTRAIN speeds**
Degraded conditions	**No**
Starting condition	**Train in FS with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets the route over the LX		OBU sends the message 132 (MA request)	
2		RBC sends the message 3 (MA) with: EoA on the LX start location packets 57 “MA request parameters” is sent to control T_MAR=39s	OBU sends ACK related to the MA **OBU DMI displays EoA at LX**	
3	Train approaches the LX		OBU sends the message 132 (MA request)	This should be done according to T_MAR=39 s
5		RBC sends the message 3 (MA) with EoA beyond the LX, with packet 65 (TSR) D_TSR=distance to LX area L_TSR=length of LX area	OBU sends ACK related to the message MA	
7			**OBU DMI displays the EoA extended beyond the LX, with a TSR over the LX**	

Step	Actions	RBC	OBU	Reference or comment
8	LX closes	RBC sends the message 24 (General message) with packet 66 (TSR revocation)	OBU sends ACK related to the message 24 **The TSR is removed from the OBU DMI**	
9	Train passes the level crossing			
10	Train leaves the track section where the LX is located	RBC order to open the LX barrier		

3.38 TC_COMP_38 – LEVEL CROSSING – PASSAGE IN OS MODE

Brief description	**Train passes over a level crossing with OS MA**
Degraded conditions	**No**
Starting condition	**Train in FS with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	The track section of the LX is unduly occupied			
2	Dispatcher sets the route OS proved over the LX		OBU sends message 132 (MA request)	
3		RBC sends message 3 (MA) with: EoA on the LX start location T_MAR=39s Pkt 80 covering the route of the LX	OBU sends ACK related to the MA **OBU DMI displays EoA at LX**	
4	Train approaches the LX		OBU sends message 132 (MA request)	
5	Driver acknowledges the OS mode		**OBU switches to OS mode** and sends a message 136 (Position Report) with M_MODE=1	
6		RBC sends an MA with EoA beyond the LX, and a TSR covering the LX area (see nominal case for details)	OBU sends message 146 (ACK) related to the received message(s) **OBU extends the EoA beyond the LX, with a TSR over the LX (not visible on DMI)**	

Step	Actions	RBC	OBU	Reference or comment
7	LX closes	RBC sends the message 24 (General message) with packet 66 (TSR revocation)	OBU sends ACK related to the message 24 **The TSR is removed from the OBU (not visible on DMI)**	
8	Train passes the level crossing			
9	Train leaves the track section where the LX is located		OBU sends the message 136 (Position Report) with D_LRBG localizing the train at least 1000 m beyond the LX center	
10		RBC sends order to open the LX barrier		

3.39 TC_COMP_39 – Deleted

3.40 TC_COMP_40 – LEVEL CROSSING – STATUS LOST AFTER "PROTECTED"

Brief description	**Train passes over a level crossing with FS MA**
Degraded conditions	**Yes**
Starting condition	**Train in FS with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets the route over the LX		OBU sends the message 132 (MA request)	
2		RBC sends the message 3 (MA) with: EoA on the LX start location T_MAR=39s	OBU sends ACK related to the MA **OBU DMI displays EoA at LX**	
3	Train approaches the LX		OBU sends the message 132 (MA request)	
4		RBC sends an MA with EoA beyond the LX, and a TSR covering the LX area (see nominal case for details)	OBU sends message 146 (ACK) related to the received message(s) **OBU DMI displays the EoA extended beyond the LX, with a TSR over the LX**	
5	LX closes	RBC sends the message 24 (General message) with packet 66 (TSR revocation)	OBU sends ACK related to the message 24 **The TSR is removed from the OBU DMI**	

Step	Actions	RBC	OBU	Reference or comment
6	When train is at least 500m before the LX: LX is simulated not in good condition (relay LC OK)	The RBC sends msg 15 (CES) to the OBU, where the stop location is the beginning of the LX	OBU sends the message 147 (ACK to CES) with Q_EMERGENCYSTOP=0 (CES accepted). **OBU DMI displays the new EoA at the LX start location**	Depending on position and speed, OBU might apply brakes and/or enter Trip mode
7	Stop the train within 100m of the LX start location	RBC sends CES revocation and then message 3 (MA) with packet 65 (TSR) D_TSR=distance to LX area L_TSR=length of LX area	OBU sends message 146 (ACK) related to the received messages **OBU DMI displays an extended MA with a TSR over the LX area**	
8	Train passes the level crossing at permitted speed 10 km/h		When the train front end passes the area covered by L_LX, then the **speed limitation of 10 km/h is removed**	
9	Train leaves the track section where the LX is located	RBC order to open the LX barrier		

3.41 TC_COMP_41 – Deleted

3.42 TC_COMP_42 – Deleted

3.43 TC_COMP_43 – LEVEL CROSSING OUT OF CONTROL – MA EXTENSION AT PASSAGE

Brief description	**Train passes over a level crossing with FS MA**
Degraded conditions	**Yes**
Starting condition	**Train in FS with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	The LX is simulated “Not in good condition”			
2	Dispatcher sets the route over the LX		OBU sends message 132 (MA request)	
3		RBC sends the message 3 (MA) with: EoA on the LX start location T_MAR=39s	OBU sends message 146 (ACK) related to the MA **OBU DMI displays EoA at LX**	
4	Train approaches the LX		OBU sends message 132 (MA request)	
5		RBC sends an MA with EoA beyond the LX, and a TSR covering the LX area (see nominal case for details)	OBU sends message 146 (ACK) related to the received message(s) **OBU DMI displays the EoA extended beyond the LX, with a TSR over the LX**	
6	When the train passes the level crossing start location: The dispatcher extends the current route	RBC sends message 3 (extended MA)	OBU sends ACK related to the MA **OBU DMI displays the extended MA.**	
7	Train leaves LX track sect.	RBC order to open the LX barrier		

3.44 TC_COMP_44 – Deleted

3.45 TC_COMP_45 – LEVEL CROSSING - MA EXTENSION AFTER POST TRIP

Brief description	**Train passes from PT to FS with MA over a level crossing**
Degraded conditions	**No**
Starting condition	**Train in FS with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets the route over the LX		OBU sends the message 132 (MA request)	
2		RBC sends the message 3 (MA) with: EoA on the LX start location T_MAR=39s	OBU sends ACK related to the MA **OBU DMI displays EoA at LX**	
3	Train approaches the LX		OBU sends the message 132 (MA request)	
4		RBC sends an MA with EoA beyond the LX, and a TSR covering the LX area (see nominal case for details)	OBU sends message 146 (ACK) related to the received message(s) **OBU DMI displays the EoA extended beyond the LX, with a TSR over the LX**	
5	LX closes	RBC sends the message 24 (General message) with packet 66 (TSR revocation)	OBU sends ACK related to the message 24 **The TSR is removed from the DMI**	
6	Train stops ahead of the LX start location			

Step	Actions	RBC	OBU	Reference or comment
7	Dispatcher selects the Emergency Stop Command for the train	RBC sends the message 16 (Unconditional Emergency Message)	OBU sends the message 147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2 **OBU switches to TRIP mode and it applies the emergency brake**	
8			**OBU DMI displays a text message for the acknowledgement of the train trip.**	The OBU may display an acknowledge icon instead of a text
9	Driver acknowledges TRIP mode (on DMI)		**OBU switches to POST TRIP mode and it releases the emergency brake** OBU sends the message 136 (Position Report) with M_MODE=8 (POST TRIP)	
10		RBC sends the message 6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to the message 6	
11	Dispatcher selects the Emergency Revocation Command for the train	RBC sends the message 18 (Revocation of UES) with ACK request	OBU sends ACK related to the message 18 **OBU DMI enables the ”START” button**	
12		Optional: RBC sends message 24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	OBU sends ACK related to the message 24	
13	Driver selects “START”		OBU sends the message 132 (MA Request)	
14		RBC sends the message 3 (FS MA *) with EoA beyond LX	**OBU switches to FS/OS mode** OBU sends ACK related to the message 3	*) Conditions may not be enough for FS; if so, an OS profile is added.

Step	Actions	RBC	OBU	Reference or comment
15	Train passes the level crossing			
16	Train leaves LX track sect	RBC order to open the LX barrier		

3.46 TC_COMP_46 – MANUAL LEVEL CHANGE TO LEVEL NTC (ATC STM)

Brief description	**Driver selects level STM / NTC (ATC) and RBC disconnects the established radio connection**
Degraded conditions	**Yes: Train running in wrong level (driver's error)**
Starting condition	**OBU is powered-off**
Train status before test	**Last used level before power-off shall be Level 2**

Step	Actions	RBC	OBU	Reference or comment
1	Driver powers the OBU and opens a cab desk			
2	Driver enters his driver ID		OBU sends the message 155 (Initiation of communication session)	
3		RBC sends message 32 "Configuration determination"	OBU sends message 146 (related to message 32) OBU sends message 159 (Communication session established) **OBU DMI displays radio connection ON.**	
4		RBC sends message 24 "General message" with packets 57 "Movement authority request parameters", 58 "Position report parameters" with acknowledgment request	OBU sends message 157 Start of mission position report with either: - Q_STATUS = 0 (Invalid), OR - Q_STATUS = 2 (Unknown) and all location variables set to unknown values	
5		RBC sends the message 41 (Train accepted)	OBU sends the message 146 (Acknowledgement) related to the message 41	
6	Driver selects Level Change Driver selects Level ATC-2 Driver ack Level ATC-2		OBU sends message 136 (Position Report) to the RBC, indicating the level STM **OBU DMI displays level ATC STM**	

Step	Actions	RBC	OBU	Reference or comment
7		RBC sends message 24 (General Message) including packet 42, with an order to terminate the communication session	OBU sends message 156 (Termination of a communication session)	
8		RBC sends message 39 (Termination acknowledgement)	OBU disconnects the radio channel to the RBC **OBU DMI displays radio connection OFF.**	
9	Driver starts and lets the train pass an ordinary position balise.		Packet 42 and 46 is read from the balise. The OBU is ordered to change to Level 2 and as a consequence is tripped due to unauthorized movement. The OBU is ordered to call the RBC.	
10	Driver acknowledges transition to level 2 Driver acknowledges trip mode	The train is registered in the RBC	**OBU DMI displays level 2 and Post Trip mode**.	
11	Driver presses “START”	RBC sends SR Authorisation with 0m	**OBU DMI displays SR mode**	

3.47 TC_COMP_47 – LOSS OF RADIO → RECONNECTION BEFORE T_NVCONTACT EXPIRATION

Brief description	**Loss of connection in Level 2 and reconnection**
Degraded conditions	**Yes**
Starting condition	**Train in FS with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Loss of RBC-OBU connection is simulated			T_NVCONTACT = 90s
2		After 20 seconds since the last radio messages, RBC sends an alarm to CTC		
3	Before 90s has elapsed since radio connection was disabled: Restore RBC-OBU connection	The alarm on the CTC is revoked RBC sends the message 3 (MA)	OBU sends ACK related to the MA **OBU does not apply brakes** **OBU DMI does not display any alarm *.**	Other message than message 3 might also be sent from the RBC. *) A BL3 train will display a warning after 45s loss off radio link.

3.48 TC_COMP_48 – LOSS OF RADIO → RECONNECTION AFTER T_NVCONTACT EXPIRATION

Brief description	**Reconnection after T_NVCONTACT expiration**
Degraded conditions	**Yes**
Starting condition	**Train in FS with long MA. A long train route shall be used and the train located just beyond the start-of-route, in order to avoid that the train passes a new signal board while the connection is lost.**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Train is running at low speed			Ensure that a new signal board is not passed during the test!
2	Loss of RBC-OBU connection is simulated	After 20 seconds since the last radio messages, RBC sends an alarm to CTC		
3			**After T_NVCONTACT service brakes are applied.** **OBU DMI displays radio connection lost**	T_NVCONTACT = 90s A BL3 train will also display a warning after 45s loss off radio link.
4	The train stops		**OBU withdraws the MA to train front end**	
5	Restore the RBC-OBU connection before the communication session is lost (i.e. within 5 minutes)		OBU reconnects with RBC **OBU DMI displays radio connection ON** OBU sends the message 132 (MA request) with Q_TRACKDEL=1	

Step	Actions	RBC	OBU	Reference or comment
6		The alarm on the CTC is revoked RBC sends message 3 (MA)	OBU sends message 146 (ACK) related to the MA **OBU DMI displays MA extended to same EoA as before loss of connection**	

3.49 TC_COMP_49 – LOSS OF COMMUNICATION SESSION → NEW COMM. SESSION

Brief description	**New communication session after T_LOST expiration**
Degraded conditions	**Yes**
Starting condition	**Train in FS with long MA. A long train route shall be used and the train located just beyond the start-of-route, in order to avoid that the train passes a new signal board while the connection is lost.**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Loss of RBC-OBU connection is simulated			Ensure that a new signal board is not passed during the test!
2		After 20 seconds since the last radio messages, RBC sends an alarm to CTC		
3			**After T_NVCONTACT service brakes are applied** **OBU DMI displays radio connection lost**	T_NVCONTACT = 90s
4	The train stops		**OBU withdraws the MA to its front end** OBU tries to reconnect with RBC for a period of 5 minutes	
5	After 5 minutes		**OBU DMI displays "No communication session"**	

Step	Actions	RBC	OBU	Reference or comment
6	Restore the RBC-OBU connection			
7	Driver selects “OVERRIDE” on the DMI		**OBU switches to SR mode.**	This mode change may trigger OBU to establish a new radio connection, i.e. in advance to the balise passage in step 9
8	Driver moves the train in SR mode			It may be needed to press “Start”
9	The train reads a new BG containing the packet 42		OBU reconnects to RBC in SR mode (without message 157)	The messages exchanged for communication establishment is not described in detail.
10		RBC sends the message 3 (MA)	OBU sends ACK related to the MA **OBU DMI displays MA extended to same EoA as before loss of connection**	

3.50 TC_COMP_50 – LOSS OF ONE BALISE IN A BG WITH DUPLICATED BALISES

Brief description	**Loss of one single balise in a BG with duplicated balises in FS mode**
Degraded conditions	**Yes**
Starting condition	**Train in FS with long MA; A balise group need to be manipulated in the used test yard, disabling one of the balises in the balise group**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Train misses one balise in a balise group containing two duplicated balises (the balise group must be part of the MA supervised by the train)		**OBU does not apply brakes.** Optional: OBU sends the message 136 (Position Report) with packet 4 containing M_ERROR=1 Optional: OBU DMI displays an error message for the missing balise	Bane NOR seeks to gather information about which vehicles use this kind of reporting. However, it is not clear from SS-026 that this reporting is mandatory.
2		If OBU sends packet 4 with M_ERROR = 1, RBC displays an alarm on the D&M		

3.51 TC_COMP_51 – LOSS OF ONE BALISE IN A BG WITH DUPLICATED BALISES / LTO_L2

Brief description	**Loss of one balise in a duplicated LTO_L2 BG (LTO_L2 orders level transition to Level 2)**
Degraded conditions	**Yes**
Starting condition	**Train in SN mode connected to RBC; The LTO_L2 balise group needs to be manipulated in the used test yard, disabling one of the balises in the group**
Train status before test	**Executed Procedure 03**

Step	Actions	RBC	OBU	Reference or comment
1	Train reads the LTA BG		OBU sends the message 136 (Position Report) containing the NID_BG of the LTA BG **OBU DMI displays announcement of level transition.**	
2		RBC sends the entry MA with a section timer defined for the end-section Packet 3 (National Values) is included in the MA. This MA is repeated every 10 seconds	OBU stores the new MA in the buffer. **Approx. 10-15s before level transition a request for acknowledge is displayed.**	Depending on the current site, it may be needed to pass another balise which is tagged in the RBC to trigger sending of an MA.
3	Driver acknowledges the level transition			
4	Train approaches the LTO BG, with one balise not readable to the train			

Step	Actions	RBC	OBU	Reference or comment
5.1	Depending on odometry accuracy the LTO BG may be passed before or after the announced level transition: Alt 1: level transition to L2 occurs based on distance from the LTA BG		OBU sends the message 136 (Position Report) with Level 2 indicated **OBU DMI displays Level 2 and FS mode. The MA is displayed with EoA corresponding to the set routes.**	
5.2	(See step 5) Alt 2: LTO BG is passed before the announced level transition occurs		**OBU applies service brakes** (released when the train is at standstill) OBU sends the message 136 (Position Report) with Level 2 indicated. **OBU DMI displays Level 2 and FS mode.** **OBU shortens MA to train front.** OBU sends MA request	The level transition occurs shortly after the LTO BG is passed based on the announced distance in LTA BG
6	(Only subsequent to step 5.2)	RBC sends the message 3 (MA without time limitation)	OBU sends ACK related to the message 3 **OBU extends the MA with EoA corresponding to the set routes.**	

3.52 TC_COMP_52 – START OF MISSION WITH DIFFERENT TRAIN CATEGORIES

Brief description	**Start of mission with different train categories**
Degraded conditions	**No**
Starting condition	Train in SB mode inside a berth section. The used train routes shall have a variety of SSP profiles. **Østfoldbanens Østre Linje has speed profiles for these categories:** **- basic profile, i.e. "no category" = "normalhastighet"** **- Category A3 (CR 770 Categories 5 + 12) ="plusshastighet"** **If other categories are engineered in the trackside system the test case should be modified accordingly.**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Execute the Procedure 01 with no train category selected at train data entry		**OBU DMI displays permitted speed corresponding to basic category**	It is a matter of DMI design which train categories can be selected Basic profile is achieved by selecting e.g. FP3 on standardized DMI (The speed related to train category is visible on the track drawings)
2	Modify train data and select category A3	RBC revalidates the train data. **New train category is visible on CMI**.	**OBU DMI displays permitted speed corresponding to category A3**	Baseline 2 category A3 is equivalent to Baseline 3 category PASS3, or CR770 Categories 5 + 12. It may be possible to select category C4 / FP4 (CR770 5 + 11) as well.

3.53 TC_COMP_53 – Deleted

3.54 TC_COMP_54 - MA SHORTENING AT SIGNAL IN FRONT OF THE TRAIN

Brief description	**Shortening of MA because of signal set to stop in front of the train**
Degraded conditions	**Yes (due to operational issue)**
Starting condition	**Train in FS mode with long MA. Train running at medium speed e.g. 50-70 km/h approx. 1000 m before the next signal marker board**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets the signal in front of the train to STOP	RBC sends the message 3 (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** **OBU DMI displays text "Kjøretillatelse (MA) forkortet"**	The braking effort depends on the current speed in relation to the distance to the signal.
2	While the train is braking, the dispatcher selects the command to release the route in front of the train previously included in the MA	RBC rejects the release command		
3	Train stops ahead of the signal set to STOP			
4	The dispatcher selects the command to release the route in front of the train previously included in the MA	RBC accepts the command and releases the route		

3.55 TC_COMP_55 – Deleted

3.56 TC_COMP_56 – NOMINAL RUN ON A LONG LINE IN BOTH DIRECTIONS

Brief description	**Nominal run over a long line, with several stations (8-10)**
Degraded conditions	**No**
Starting condition	**Train in FS mode**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets all FS routes of the line in right direction		**OBU DMI displays MA correspondingly**	
2	Train moves in FS mode over whole line in right direction			
3		RBC sends the message 3 (extended MA) when the conditions to extend it are fulfilled	OBU sends ACK related to the MA **OBU DMI extends MA correspondingly**	
4	Train stops at the end on the line Driver closes the desk		OBU sends the message 150 (End of Mission)	
5		RBC sends the message 24 (General Message) including packet 42 (Termination of a Communication Session) with variable: Q_RBC = 0; Q_SLEEPSESSION=0		
6			OBU sends the message 156 (Termination of a Communication Session)	

Step	Actions	RBC	OBU	Reference or comment
7		RBC sends the message 39 (ACK of Termination of a Communication Session)		
8	Driver changes the cab Driver performs the Start of Mission in left direction inside berth section	RBC sends the message 3 (MA) with ACK request	OBU sends ACK related to the MA	
9	Dispatcher sets all FS routes of the line in left direction	RBC sends the message 3 (extended MA) when the conditions to extend it are fulfilled	OBU sends ACK related to the MA. **OBU DMI displays MA correspondingly**	
10	Train stops at the end of the line Driver closes the desk		OBU sends the message 150 (End of Mission)	
11		RBC sends the message 24 (General Message) including packet 42 (Termination of a Communication Session) with variable: Q_RBC = 0; Q_SLEEPSESSION=0		
12			OBU sends the message 156 (ACK of Termination of a Communication Session)	
13		RBC sends the message 39 (ACK of Termination of a Comm. Session)		

3.57 TC_COMP_57 – Deleted

3.58 TC_COMP_58 – Deleted

3.59 TC_COMP_59 – Deleted

3.60 TC_COMP_60 – LEVEL CROSSING TYPE PREPARED – NOMINAL CASE

Brief description	**Train passes a level crossing type *prepared***
Degraded conditions	**No**
Starting condition	**Train in FS mode with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets an FS train route including a level crossing type *prepared*	RBC sends an MA to the train, covering the route to the start location of the LX	**OBU DMI displays EoA at LX**	The level crossing is simulated as being in “good condition”
2	Train moves towards the LX (which is equal to the EoA)		OBU sends message 132 (MA Request)	
3		RBC sends an MA to the train, with EoA at the end of the train route. The MA is split in two sections. The first section ends at the LX-start location and the end-section covers the rest of the MA. The end-section has a section timer defined	**OBU DMI displays the EoA extended beyond the LX**	
4	The level crossing is simulated as protected	RBC sends a new MA to the train, without sections and without timers	(no visible change on the DMI)	

Step	Actions	RBC	OBU	Reference or comment
5	Driver runs the train and passes the level crossing			The train can pass the level crossing at full speed

3.61 TC_COMP_61 – LEVEL CROSSING TYPE PREPARED – PROTECTED STATUS IS LOST

Brief description	**Train approaches a level crossing type prepared, first being in good condition and then changing to bad condition**
Degraded conditions	**Yes**
Starting condition	**Train in FS mode with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets an FS train route including a level crossing type *prepared*	RBC sends an MA to the train, covering the route to the start location of the LX	**OBU DMI displays EoA at LX**	The level crossing is simulated as being in “good condition”
2	Train moves towards the LX (which is equal to the EoA)		OBU sends message 132 (MA Request)	
3		RBC sends an MA to the train, to the end of the train route. The MA is split in two sections. The first section ends at the LX-start location and the end-section covers the rest of the MA. The end-section has a section timer defined	**OBU DMI displays the EoA extended beyond the LX**	
4	The level crossing is simulated as protected	RBC sends a new MA to the train, now without sections and without timers	(no visible change on the DMI)	

Step	Actions	RBC	OBU	Reference or comment
5	Protected status is lost (level crossing is simulated as being in “bad condition”)	The RBC sends msg 15 (CES) to the OBU, where the stop location is the beginning of the LX	OBU sends the message 147 (ACK to Conditional Emergency Stop) with Q_EMERGENCYSTOP=0 (CES accepted). **OBU DMI displays the EoA shortened to the LX**	Depending on position and speed, OBU might apply brakes
6	The train is forced to standstill due to the CES	The RBC sends packet 65 (TSR) to the OBU with speed restriction 20 km/h over the LX	**OBU DMI displays a TSR over the LX with speed 20 km/h**	

3.62 TC_COMP_62 – LEVEL CROSSING TYPE PREPARED – PROTECTED STATUS NOT OBTAINED

Brief description	**Train approaches a level crossing type prepared that is malfunctioning**
Degraded conditions	**Yes**
Starting condition	**Train in FS mode with long MA**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets an FS train route including a level crossing type *prepared*	RBC sends an MA to the train, covering the route to the start location of the LX	**OBU DMI displays EoA at LX**	The level crossing is simulated as being in good condition
2	Train moves towards the LX (which is equal to the EoA)		OBU sends message 132 (MA Request)	
3		RBC sends an MA to the train, to the end of the train route. The MA is split in two sections. The first section ends at the LX-start location and the end-section covers the rest of the MA. The end-section has a section timer defined	**OBU DMI displays the EoA extended beyond the LX**	
4	Level crossing is simulated as “Not protected”	(RBC does not update the MA)	The section timer expires for the end section, and **OBU DMI displays a shortened MA (EoA ending at the LX start location)**	Depending on the current speed and position of the train, brakes might be applied
5	Train approaches the EoA and stops.	A new MA (msg 3) is sent with EoA beyond the LX, with a speed restriction 20 km/h (packet 65) over the LX.	**OBU DMI displays the EoA extended beyond the LX, with a TSR extending over the LX**	

Step	Actions	RBC	OBU	Reference or comment
6	Restore the simulated state of the LX to “protected”	The speed restriction over the LX is revoked (packet 66)	**The TSR is removed from the DMI**	

3.63 TC_COMP_63 – ROUTE RELEASE WITH SHIFTED LOCATION

Brief description	**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)**
Degraded conditions	**No**
Starting condition	**Train in FS mode**
Train status before test	**Executed Procedure 01**

Note: to facilitate reading, this test case excludes many details related to messages exchanged between OBU and RBC. These interactions are already tested through other test cases.

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher sets a route out of the station	RBC sends OS-MA to the train	**OBU DMI displays a request for OS acknowledgement**	
2	Driver acknowledges OS. Driver runs the train out of the station and stops after the entry signal to the station.		**OBU enters OS mode** **Having passed the marker board of the train route, OBU switches to FS.**	
3	Driver deactivates the cabin		OBU sends msg 150, indicating End of Mission	
4		RBC orders disconnection of the radio connection	OBU disconnects the radio	

Step	Actions	RBC	OBU	Reference or comment
5	Driver activates the other cabin, to run in the opposite direction (back to the station)		OBU establishes a new radio communication session with the RBC	
6	Dispatcher sets a route to track 3 at the station	RBC sends OS-MA with shifted location, ending at track 3. The location reference is the BG at the entry signal	**OBU DMI displays a request for OS acknowledgement**	
7	Driver acknowledges OS		**OBU enters OS mode** **OBU DMI displays permitted speed 40 km/h**	
8	As the train was supposed to go to track 2, dispatcher releases the route to track 3	RBC sends a new 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) **OBU DMI displays text "Kjøretillatelse (MA) forkortet"**	Train need to be at standstill to allow train route release
9	Dispatcher sets a route to track 2 at the station	RBC sends OS-MA with shifted location, ending at track 2	**OBU DMI displays permitted speed 40 km/h**	

3.64 TC_COMP_64 – Deleted

3.65 TC_COMP_65 – Deleted

3.66 TC_COMP_66 – Deleted

3.68 TC_COMP_67 – SYSTEM FAILURE

Brief description	**Train runs on a route and an onboard technical failure occurs leading to mode change to System Failure mode (SF)**
Degraded conditions	**Yes**
Starting condition	**Train in FS mode, running on a locked train route, at least 80 km/h**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	A technical failure is provoked in the OBU		OBU enters system failure mode. A position report (packet 0) with mode SF is sent to RBC	The behavior on DMI is implementation dependent. The moment of mode transition could be instantaneous, or after train coming to standstill (implementation dependent).
2	While train still running, try to release the train route	Train route is not released		
3	Wait 3 minutes, then try to release the train route	Train route is released		

3.69 TC_COMP_68 – SLEEPING

Brief description	**Mode transition to and from Sleeping mode (SL)**
Degraded conditions	**No**
Starting condition	**OBU is configured with a sleeping status input. Train in FS mode, at standstill**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Close the cab	Train is deregistered	OBU enters Standby mode. An End-of-Mission message is sent to RBC, indicating mode transition to Standby.	
2	Activate the sleeping status input (*)	RBC sends an order to close the connection (paket 42) Check that the connection is closed in the RBC Train is not registered (**)	OBU establishes a connection with the RBC and sends a position report (packet 0) with mode SL OBU closes the connection	(*) by simulating the activation of another cab in a multi-coupled train (or with real train, by multi-coupling another vehicle unit) (**) from an operational point of view, i.e. no train is visible in the CTC

Step	Actions	RBC	OBU	Reference or comment
3	Inactivate the sleeping status input (*)	RBC sends an order to close the connection (paket 42) Check that the connection is closed in the RBC (Train is not registered)	OBU establishes a connection with the RBC and sends a position report (packet 0) with mode SB OBU closes the connection	(*) by simulating the deactivation of another cab in a multi-coupled train (or with real train, by closing the cab of the other multi-coupled vehicle unit)
4	Open the cab	Train is registered	OBU establishes a connection with the RBC and initiates the ordinary Start-of-Mission procedure.	

3.70 TC_COMP_100 – START IN SR MODE, MARKER BOARD NOT VISIBLE / NOT READABLE

Brief description	**Start of mission with unknown position. Train is not near a visible marker board (Operational checklist point 3.1) or the identification of the marker board is not readable (checklist point 3.2), requiring driving in SR to the berth section of the next route.**
Degraded conditions	**Yes**
Starting condition	**Train in SB, marker board is not visible or not possible to identify from the train**
Train status before test	**Executed Procedure 02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher releases the train route under the train, if any			
2	Dispatcher locks the next route and activates level crossing, if any			Do not position the train (operationally not allowed). Note any TSR in the area and issue written order 07 to driver.
3	Driver selects “START”		OBU sends the message 132 (MA request)	
4		RBC sends the message 2 (SR authorization) including a list of balises corresponding to the route	**OBU switches to SR mode** OBU sends ACK related to the SR authorization	
5	Driver moves the train until it reads a new balise group		OBU sends position report (packet 0) with known position	Note that balises with message “Stop if in SR” (last BG before each MB) require “override” before passing.
6		RBC receives position report from train ERTMS CTC shows train position		

Step	Actions	RBC	OBU	Reference or comment
7	Driver runs inside berth section	RBC sends the MA with OS profile covering the berth section and FS profile over the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	Occurs together with step 6 if the BG is within the berth section
8		RBC sends the message 34 (TAF request)		Msg 34 is sent directly after MA, although not visible on the DMI until the TAF window is reached)
9	Driver runs inside TAF window	msg 34 already sent	**OBU DMI displays "TAF Request" symbol**	The TAF window is normally 150m ahead of the signal board.
10	Driver confirms the TAF		OBU sends the message 149 (TAF granted)	
11		RBC sends the message 3 (MA) with FS profile covering the berth section and the next routes	**OBU switches to FS mode.**	

3.71 TC_COMP_101 – RECOVERY FROM TRIP IN FS/OS/SR

Brief description	**Train trips due to degraded condition (passage of "Stop if in SR" balise without override, unauthorized passage of EoA, emergency stop from dispatcher, SR 0m scenario during start of mission, shortened MA due to track occupation or axle counter fault, failed level transition).**
Degraded conditions	**Yes**
Starting condition	**Train is in FS or OS, or is about to achieve FS or OS via start of mission or level transition**
Train status before test	**Train in Level 2, appropriate status to achieve degraded scenario**

Step	Actions	RBC	OBU	Reference or comment
1	Produce one of the degraded scenarios described above.	RBC sends the message 16 (Unconditional Emergency Message)	OBU sends the message 147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2 **OBU switches to TRIP mode and applies the emergency brake**	Possible actions: Put train in SR and run over "stop if in SR" balise without override; run train past EoA; send emergency stop from dispatcher (command NST); perform start of mission and pass marker board without locked route; occupy the overlap of a route for a train in FS; perform level transition to L2 without locked L2 route or with GSM-R modem disconnected.
2	Train at standstill		**OBU displays a text message for train trip confirmation.** **OBU switches to POST TRIP mode and it releases the emergency brake.** OBU sends the message 136 (Position Report) with M_MODE=8 (POST TRIP)	The OBU may display an acknowledge icon instead of a text

Step	Actions	RBC	OBU	Reference or comment
3	Remove the condition causing the emergency stop message, if any.			Possible actions: lock a route for the train; remove occupation causing emergency stop; revoke emergency stop from dispatcher; restore GSM-R link
4		RBC sends the message 6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to the message 6	
5	Dispatcher: if train was in a locked FS/OS route, do not release the route under the train.	ERTMS CTC shows route locked under train		Operational goal is to achieve FS or OS in the same locked route. (Release of route is only necessary if TRIP results in system failure, which indicates a failed test case). Note any TSR in the area and issue written order 02 to driver.
6	Driver selects “START”		OBU sends the message 132 (MA request)	OBU may require driver to select “main menu” for the start button to be available.
7		RBC sends the message 3 (MA) in FS or OS mode	**OBU switches to FS or OS mode** OBU sends ACK related to the message 3	

3.72 TC_COMP_102 – RECOVERY FROM TRIP AT BORDER OF TSA

Brief description	**Train trips due to passage of "Danger for Shunting" balise at border of TSA, returns to TSA in SH.**
Degraded conditions	**Yes**
Starting condition	**Train has known position in an area where TSA can be locked.**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher: release train route, if any, and lock a TSA at the train's position			Locked TSA is necessary for approval of SH request by RBC.
2	Driver selects "Shunting Request"		OBU sends the message 130 (SH request)	Driver selects "Shunting Request"
3		RBC sends the message 28 (SH authorised)	**OBU switches to SH mode** OBU sends the message 136 (Position Report) with M_MODE=3	
4			OBU sends the message 150 (End of Mission)	
5		RBC sends the message 24 (General Message) including packet 42 (Termination of a Communication Session) with variable: Q_RBC = 0; Q_SLEEPSESSION=0		
6			OBU sends the message 156 (ACK of Termination of a Communication Session)	

Step	Actions	RBC	OBU	Reference or comment
7		RBC sends the message 39 (ACK of Termination of a Communication Session)		
8	Driver: move the train past the “Danger for Snunting” balise at the border of the TSA		**OBU switches to TRIP mode and applies the emergency brake**	
9	Train at standstill		**OBU displays a text message for train trip confirmation.** **OBU switches to POST TRIP mode and it releases the emergency brake.** OBU sends the message 136 (Position Report) with M_MODE=8 (POST TRIP)	The OBU may display an acknowledge icon instead of a text
10		RBC sends the message 6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to the message 6	
11	Driver: enter train data but do not select “start”.			
12	Dispatcher: issue written order 02.			
13	Driver: select “OVERRIDE”		**OBU switches to SR mode.** OBU sends message 136 (Position Report) with M_MODE=2	
14	Driver: deactivate the cabin		**OBU switches to SB mode.** OBU sends msg 150, indicating End of Mission	

Step	Actions	RBC	OBU	Reference or comment
15		RBC orders disconnection of the radio connection	OBU disconnects the radio	
16	Driver activates the other cabin, to run in the opposite direction (back into the TSA)		OBU establishes a new radio communication session with the RBC	
17	Driver selects “Shunting Request”		**OBU switches to SH mode**	Radio messages between RBC and OBU are as described in steps 2 through 7 above.
18	Driver moves the train forward in SH and returns to the TSA.			

3.73 TC_COMP_103 – DRIVER SELECTS START TWICE

Brief description	**Driver presses start twice, potentially producing deadlock. The purpose of the test is to see how the train reacts to this scenario and develop a workaround procedure if necessary.**
Degraded conditions	**Yes**
Starting condition	**Unknown position, START available, train located inside berth section**
Train status before test	**Executed Procedure 02**

Step	Actions	RBC	OBU	Reference or comment
1	Dispatcher: lock a route for the train			
2	Dispatcher: position the train using the POS command			Driver participates according to operational procedure
3	Driver selects Start, acknowledges SR mode	RBC sends the message 2 (SR authorisation) with D_SR <> 0	**OBU switches to SR mode** OBU sends ACK related to the SR authorization	RBC responds immediately with Message 2
4	Driver selects Start again	RBC will not answer after the first SR authorisation is sent.	According to Subset-026, the OBU should wait for an answer to the MA request.	The driver normally should select Override (“passer”) in this situation, but in this scenario Start is pressed again by mistake
5	Driver selects Override (passer) when possible		**Train enters “override” state.** The OBU may allow the driver to press Override immediately, it may allow this only after a timeout, or it may continue to wait for an answer from the RBC (deadlock).	The operational situation calls for Override, to remain in SR mode with Override active. If deadlock occurs, it may be helpful to send an emergency stop to the train, forcing it into Trip mode.

3.74 TC_COMP_104 – SH REQUEST WITH BG BETWEEN BALISE ANTENNAS

Brief description	**Verify proper SH request is sent when train passes LRBG with only one of two antennas.**
Degraded conditions	**No**
Starting condition	**Train in station, SH mode.**
Train status before test	**Train in locked TSA, known position.**

Step	Actions	RBC	OBU	Reference or comment
1	Driver: move the train past a set of points in SH, then pass a BG with 1 of 2 balise antennas			Scenario is changing tracks in SH, where the train moves just past a set of points before changing directions.
2	Driver deactivates the cabin without exiting SH mode		**OBU enters SB mode.**	
3	Driver activates cabin in the opposite end of the train and selects “Shunting Request”		OBU sends the message 130 (SH request)	Scenario is shifted location reference in SH mode with LRBG under the train (between balise antennas).
4		RBC sends the message 28 (SH authorised)	**OBU switches to SH mode** OBU sends the message 136 (Position Report) with M_MODE=3	

3.75 TC_COMP_105 – SH request with 2 antennas past BG

Brief description	**Verify proper SH request is sent when train passes LRBG with two antennas.**
Degraded conditions	**No**
Starting condition	**Train in station, SH mode.**
Train status before test	**Train in locked TSA, known position.**

Step	Actions	RBC	OBU	Reference or comment
1	Driver: move the train past a set of points in SH, then pass a BG with both balise antennas			Scenario is changing tracks in SH, where the train moves just past a set of points before changing directions.
2	Driver deactivates the cabin without exiting SH mode		**OBU enters SB mode.**	
3	Driver activates cabin in the opposite end of the train and selects “Shunting Request”		OBU sends the message 130 (SH request)	Scenario is shifted location reference in SH mode with LRBG in front of the train.
4		RBC sends the message 28 (SH authorised)	**OBU switches to SH mode** OBU sends the message 136 (Position Report) with M_MODE=3	

3.76 TC_COMP_106 – START OF MISSION WITH ANTENNA OVER BALISE

Brief description	**Train starts with antenna directly over a balise and sends a proper MA request message, achieving FS mode afterwards.**
Degraded conditions	**Yes**
Starting condition	**FS mode, approaching berth section to next route**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Driver: stop the train with balise antenna directly over a balise that lies within the berth section to the next route.			An observer is required to assist the driver to stop at the correct location. Test location is chosen to allow an observer. The choice of the first or second balise in a BG is not expected to be important, but could be a factor.
2	Driver: deactivate and reactivate the cabin		**OBU enters SB**, then is ready to perform a new start of mission	
3	Perform a new start of mission (Procedure 01). Driver selects “Start”.		OBU sends the message 132 (MA Request)	A well-formed MA request message is the desired outcome of the test.
4		RBC sends message 3 (FS MA *) with ACK request	**OBU switches to FS/OS mode** OBU sends ACK related to the message 3	*) Conditions may not be enough for FS; if so, an OS profile is added.
5	Driver runs the train past next signal board		**OBU switches to FS mode** (if not already in FS mode)	

3.77 TC_COMP_107 – DETERMINE ACTIVE BALISE ANTENNA IN SL

Brief description	**A train in SL mode reads balises with at least one of its balise antennas. Operationally it is desirable that the "front" antenna, in the direction of travel, performs this function. The purpose of the test is to develop a procedure to produce this result.**
Degraded conditions	**No**
Starting condition	**Train in SL mode (second trainset in coupled consist).**
Train status before test	**The front cabin in the direction of travel was most recently activated before entering SL.**

Step	Actions	RBC	OBU	Reference or comment
1	Initial condition: test Train in SL (second train), front cabin was most recently activated			The assumption is that the last activated cabin may determine which balise antenna reads balises in SL.
2	Driver: move the consist so that the train in SL reads a balise group with one antenna but not both		Test train reads the balise telegram if the front antenna is active.	It may be helpful to choose a BG just inside a set of points so that the train will have unknown position (ambiguous) if it reports the previous LRBG.
3	Exit SL mode.			May require splitting the test train from the front train.
4	Activate the front cabin in the test train and perform start of mission (Procedure 01).		**OBU starts normally with known position and reports the balise group from step 2 as LRBG**, indicating that the front antenna of the sleeping train was active.	If the train has unknown position, the RBC will send message 24 with packet 72 (text message) including the text "Ukjent position"

Step	Actions	RBC	OBU	Reference or comment
5	Activate the rear cabin in the test train and perform start of mission (Procedure 01).		**OBU starts normally with known position and reports the balise group from step 2 as LRBG.**	If the train has unknown position, the RBC will send message 24 with packet 72 (text message) including the text “Ukjent position”
6	Put the test train in SL mode.			May require joining the test train to the front train.
7	Driver: move the consist forward to a different balise group. Pass the balise group so that the test train passes the BG with one antenna but not both.			The rear cabin of the test train was now most recently activated. If the front antenna is not active, the train will report the previous LRBG in its position reports.
8	Activate the rear cabin in the test train and perform start of mission (Procedure 01).		**OBU starts normally with known position and reports the balise group from step 7 as LRBG**, indicating that the front antenna of the sleeping train was active.	If the train has unknown position, the RBC will send message 24 with packet 72 (text message) including the text “Ukjent position”
9	Activate the front cabin in the test train and perform start of mission (Procedure 01).		**OBU starts normally with known position and reports the balise group from step 7 as LRBG**.	If the train has unknown position, the RBC will send message 24 with packet 72 (text message) including the text “Ukjent position”

3.78 TC_COMP_108 – LEVEL TRANSITION IN SL MODE

Brief description	**A train enters SL mode in an ATC area and is activated in a Level 2 area, starting normally with known position.**
Degraded conditions	**No**
Starting condition	**The train is located in an ATC area.**
Train status before test	**Executed Procedure 03. Test train in level STM, SN mode.**

Step	Actions	RBC	OBU	Reference or comment
1	Put the test train in SL mode as the second train in a coupled consist.			May require joining the test train to the front train.
2	Move the consist into the Level 2 area.		Test train remains in SL mode.	First train transitions to Level 2 at the border.
3	Exit SL mode.			May require splitting the test train from the front train.
4	Activate the front cabin in the test train and perform start of mission (Procedure 01).		**OBU starts normally with known position and reports the correct LRBG.**	If the train has unknown position, the RBC will send message 24 with packet 72 (text message) including the text “Ukjent position”

3.79 TC_COMP_109 – START AT LEVEL CROSSING IN A STATION

Brief description	**A train starts at a level crossing in a station and receives an MA without delay. Although this is primarily an RBC function, this test helps to validate RBC-OBU integration.**
Degraded conditions	**Yes**
Starting condition	**Train in FS with route into a station over a level crossing.**
Train status before test	**Train in FS**

Step	Actions	RBC	OBU	Reference or comment
1	Driver moves the train into the station and over the level crossing, stopping when the entire train has passed the LX. Driver deactivates the cabin.		**OBU enters standby**.	
2	Dispatcher: lock a route in the neighboring track that will prevent the test train's route over the LX from locking. Queue a route for the test train over the LX.			

Step	Actions	RBC	OBU	Reference or comment
3	Activate the cabin on the opposite end of the train (nearest the LX). Perform start of mission (Procedure 01) but do not press “Start”.	RBC registers train.	**OBU starts with known position**.	Train has shifted location reference after changing direction.
4	Dispatcher: activate the LX using the VBS command.			LX is activated.
5	Driver selects “Start”	RBC sends SR authorization.	OBU receives SR authorization and requests the driver to acknowledge.	RBC is unable to send an MA because the route is not locked. It should make no difference whether or not the driver acknowledges SR.
6	Dispatcher: release the conflicting route so that the queued route for the test train locks automatically.	**RBC sends OS-MA to the train immediately after the route is locked**.		The scenario simulates a crossing train arriving in the station.

3.80 TC_COMP_110 – SR AFTER AUTOMATIC END OF ROUTE RELEASE

Brief description	**At a location with automatic end-of-route release, the train enters SR and drives into the next route.**
Degraded conditions	**Yes**
Starting condition	**Train in FS mode with MA ending on a signal where the automatic end of route release is defined**
Train status before test	**Executed Procedure 01 and TC_COMP_02**

Step	Actions	RBC	OBU	Reference or comment
1	Driver moves to the EoA and stops the train within 30m from the next signal. Train at standstill			
2		RBC activates its internal timer T_STANDSTILL=10s		
3		After timer expiration, RBC sends the message 9 (Request to Shorten MA) with packet 15 including the variable: L_ENDSECTION= at train front end Q_DANGERPOINT=1 D_DP=L_DOUBTUNDER m		

Step	Actions	RBC	OBU	Reference or comment
4			OBU checks its braking curves . **OBU DMI displays a shortened MA , with EoA set to the train front.** OBU sends the message 137 (Request to shorten MA is granted)	
5	Driver selects Override (“passer”)		**OBU enters SR mode** and requires driver acknowledgement.	Written orders are performed as required operationally if performed as a field test.
6	Driver moves to BG in front of the signal, stops the train, and selects Override again.		**OBU enters Override state.** The Override symbol is visible on the screen.	Override is necessary to avoid trip at balise group containing Stop if in SR.
7	Driver moves past the BG and marker board into the next route.		**Override state disappears when passing the BG.**	

3.81 TC_COMP_111 – Level Transition From ATC into TSA

Brief description	**The train drives from an ATC area into a construction area (“anleggsområde”) - a temporary shunting area, with or without an activated working area. This test case is designed as a field test.**
Degraded conditions	**No**
Starting condition	**Train is in level STM/NTC, located in a border station near the ATC/L2 border. A TSA is established on the L2 line. A shunting route (skiftevei) is locked from the train’s position to the ATC/L2 border.**
Train status before test	**Executed Procedure 03**

Step	Actions	RBC	OBU	Reference or comment
1	Driver places the train in STM “override” state and moves the train toward the station border.		Train enters “override/passer” state while remaining in level STM/NTC. The train passes main signal(s) without ATC stop.	On ØØL the “override/passer” action must be performed at the latest at these locations: station platform (Ski) or exit signal 376 SBO (Sarpsborg).
2	The train approaches and then passes the L2 border, stopping at the station exit signal (station border).	Train is registered normally.	Train connects to the RBC and enters L2 near the LTO balise.	
3	Driver places the train in SR mode using the “override” button and moves the train into the TSA, stopping inside the border of the TSA.		Train enters SR mode and allows the driver to acknowledge.	Use written order 01 as required by operational rules. The train should stop when the entire train is inside the TSA border marker (“grensestolpe”) near D782 SKI or D371 SBO. Driver and dispatcher contact PICOP (“hovedsikkerhetsvakt”) as required by operational rules.

Step	Actions	RBC	OBU	Reference or comment
4	Driver places the train in SH mode	RBC approves OBU request for SH mode.	Train sends SH request message, receives permission from RBC, and enters SH mode.	

3.82 TC_COMP_112 – Re-establish Lost Communication

Brief description	**The OBU-RBC connection fails (e.g. due to a GSM-R failure). The procedure for reconnecting is performed.**
Degraded conditions	**Yes**
Starting condition	**Train is in the Level 2 area, in a train route, FS mode, connected to the RBC.**
Train status before test	**Executed Procedure 01**

Step	Actions	RBC	OBU	Reference or comment
1	Simulate a GSM-R fault to force the train to disconnect from the RBC	10 seconds after the last message was received from the train, RBC considers the communication status as “compromised”. An alarm is sent to CTC / LOP.	DMI indicates loss of connection to RBC. After 90 seconds, a service brake command is initiated.	Use an appropriate method to produce communication failure, such as disconnecting or powering down the GSM-R modem in the train.
2	Wait until the train connection status becomes “lost”. Route under the train remains locked.	When 180 seconds has elapsed from the last message received from the OBU, the RBC considers the communication status to be “lost”.	When five minutes has elapsed, a radio communication fault is shown on the DMI.	
3	Remove the GSM-R fault from step 1 to allow communication again.			
4	Re-establish communication from the train to the RBC.	The RBC allows the train to connect normally.	The train calls the RBC and establishes a connection. The communication status is shown on the DMI.	Use normal operating procedures to re-establish the connection

Step	Actions	RBC	OBU	Reference or comment
5	Dispatcher releases the route under the train and locks the next route.			As described in operating procedures.
6	Driver moves the train to the next marker board in SR mode.			Use written order 01 as required by operating procedures.
7	Driver and dispatcher perform a start of mission scenario to achieve FS	RBC sends FS-MA to the train	The train switches to FS mode.	As described in operational procedures and Procedure 01.

4 MESSAGES AND PACKET COVERAGE

4.1 Messages from RBC to the OBU

Message ID	Message name sent by RBC	Bane NOR
2	SR authorization	Covered
3	Movement Authority	Covered
6	Recognition of exit from TRIP mode	Covered
8	Acknowledgement of Train Data	Covered
9	Request to Shorten MA	Covered
15	Conditional Emergency Stop	Covered
16	Unconditional Emergency Stop	Covered
18	Revocation of Emergency Stop	Covered
24	General message	Covered
27	SH Refused	Covered
28	SH Authorised	Covered
32	Configuration Determination	Covered
33	MA with Shifted Location Reference	Covered
34	Track Ahead Free Request	Covered
37	In-fill MA	Not used by Bane NOR
38	Initiation of a communication session	Not used by Bane NOR
39	Acknowledgement of termination of a communication session	Covered
40	Train Rejected	Not covered in this specification
41	Train Accepted	Covered
43	SoM position report confirmed by RBC	Not used by Bane NOR
45	Assignment of coordinate system	Not used by Bane NOR

Table 4.1 - Messages sent by RBC to the OBU

4.2 Packets from RBC to the OBU

Packet ID	Message name sent by RBC	Covered/Not used by Bane NOR
2	System Version Order	Covered
3	National Values	Covered
5	Linking	Covered
12	Level 1 Movement Authority	Not used by Bane NOR
15	Level 2/3 Movement Authority	Covered
16	Repositioning Information	Not used by Bane NOR
21	Gradient Profile	Covered
27	International Static Speed Profile	Covered
39	Track Condition Change of traction power	Not used by Bane NOR
41	Level Transition Order	Covered
42	Session Management	Covered
44	Data used by applications outside the ERTMS/ETCS system.	Not used by Bane NOR
45	Radio Network registration	Covered
46	Conditional Level Transition Order	Covered
49	List of balises for SH Area	Not used by Bane NOR
51	Axle load Speed Profile	Not used by Bane NOR
57	Movement Authority Request Parameters	Covered
58	Position Report Parameters	Covered
63	List of Balises in SR Authority	Covered
65	Temporary Speed Restriction	Covered
66	Temporary Speed Restriction Revocation	Covered
67	Track Condition Big Metal Masses	Not used by Bane NOR

Packet ID	Message name sent by RBC	Covered/Not used by Bane NOR
68	Track Condition	Not used by Bane NOR
70	Route Suitability Data	Not used by Bane NOR
71	Adhesion Factor	Not used by Bane NOR
72	Packet for sending plain text messages	Covered
76	Packet for sending fixed text messages	Not used by Bane NOR
79	Geographical Position Information	Covered, sent from balises
80	Mode profile	Covered
90	Track Ahead Free up to level 2/3 transition location	Covered
131	RBC transition order	Not used by Bane NOR
132	Danger for Shunting information	Covered
133	Radio in-fill area information	Not used by Bane NOR
134	EOLM Packet	Not used by Bane NOR
136	Infill location reference	Not used by Bane NOR
137	Stop if in Staff Responsible	Covered
138	Reversing area information	Not used by Bane NOR
139	Reversing supervision information	Not used by Bane NOR
140	Train running number from RBC	Not used by Bane NOR
141	Default Gradient for Temporary Speed Restriction	Not used by Bane NOR
254	Default balise loop or RIU information	Not used by Bane NOR

Table 4.2 - Packets sent by RBC to the OBU

4.3 Messages from OBU to the RBC

Message ID	Message name sent by RBC	Covered/Not used by Bane NOR
129	Validated Train Data	Covered
130	Request for Shunting	Covered
132	MA Request	Covered
136	Train Position Report	Covered
137	Request to shorten MA is granted	Covered
138	Request to shorten MA is rejected	Covered
146	Acknowledgement	Covered
147	Acknowledgement of Emergency Stop	Covered
149	Track Ahead Free Granted	Covered
150	End of Mission	Covered
153	Radio in-fill request	Not used by Bane NOR
154	No compatible version	Not used by Bane NOR
155	Initiation of a communication session	Covered
156	Termination of a communication session	Covered
157	SoM Position Report	Covered
159	Session Established	Covered

Table 4.3 - Messages sent by OBU to the RBC

4.4 Packets from OBU to the RBC

Packet ID	Message name sent by RBC	Covered/Not used by Bane NOR
0	Position Report	Covered
1	Position Report based on two balise groups	Covered
3	Onboard telephone numbers	Not used by Bane NOR
4	Error Reporting	Covered
5	Train Running number	Covered
9	Level 2/3 transition information	Covered
11	Validated train data	Covered

Packet ID	Message name sent by RBC	Covered/Not used by Bane NOR
44	Data used by applications outside the ERTMS/ETCS system.	Not used by Bane NOR

Table 4.4 - Packets sent by OBU to the RBC

5 DOCUMENT INFORMATION

5.1 Document change history

Rev.	Description of change	Date	Created by
01E	Updates to address comments from ERA. Added Bane NOR contact information and RSC information. Updated title and introduction to reflect ESC terminology. Minor adjustments to test cases TC_COMP_13 and TC_COMP_30 based on internal review. Deleted test case TC_COMP_64 based on internal review – not possible to perform on ØØL. Updated document template.	29.06.2020	PRJO
00E	First issue. Test cases TC_COMP_68 and lower are adapted from Trafikverket test specification [4] cases with the same numbers. Test cases TC_COMP_100 and higher are Norway-specific test cases.	23.10.2017	PRJO

5.2 Terminology

Berth	A part of the track in front of a marker board (signal point) within which the train front must be located to get an MA for the train route corresponding to this marker board
BN	Bane NOR
CES	Conditional Emergency Stop
CosMA	Co-operative Shortening of MA
CMI	Monitors connected to the CTC for presentation of track layout and various signaling objects and train numbers
CTC	Centralized Traffic Control
D&M	RBC Diagnostic and Maintenance Workstation
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
ESC	ETCS System Compatibility
FS	Full Supervision (operative mode of the train)
IL	Interlocking
LX	Level Crossing
MA	Movement Authority
OBU	On Board unit
OS	On Sight (operative mode of the train)
PT	Post Trip (operative mode of the train)
RBC	Radio Block Center
ROLL-IN	This is a status in the interlocking related with the end of a train route. It states whether the occupation at the end of the route is exclusive for a known train (NID_ENGINE). “Clear” means this is true. It is achieved by running the train in FS mode though the train route up to the end of the route. If a roll-in occurs (=occupation beyond the end of the route), the status is lost. The ROLL-IN status conditions whether the train can start towards the next route in FS or OS mode.
RSC	Radio System Compatibility
SB	Stand By (operative mode of the train)
SH	Shunting (operative mode of the train)
SOM	Start Of Mission
SR	Staff Responsible (operative mode of the train)
TBD	To Be Defined
TSR	Temporary Speed Restriction
TR	Trip (operative mode of the train)

5.3 Reference list

[1] System Requirements Specification, Chapter 7, ERTMS/ETCS language, SUBSET-026-7, Ver 2.3.0d

[2] System Requirements Specification, Chapter 8, Messages, SUBSET-026-7, Ver 2.3.0d

[3] SRS 1.3, Ver 4.1.1. This is the requirement specification for Trafikverket's contract with Bombardier. (The document is derived from the common SRS ESTER07-015 with same version number. Bane NOR's RBC is based on a similar SRS also derived from these specifications.)

[4] Swedish Trackside – Generic OBU Compatibility Test Specification, TE14-027 Ver. 1.6, 2016.01.29