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TRAFIKVERKET
SWEDISH TRANSPORT ADMINISTRATION

ERTMS

Swedish Trackside – Generic OBU Compatibility

(Svensk ETCS mark – Generell ETCS ombord kompatibilitet)

Project

ESC Tests

Document type

Test Specification

Traffic System

E2

Signalling system, model(s)

M95E2

M11E2

Manufacturers

Alstom Transportation (Signal) Sweden HB

Hitachi Rail STS Sweden AB

Functional Product(s)

BL2: least FP 4.1

BL3: least FP 5.2.1

System Release(s)

-

Projekt

ESC-tester

Dokumenttyp

Testspecifikation + Testrappportmall

Trafikeringssystem

E2

Signalsystem, modell(er)

M95E2

M11E2

Tillverkare

Alstom Transportation (Signal) Sweden HB

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Funktionsprodukt(er)

BL2: least FP 4.1

BL3: least FP 5.2.1

Systemrelease(r)

-

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History

Version	Date	By	Change	Approved
0.1	2014-04-14	Dan Enberg	First version of the document, based on INT13-001, v1.1. Added/removed and renumbered test cases can be traced in a produced Excel-matrix	
1.0	2014-05-21	Dan Enberg	Ready for review	
1.1	2014-06-03	Dan Enberg	Updated after review	
1.2	2014-06-15	Dan Enberg	Updated after review	
1.3	2014-10-21	Dan Enberg	Updated after external review	
1.4	2015-04-21	S. Edén	Updated due to experience from testing and various review remarks New chapter added; 1.2 Validity of the document	
1.5	2015-05-15	S.Edén	Updated due to experience from testing.	
1.6	2016-01-29	S. Edén	Updated due to experiences from testing: Ch. 1.1 updated for clarification of purpose and validity. Summary of test case changes: - Considering in some situations M11 is not able to resend an MA after a degradation - Improved instructions in *_26, *_27, *_48, *_49, *_52 - Deleted test cases: *_39, *_41, *_42, *_44 - Extended test cases: *_46, *_55, *_62, - Reduced test case: *_63 - New test cases: *_67, *_68	
1.7	2016-08-30	J.COUDE	Updated to conform to Trafikverket´s SRS version 4.2	
1.8	2017-08-30	S. Sjögren	Updated to reflect CR254, CR264, CR283, and CR196, corresponding to SRS version 4.3. New test cases: 34B, 69, 70, 71 Extended test case: 57	
2.0	2018-08-17	M. Olsson S. Edén	- Update to align with Baseline 3. - Test case structure is reworked. - Test case numbering changed (cross-reference list in appendix 2). - Several old test cases developed further to improve coverage. - Various editorial changes	
2.1	2019-01-28	S. Edén	Added test cases: *_110, *_111, *_607, *_721, *_913, *_914 plus tests related with PS data communication over GPRS (*_1001 to *_1010). Miscellaneous updates due to findings during tests	

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2.1.1	2019-07-28	JS	New front page – no other changes committed. New document ID ERMTS19-0593 reserved – can be used optionally to TE14-027.	
2.2	2019-10-04	S. Edén	Modified test cases (minor/clarifications): *_303, *_206, *_207, *_603, *_901, *_902, *_905, *_913, *_401 Modified test cases (technical): *_712, *_719, *_504, *_801, *_804, *_807, *_808 Added test case: *_305	
2.3	2019-12-03	H. Henningsson	Changes in chapter 1 due to submission of ESC and RSC checks to EUAR (some parts have been moved to a top document concerning ESC and RSC checks).	
2.4	2020-03-27	S. Edén M. Olsson	Clarifications regarding possible influence of CMD. Added attribute trackside independency for all test cases. Modified test cases (minor/clarifications): *_103, *_105, *_210, *_509, *_808, *_908, *_912, *_914 Modified test cases (technical): *_108, *_305, *_603, *_702, *_714, *_718, *_719, *_905, *_907 Added test case: *_915, *_916, *_917, *_211, *_722, *_723 Deleted test case *_404	
2.4.1	2020-07-15	S. Edén	Corrections based on IOP testing: Various informative comments (not listed here) Modified test cases (with technical changes): *_211,*_603, *_719, *_808, *_905, *_914,	
2.4.2	2020-10-23	S. Edén	Corrections based on IOP testing: Miscellaneous added advice/comments: [*_210, *_302, *_712, *_803] Remark added that OBUs may support CR #1166 Other modified test cases (technical changes): [*_106, *_701]	
2.4.3	2021-02-15	S. Edén	Corrections based on IOP testing: Various informative comments, clarifications of starting conditions and minor modifications (not imposing changes in test scope): *_204, *_509, *_601, *_602, *_604, *_605, *_710, *_713, *_714, *_719, *_720, *_721, *_801, *_804, *_903, *_904, *_906, *_908, *_914 Testcase *_605 corrected.; Testcase *_608 added. Introduction of concept “Redundant event for Trafikverket”	
2.4.4	2021-05-28	S. Edén	Corrections based on IOP testing: Various informative comments and minor modifications (not imposing changes in test scope): *_504, *_509, *_905, *_706	

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2.5	2022-04-08	S. Edén	Modifications to comply with FP 5.4: - CR 478 and CR 415: Changed behaviour when shortening MA to train front at route release: *_503 - CR 451: Monitoring of odometry: *_919 - CR 424: Premature acceleration from PSA: *_306 - CR 444: Functionality for Platform barriers: *_809 - Added test case for safety regarding T_NVCONTACT supervision at RBC/RBC border: *_918 - Added test case regarding Cab switch: *_112 - Changed test due to changed function: *_607 - Expanded the test scenario in *_902 to cover sequential SR train routes - Added check of cyclic position reporting in *:107 Various informative comments and minor modifications (not imposing changes in test scope): *_106, *_107, *_111, *_504, *_703, *_704, *_709, *_710, *_711, *_712, *_714, *_720, *_605, *_606, *_601, *_802, *_905, *_913, *_914 An additional set of test cases have been classified as “trackside independent”.	
3.0	2023-06-12	M.El-Tahan	Added test case: *_410, *_411 Technical changes to test case: *_701, *_702 Various informative comments and minor modifications (not imposing changes in test scope): *_108, *_306, *_601, *_701, *_723, *_802, *_917, *_918, An additional set of test cases have been classified as “trackside independent”. Some test case headers rephrased without further changes in contents	

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1. INTRODUCTION

1.1. Purpose and validity of the document

The purpose of this document is to constitute a generic basis for a test specification for compatibility between Swedish ETCS level 2 (and 3/Regional with special tailoring) trackside command, control and signaling systems and an ERTMS onboard system.

1.2. Scope

This document is a high level test specification for the interface between a generic wayside supplier and a generic ERTMS onboard system with a Swedish 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. Prerequisites

This test specification is compliant with the SRS issued by Trafikverket towards the assigned trackside suppliers for Swedish infrastructure (see ref [A3]). The tests should be carried out against trackside products compliant with ref [A3]. In case a trackside product is not fully aligned with ref [A3], an impact analysis has to be done before testing in order to identify the relevant delta and modify the test scope and expected test results accordingly.

All tests are meant to be carried out in lab-environment. All tests should be carried out twice, once for each of the above listed products. Test execution in field is also possible.

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

1.4. 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. Where the RBCs are known to have different behaviors depending on manufacturer, this is noted in the test step with the name of the product (M11/M95).
3. 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 the expected results occurs or not).
4. 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 trouble shooting.
5. The wording "*redundant event for Trafikverket*" is used for events that are expected to happen according to SS-026, but the event in itself has no relevance for Trafikverket. Any discrepancy will just be noted but will not be raised as a non-conformity.

6. Whether a test case only needs to be performed once in order to prove compatibility for Trafikverket generic trackside as a whole, this is marked with “Trackside independency” [Yes/No] in the header of the test case.
7. The “actors” specified in the *ACTION* column of the test cases are either of :
    a. DRIVER = the tester operating the OBU/DMI
    b. DISPATCHER = the tester operating the trackside signaling system. Note that this includes any staff with access to the local control system (CTC).
    c. TOOL = This concerns operation/manipulation of simulators which is not achieved through normal user interactions, e.g. inducing of a failure.
    d. (blablabla) = waiting for something to happen, e.g. a timer to expire

1.5. References

Ref.	Reference number	Version	Title of the document
[A1]	SUBSET-026-7	3.6.0	System Requirements Specification Chapter 7 ERTMS/ETCS language
[A2]	SUBSET-026-8	3.6.0	System Requirements Specification Chapter 8 Messages
[A3]	ESTER07-015	5.2	1.3 SRS

1.6. Acronyms & Definitions

Berth	A part of the track in front of a signal board (signal point) within which the train front must be located to get an MA for the train route corresponding to this signal board
bg	balise group
CES	Conditional Emergency Stop
CoSMA	Co-operative Shortening of MA
CMD	Cold Movement Detection
CMI	Monitors connected to the CTC for presentation of track layout and various signaling objects and train numbers
CSG	Circular Speed Gauge (sometimes referred to as “speedometer”)
CSM	Ceiling Speed Monitoring
CTC	Centralized Traffic Control
D&M	RBC Diagnostic and Maintenance Workstation
FS	Full Supervision (operative mode of the train)
FQDN	Fully Qualified Domain Name
IL	Interlocking
LTA	Level Transition Announcement (normally a label used for a certain balise group)
LTO	Level Transition Order (normally a label used for a certain balise group)
LX	Level Crossing
MA	Movement Authority
Mxyz	Message xyz (as specified in SS-026 chapter 8)
OBU	On Board unit
OS	On Sight (operative mode of the train)
Pxy	Packet xy (as specified in SS-026 chapter 7)
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.
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
TSM	Target Speed Monitoring
TSR	Temporary Speed Restriction

TR	Trip (operative mode of the train)

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

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 M155 (Initiation of communication session)
	RBC checks for duplicates and registers train with its ETCS ID RBC sends M32 “RBC System Version”	
		Optional[1] :OBU sends M146 (related to M32)

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

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Actions	RBC	OBU
		OBU sends M159, including P2 listing the supported system versions
	RBC considers communication session established with train	
		OBU sends M157 “Start of mission position report” with Q_STATUS = 1 (Valid)
	RBC sends M24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	
		OBU sends M146 (Acknowledgement) related to M24
	RBC sends M24 with P3 “National Values” with acknowledgment request to the train	
		OBU sends M146 (Acknowledgement) related to M24 with P3
DRIVER: Select train data entry Driver enters/revalidates train data		OBU sends M129 (validated train data) with packet 0 and P11. Variables of interest: NC_CDTRAIN = variable NC_TRAIN = variable L_TRAIN = variable V_MAXTRAIN = variable M_LOADINGGAUGE = 0 M_AXLELOADCAT = variable M_AIRTIGHT = variable N_AXLE = variable N_ITER = variable M_VOLTAGE(1) = variable NID_CTRACTION(1) = variable N_ITER = variable NID_NTC(1) = variable

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Actions	RBC	OBU
Driver enters train running number		OBU sends M136 with packet 0 and P5 NID_OPERATIONAL = variable
	RBC sends message 8 “Acknowledgment of train data” with acknowledgment request to the train	
		OBU sends M146 (Acknowledgement) related to M8
		DMI: **”START” shown to the driver**

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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 must ensure the expected status is provided by the OBU. The method to achieve this is not specified in this document.

Actions	RBC	OBU
Note: If the OBU is equipped with function for Cold Movement Detection (CMD) it is not enough to apply NP mode to obtain invalid position. Should CMD be acting, it has to be disabled or alternatively a movement be forced during the NP phase.		**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 

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Actions	RBC	OBU
		OBU sends M155 (Initiation of communication session)
	RBC checks for duplicates and registers train with its ECTS ID RBC sends M32 “RBC System Version”	
		Optional: OBU sends M146 (related to M32)
		OBU sends M159, including P2 listing the supported system versions
	RBC considers communication session established with train	
	RBC sends M24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	
		OBU sends M146 (Acknowledgement) related to M24
		OBU sends M157 Start of mission position report, with either: Q_STATUS = 0 (Invalid) OR Q_STATUS = 2 (Unknown) and all location variables set to their unknown values)
	RBC sends M41 (Train accepted)	
		OBU sends M146 (Acknowledgement) related to M41

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Actions	RBC	OBU
DRIVER: Select train data entry Driver enters/revalidates train data		OBU sends M129 (validated train data) with packet 0 and P11. Variables of interest: NC_CDTRAIN = variable NC_TRAIN = variable L_TRAIN = variable V_MAXTRAIN = variable M_LOADINGGAUGE = 0 M_AXLELOADCAT = variable M_AIRTIGHT = variable N_AXLE = variable N_ITER = variable M_VOLTAGE (1) = variable NID_CTRACTION(1) = variable N_ITER = variable NID_NTC(1) = variable
Driver enters train running number		OBU sends M136 with packet 0 and P5 NID_OPERATIONAL = variable
	RBC sends M24 with P72 (text message) including the text “Okänd position”	
	RBC sends message 8 “Acknowledgment of train data” with acknowledgment request to the train	
		OBU sends M146 (Acknowledgement) related to M8
		DMI displays text “Okänd position”
		DMI: **”START” 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 NTC) 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: Confirm Level NTC (ATC STM)		OBU: ERTMS/ETCS Level valid
DRIVER: Select ATC-2		
DRIVER: Select Train data entry		
Driver enters/re-validates train data, including Train Running Number		OBU: Train data valid
DRIVER: Press ”START”		
DRIVER: Acknowledge SN-mode		DMI: **SN mode**

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Actions	RBC	OBU
Train passed “RE” BG		Sets and memorizes the identity of the GSM-R Network (data from P45) RBC-ID and phone number valid (data from P42) Train position data valid
		OBU sends M155 (Initiation of communication session)
	RBC checks for duplicates and registers train with its ECTS ID RBC sends M32 “RBC System Version”	
		OBU sends M146 (related to M32)
		OBU sends M159, including P2 listing the supported system versions
		OBU sends M129 (validated train data) with packet 0 and P11. Variables of interest: NC_CDTRAIN = variable NC_TRAIN = variable L_TRAIN = variable V_MAXTRAIN = variable M_LOADINGGAUGE = 0 M_AXLELOADCAT = variable M_AIRTIGHT = variable N_AXLE = variable N_ITER = variable M_VOLTAGE(1) = variable NID_CTRACTION(1) = variable N_ITER = variable NID_NTC(1) = variable

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Actions	RBC	OBU
		OBU sends M136 with P0 and P5 NID_OPERATIONAL = variable
	RBC sends M24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	
		OBU sends M146 (Acknowledgement) related to M24
	RBC sends message 8 “Acknowledgment of train data” with acknowledgment request to the train	
		OBU sends M146 (Acknowledgement) related to M8
	RBC receives position report from train ERTMS CTC shows train in SN	

3. TEST SPECIFICATION

3.1. START-UP SCENARIOS

3.1.1. TC_BL3_101 – MA IN FS (ROLL-IN CLEAR)

Purpose	Test of a Start-of-Mission leading to a mode transition SB->FS
Trackside independency	No
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. Train located inside berth section

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route in front of the train			
2	DRIVER: Press "START"		OBU sends M132 (MA request)	Q_MARQSTREASON=1
3		RBC sends M24 (General Message) with P72 including the text "Startbegäran mottagen"	**OBU DMI displays the text message "Startbegäran mottagen"**	
4		RBC sends M3 (MA) corresponding to the route in front of the train	**OBU switches to FS mode.** OBU sends ACK related to the MA	

3.1.2. TC_BL3_102 – MA OS-FS AND TAF GRANTED

Purpose	Test of a Start-of-Mission leading to a mode transition SB-> OS -> FS, via granting of TAF
Trackside independency	No
Degraded conditions	No
Starting condition	ROLL-IN not clear
Train status before test	Executed Procedure 01. Train located inside berth section

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route in front of the train			
2	DRIVER: Press “START”		OBU sends M132 (MA request)	Q_MARQSTREASON=1
3		RBC sends M24 (General Message) with P72 including the text “Startbegäran mottagen”	**OBU DMI displays the text message “Startbegäran mottagen”**	
4		RBC sends M3 (MA) with OS profile covering the berth section of the locked 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	DRIVER: Acknowledge OS mode and run inside TAF window	RBC sends M34 (TAF request)		The TAF window is normally 300m ahead of the signal board.
6			**OBU DMI displays “TAF Request”**	
7	DRIVER: Confirm the TAF		OBU sends M149 (TAF granted)	

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Step	Actions	RBC	OBU	Reference or comment
8		RBC sends M3 (MA) without OS profile.	**OBU switches to FS mode.**	

3.1.3. TC_BL3_103 – MA OS-FS AND TAF NOT GRANTED

Purpose	Test of a Start-of-Mission leading to a mode transition SB-> OS -> FS, not via TAF granting
Trackside independency	Yes
Degraded conditions	No
Starting condition	ROLL-IN not clear
Train status before test	Executed Procedure 01. Train located inside berth section

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Press “START”		OBU sends M132 (MA request)	Q_MARQSTREASON=1
2		RBC sends M24 (General Message) with P72 including the text “Startbegäran mottagen” RBC sends M2 (SR Authorsiation) with distance 60m	**OBU DMI displays the text message “Startbegäran mottagen”** **A short target distance (~60m) is displayed (*)**	*) OBU compliant to R2 will not indicate the target until the train is moved.
3	DISPATCHER: Set a train route in front of the train			
4		RBC sends M3 (MA) with OS profile covering the berth section of the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	The driver needs to confirm the mode change
5	DRIVER: Acknowledge OS mode and run inside TAF window	RBC sends M34 (TAF request)		
6			**OBU DMI displays “TAF Request”**	

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Step	Actions	RBC	OBU	Reference or comment
7	DRIVER: Move the train without confirming the TAF and pass the signal		**OBU switches to FS mode**	

3.1.4. TC_BL3_104 – MA OS-FS (TRAIN OUT OF BERTH SECTION)

Purpose	Test of a Start-of-Mission with train moving in SR into a signal berth, then being upgraded to OS.
Trackside independency	No
Degraded conditions	No
Starting condition	ROLL-IN not clear
Train status before test	Executed Procedure 01. Train located outside berth section.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route in front of the train			
2	DRIVER: Press “START”		OBU sends M132 (MA request)	Q_MARQSTREASON=1
3		RBC sends M2 with D_SR = 60m	**OBU switches to SR mode**	
4	DRIVER: Select OVERRIDE		**OBU displays the Override Active symbol on the DMI**	This action is needed to extend the SR distance.
5	DRIVER: Move the train inside berth section	RBC sends M3 (MA) with OS profile covering the berth section of 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	DRIVER: Run inside TAF window	RBC sends M34 (TAF request)		
7			**OBU DMI displays “TAF Request”**	
8	DRIVER: Confirm the TAF		OBU sends M149 (TAF granted)	
9		RBC sends M3 (MA) without OS profile	**OBU switches to FS mode**	

3.1.5. TC_BL3_105 – ENTERING SIGNAL SECTION WITHOUT TRAIN ROUTE LOCKED

Purpose	Test of a Start-of-Mission with a train reporting KNOWN position and moving by use of the Override procedure.
Trackside independency	Yes
Degraded conditions	No
Starting condition	The balise groups for two signal boards in sequence shall be programmed with “stop if in SR” (P137). Train located approx. 50 m ahead of the 1st signal board.
Train status before test	Executed procedure 1 (train in SB mode with KNOWN position)

Step	Actions	RBC/Track	OBU	Reference or comment
1	DRIVER: Select OVERRIDE and move the train to the signal board and stop before the balise group.		**The Override procedure is activated (for a short while)** **OBU switches to SR mode.**	This step is not needed if the OBU is initially in SR instead of SB mode
2	DRIVER: Select OVERRIDE		**The Override procedure is activated**	
3	While the override procedure is active (*): DRIVER: Move the train passing the bg containing P137	The bg at the signal board produces P137	The override symbol on the DMI is removed after balise passage.	*) National value: max 90s
4	DRIVER: Move the train to and across next signal board	The bg at the signal board produces P137	**OBU switches to TRIP mode and applies the emergency brake**	

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Step	Actions	RBC/Track	OBU	Reference or comment
5	When train at standstill: DRIVER: Acknowledge the trip		**OBU switches to POST TRIP mode and releases the emergency brake.** OBU sends M136 (Position Report) with M_MODE=8 (POST TRIP)	
6		RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to M6	
7	DRIVER: put the direction controller in reverse and move the train backwards behind the signal board.		OBU DMI continues displaying POST TRIP (*). (the mode prevails until “Start” is pressed; which is out of scope for this test)	*) Max allowed reversing distance in PT mode is 200m

3.1.6. TC_BL3_106 – POSITION APPROXIMATION OF TRAIN WITH UNKNOWN POSITION

Purpose	Test of a Start-of-Mission with a train reporting UNKNOWN position. Handling of "Stop if in SR" with and without an SR Authorization.
Trackside independency	No
Degraded conditions	No
Starting condition	The balise at the Signal Board is programmed with "stop if in SR" (P137) and it is located directly ahead of the signal.
Train status before test	Executed Procedure 02. Train located inside berth section with UNKNOWN position, with train front approx. 100m from the signal board. Note: Normally the OBU only reports "Invalid position" after a Power OFF –> Power ON cycle. Special manipulation may be needed in OBU to force an Unknown position status (also the influence of an acting CMD function, if any, must be taken into account).

Step	Actions	RBC	OBU	Reference or comment
0	N/A		**DMI displays text "Okänd position"** (*)	*) Initial situation coming from procedure 2
1	DRIVER: Select OVERRIDE		**OBU switches to SR mode** **DMI displays the Override procedure as activated**	Steps 1-5 is a reference test to confirm the complement of the function addressed in this test case
2	DRIVER: While the override symbol is displayed, move the train 20-30m, then stop.		**DMI displays the Override procedure as concluded**	T_NVOVTRP=90s
3	(ensure the Override symbols is erased) DRIVER: Move the train passing the signal board	The bg at the signal board produces P137	**OBU switches to TRIP mode and applies the emergency brake**	

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

3.1.7. TC_BL3_107 – MA OS-FS TO A TRAIN WITH INVALID POSITION, ROUTE SET

Purpose	Test of a Start-of-Mission with a train reporting INVALID position. Handling of SR Authorization with long distance.
Trackside independency	No
Degraded conditions	No
Starting condition	ROLL-IN not clear
Train status before test	Executed Procedure 02. Train located inside berth section with INVALID position. Note: ensure the train is really reporting "Invalid position" which may not be the case if the OBU is equipped with an acting CMD, see description of Procedure 2 for more information.

Step	Actions	RBC	OBU	Reference or comment
0	N/A		**DMI displays text "Okänd position"** (*)	*) Initial situation coming from procedure 2
1	DISPATCHER: Set a train route in front of the train			
2	DISPATCHER: Set the train position	RBC sends P72 including the text "Positionering genomförd"	**OBU DMI display the text "Positionering genomförd"**	
3	DRIVER: Press "START"	RBC sends M2 (SR authorization)	**OBU switches to SR mode**	
4	DRIVER: Move the train until it reads a new balise group	RBC sends the MA with OS profile covering the berth section of 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	DRIVER: Acknowledge OS mode and run inside TAF window	RBC sends M34 (TAF request)	**OBU DMI displays "TAF Request"**	See comm. step 4

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Step	Actions	RBC	OBU	Reference or comment
6	DRIVER: Confirm the TAF		OBU sends M149 (TAF granted)	See comm. step 4
7		RBC sends M3 (MA) MA without OS profile	**OBU switches to FS mode** Verify in RBC logs that position reporting is produced cyclically (*)	*) Expected interval 6 s, based on parameterization of Packet 58 sent by RBC

3.1.8. TC_BL3_108 – MA OS-FS TO A TRAIN WITH INVALID POSITION - INFLUENCE BY CMD

Purpose	Test of a Start-of-Mission with a train reporting INVALID position. Handling of SR Authorization with short distance. Moreover this test case has steps for verification of the influence of a CMD unit.
Trackside independency	No
Degraded conditions	No
Starting condition	Note; Step 8-15 is only relevant for trains equipped with CMD.
Train status before test	Executed Procedure 02. Train located inside berth section with INVALID position (Q_STATUS =0). Note: ensure the train is really reporting “Invalid position” which may not be the case if the OBU is equipped with an acting CMD, see description of Procedure 2 for more information.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train position	RBC sends P72 including the text “Positionering genomförd”	**OBU DMI display the text “Positionering genomförd”**	
2	DRIVER: Press ”START”	RBC sends M2 (SR authorization) with D_SR = 60m	**OBU switches to SR mode**	
3	DISPATCHER: Set a train route in front of the train	RBC sends M2 (SR authorization) with D_SR <> 60m		
4	DRIVER: Move the train until it reads a new balise group	RBC sends the MA with OS profile covering the berth section of 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	DRIVER: Acknowledge OS mode and run inside TAF window	RBC sends M34 (TAF request)	**OBU DMI displays “TAF Request”**	See comm. step 4
6	DRIVER: Confirm the TAF		OBU sends M149 (TAF granted)	See comm. step 4

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Step	Actions	RBC	OBU	Reference or comment
7		RBC sends M3 (MA) without OS profile	**OBU switches to FS mode**	
8	DRIVER: Stop the train approx. 100m ahead of a signal point, close the cab and Power-OFF the OBU. DISPATCHER: Release the train route under the train (if still locked)	RBC de-registers the train The train route is released.	**OBU is powered off**	Note that the following steps is only relevant for trains equipped with CMD.
9	DISPATCHER: Lock a train route from the signal point in front of the train (if not already locked)	A train route is locked The start signal point for the train route is indicated with “green”.		
10	DRIVER: Power-ON the OBU (*), activate the cab and enter train data	RBC registers the train. (M157 is received with Q_STATUS = 1 = valid position)		*) It is presumed the CMD is acting towards OBU, thus giving criterion for “valid position”.
11	DRIVER: Press “Start”	The start signal point for the train route is indicated with “filled green” (= an MA is issued for the train route)	**OBU DMI display the text “Startbegäran mottagen”** **OBU switches to FS mode** **OBU DMI displays an MA corresponding to the locked train routes(s).**	
12	DRIVER: Close the cab and Power-OFF the OBU.	RBC de-registers the train The start signal point for the train route is indicated with “green” (=no MA is issued for the train route)	**OBU is powered off**	

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Step	Actions	RBC	OBU	Reference or comment
13	TOOL: Provoke a train movement (while OBU in NP mode)			The purpose is to provoke a movement detection by CMD
14	DRIVER: Power-ON the OBU (*), activate the cab and enter train data	RBC registers the train. (M157 is received with Q_STATUS = 0 = Invalid position)	**OBU DMI display the text "Okänd position"**	*) It is presumed the CMD has detected the movement, thus turning down the criterion for "valid position"
15	Repeat steps 1-4	See steps 1-4	See steps 1-4	

3.1.1. TC_BL3_109 – START WITH SHIFTED MA

Purpose	Test of a Start-of-Mission with a train having “shifted location”.
Trackside independency	No
Degraded conditions	No
Starting condition	
Train status before test	Executed Procedure 01 and TC_BL3_105 (train located inside berth section referring to a bg beyond train front end and located in the train route to be locked)

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route in front of the train			
2	DRIVER: Press ”START”		OBU sends M132 (MA request)	Q_MARQSTREASON=1
3		RBC sends M24 (General Message) with P72 including the text “Startbegäran mottagen”	**OBU DMI displays text message “Startbegäran mottagen”**	
4		RBC sends M33 (shifted MA) with OS profile covering the berth of the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	
5	DRIVER: Acknowledge OS mode and run inside TAF window	RBC sends M34 (TAF request)	**OBU DMI displays “TAF Request”**	
6	DRIVER: Confirm the TAF		OBU sends M149 (TAF granted)	
7			**OBU switches to FS mode**	

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Step	Actions	RBC	OBU	Reference or comment
8	DRIVER: Run until the train reads a new balise group	Optionally: RBC sends M3 (MA) without shifted location		This may occur before step 5, depending on the balise position in relation to the start-of-route.

3.1.2. TC_BL3_110 - START WTH ANTENNA OVER BALISE

Purpose	To verify that the continued mission is not disturbed by a Start-of-Mission over a balise group.
Trackside independency	Yes
Degraded conditions	Yes
Starting condition	Train in FS mode running on a train route
Train status before test	Executed Procedure 01

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Approach the EOA and stop the train with the balise antenna aligned right over a balise associated with the next signal board.			An observer is required to assist with stopping at the correct location. The choice of the 1st or 2nd balise in a BG is not expected to be important, but could be a factor. Take note!
2	DRIVER: close the cab.			
3	DISPATCHER: Set a train route from the signal board ahead of the train	A train route is locked		
4	DRIVER: Open the cab and enter train data (normal SoM procedure).	The train is registered in the RBC and indicated at the expected position.	**OBU enters SB mode.**	
5	DRIVER: Press “START”	RBC sends an FS MA (M3) according to the set route.	OBU sends M132 (MA request) OBU sends ACK related to M3 **OBU switches to FS mode**	

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Step	Actions	RBC	OBU	Reference or comment
6	DRIVER: Run the train into the train route	The position of the train is updated correctly (observe the train data window´on CMI!)	OBU supervises the mission. **Permitted speed and planning area is displayed correctly on the DMI.**	Check if LRBG is updated when the whole balise group has been passed!

3.1.3. TC_BL3_111 – DRIVER SELECTS "START" TWICE ON DMI

Purpose	Test of a potential deadlock caused by a repeated pressing of "START" on DMI. The purpose is to see how the train reacts and to develop a workaround procedure if necessary.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Known position, train in berth but no route set. Note: the train route (to be locked) in front of the train must have an end-of-route which is asymmetric, i.e. no back-to-back signal point relative to the end-of-route.
Train status before test	Executed Procedure 01

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Press "START"	RBC sends M24 (General Message) with P72 including the text "Startbegäran mottagen" RBC sends M2 with D_SR=60m (because there is no route set)	OBU sends M132 (MA request) **OBU DMI displays text message "Startbegäran mottagen"** **Time glass is shown shortly** OBU sends ACK related to M2	Q_MARQSTREASON=1
2	DRIVER: acknowledge mode change to SR		**OBU switches to SR mode**	
3	(wait 15-20s) DRIVER: Press "START"	RBC sends M2 with D_SR=60m (because there is still no route set)	OBU sends M132 (MA request) **Time glass is shown shortly** OBU sends ACK related to M2 **OBU stays in SR mode**	(if time glass stays on, wait at least 60s to see if it goes off)

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Step	Actions	RBC	OBU	Reference or comment
4	DRIVER: Run the train 10-20 m towards EOA and stop (don't pass the signal!) Press "START"	RBC sends M2 with D_SR=60m (because there is still no route set)	OBU sends M132 (MA request) **Time glass is shown shortly** OBU sends ACK related to M2 **OBU stays in SR mode**	(if time glass stays on, wait at least 60s to see if it goes off)
5	DISPATCHER: Set a train route from the signal board in front of the train	RBC sends M3 with relevant data	OBU sends ACK related to the MA **OBU switches to OS mode**	MA (M3) may be sent without OS profile if the train has arrived to the spot in FS mode.
6	DRIVER: Acknowledge mode change to OS and run the train into the train route and stop. (ensure not to stop on the last track section of the route!)		**OBU switches to FS mode**	Only relevant if OS profile was obtained in previous step
7	TOOL: Occupy the front protection area	RBC sends M16 (Unconditional Emergency Message)	OBU sends M147 (ACK to the emergency stop) **OBU switches to TR mode**	
8	DRIVER: Acknowledge the trip		**OBU switches to PT mode**	
9	DRIVER: Press "START"	RBC sends M2 with D_SR=60m (because the route is still degraded)	OBU sends M132 (MA request) **Time glass is shown shortly** OBU sends ACK related to M2	
10	DRIVER: acknowledge mode change to SR		**OBU switches to SR mode**	

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Step	Actions	RBC	OBU	Reference or comment
11	(wait 15-20s) DRIVER: Press ”START”	RBC sends M2 with D_SR=60m (because the route is still degraded)	OBU sends M132 (MA request) **Time glass is shown shortly** OBU sends ACK related to M2 **OBU stays in SR mode**	(if time glass stays on, wait at least 60s to see if it goes off)
12	TOOL: remove the occupancy	RBC sends OS MA (because the route status is restored)	**OBU switches to OS mode**	To obtain an MA there should be one track section free between train front and EOA

3.1.4. TC_BL3_112 – START-OF-MISSION AFTER CAB SWITCH

Purpose	To test that change of cab is correctly handled, with regard to the reporting of train front position.
Trackside independency	Yes
Degraded conditions	No
Starting condition	A train route should be locked in front of the train Train should be configured as a locomotive with 2 cabs, pulling a set of wagons. The test case presumes a total train length of 250 m
Train status before test	Executed Procedure 01; train in standby standing in berth, e.g. at an entrance signal to a station.

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: ensure the loco is configured to a “loco length”, e.g. 20 m, whereas the actual train should be “considerably longer”, e.g. 250 m. (*) DRIVER: Enter train data and set the train length to the total train length, e.g. 250 m			*) It is not crucial for this test that the train is “physically long”, but it is important that the train length set by driver (in the train data entry) is considerably longer than the configured “loco length”.
2	DRIVER: Press ”START”	RBC sends M24 (General Message) with P72 including the text “Startbegäran mottagen” RBC sends an MA (M3) (*) with relevant data for the locked train route.	OBU sends M132 (MA request) **DMI displays an MA**	*) Either FS or OS depending on the interlocking conditions

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Step	Actions	RBC	OBU	Reference or comment
3	DRIVER: Run the train into the station and stop when the entire train has entered the station track (>250 m beyond the opposite signal).		OBU sends a position report (M136) at standstill (V_TRAIN=0). Take note of the reported position relative to the LRBG [= X] (see D_LRBG in M136/P0)	
4	DRIVER: Close the active cab and open the opposite cab.(*) DRIVER: Perform Start-of-Mission, including train data entry. Set a train length of 100 m (**)		Check the train position relative to LRBG as reported in the SoM Position report (see D_LRBG in M157/P0) The position shall correspond to the reported position before cab closure minus the configured "loco length" [= X- 20]. Check that subsequent position reports stick to this same position. Verify that the correct train length (e.g. 100 m) is shown on the CTC.	*) In a real scenario, the wagons pulled by the loco into the station must have be pulled away by another loco before this step is done (this is not relevant for the test case and therefore omitted) **) The length may be selected randomly, but should be more than loco length and less than the previously used train length.
5	DISPATCHER: Lock a train route in front of the train DRIVER: Press "START"	RBC sends M24 (General Message) with P72 including the text "Startbegäran mottagen" RBC sends a shifted OS MA (M33) with relevant data for the locked train route.	**OBU switches to OS mode** **DMI displays OS mode**	

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Step	Actions	RBC	OBU	Reference or comment
6	DRIVER: Acknowledge OS mode and start the train.		**When train front passes the signal, FS mode is displayed.**	

3.2. NORMAL TRAIN OPERATION

3.2.1. TC_BL3_201 – NOMINAL RUN ON A LONG LINE IN BOTH DIRECTIONS

Purpose	To test nominal train operation over a long line, with several stations (at least 8-10). This will improve confidence in compatibility with railway lines engineered according to Trafikverkets rules and principles.
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS mode
Train status before test	Executed Procedure 01 and TC_BL3_102.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set all train routes of the selected test track in right direction.		**OBU DMI displays MA correspondingly**	
2	DRIVER: Run the train in FS mode over the selected test track in right direction, at permitted speed.			
3		RBC continuously sends M3 (extended MA) whenever conditions for extension are fulfilled	OBU sends ACK related to the MA **OBU DMI extends MA correspondingly**	
4	DRIVER: Stop the train at the end of the selected test track. Close the desk.		OBU sends M150 (End of Mission)	

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

Step	Actions	RBC	OBU	Reference or comment
13		RBC sends M39 (ACK of Termination of a Comm. Session)		

3.2.2. TC_BL3_202 – MA EXTENSION WITH FRONT PROTECTION OCCUPIED

Purpose	Test of handling of OS profile starting almost at the end of an MA.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	Yes/No: Front protection occupied, either by other train or due to track circuit failure
Starting condition	Train in FS mode
Train status before test	Executed Procedure 01 and TC_BL3_102.

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Occupy the track circuit beyond a “back-to-back” signal.			
2	DISPATCHER: Set a train route in front of the train, ending at the back-to-back signal (as referred in step 1)	Train route is locked and proven for FS.		
3		RBC sends M3 (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=10km/h	OBU sends ACK related to the MA	
4	DRIVER: Run according to permitted speed towards the EoA		Approximately 600m before EOA: **OBU DMI displays the OS ack request as soon as the train enters the OS ack window**	Train speed must have reduced to 40 km/h

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Step	Actions	RBC	OBU	Reference or comment
5	DRIVER: Acknowledge OS mode		**OBU switches to OS mode**	

3.2.3. TC_BL3_203 – CHANGING OF TRAIN DATA IN FS MODE, ACCEPTED BY RBC

Purpose	Test of train data change in FS mode, causing shortening of MA
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	Window for display of current train data for the train is present on the CMI
Train status before test	Executed Procedure 01 and TC_BL3_102. Train in FS mode

Step	Actions	RBC	OBU	Reference or comment
1	Train at standstill. DRIVER: Change the TRAIN DATA with regard to axle load [M_AXLELOADCAT]		OBU deletes its track descriptions and the MA is shortened to train front. **The new EoA is displayed on the DMI** OBU sends M129 (Validated Train Data) with P11 with the modified train data	As alternative the train category may be changed.
2		RBC checks the validity of the new train data and sends M8 (ACK to validated train data). **The changed train data can be seen on the CMI.**	OBU sends ACK related to M8	
3		RBC sends M3 (MA) previously assigned to the train	OBU sends ACK related to M3. OBU accepts the MA **and displays the extended MA on the DMI to the same location as before.**	Note 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: Move to EoA			

3.2.4. TC_BL3_204 – CHANGE OF TRAIN RUNNING NUMBER FROM TRACKSIDE

Purpose	Test of the possibility for the RBC to change the train's Train Running Number.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	Train moving at slow speed, e.g. 30 km/h in FS
Train status before test	Executed Procedure 01 and TC_BL3_102.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Change the Train Running Number of the train (command TNB)	RBC sends M24 (General Message) including P140 with a request to set a new Train Running Number	OBU sends ACK related to the request	
2		**The Train Running Number has been updated and is indicated on the CMI**	The Train Running Number has been updated and stored by the OBU	
3	DRIVER: Stop the train and select train data entry. DRIVER: Change optional train data variables, not the Train Running Number	**The changed train data can be seen on the CMI.** **The Train Running Number has not changed.**	The changed train data has been stored by the OBU. The Train Running Number has not changed.	
4	DRIVER: Start the train and run at slow speed DRIVER: Change the Train Running Number while running	**The Train Running Number is updated accordingly on the CMI**		

3.2.5. TC_BL3_205 – TEXT MESSAGE TO TRAIN

Purpose	Test of the possibility for the Dispatcher/RBC to send a text message to the train, including Swedish characters.
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS
Train status before test	Executed Procedure 01 and TC_BL3_102.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Send a text message to the train: The text used is : “MSG IN FS 0123456789”	RBC sends M24 (General Message) including P72 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 M24	
3	DISPATCHER: Send a text message with Swedish characters to the train: The text used is: “ÅÄÖåäö”	RBC sends M24 (General Message) including P72 with variable: X_TEXT coded as the used text M_ACK=1	**OBU displays the message on the DMI reporting the text:** **“ÅÄÖåäö”**	
4			OBU sends ACK related to M24	

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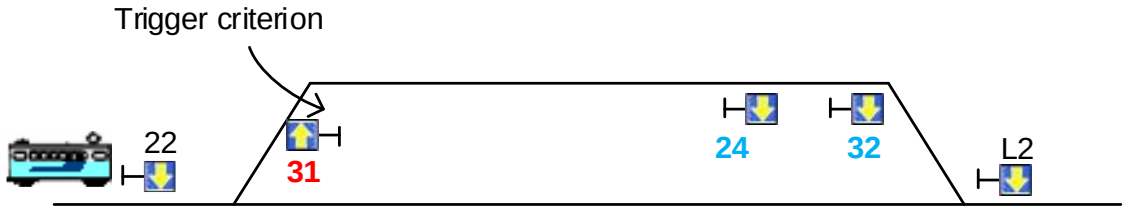
3.2.6. TC_BL3_206 – TEXT MESSAGES ABOUT "INDICATION OF REAR END FREE" – LONG TRAIN

Purpose	To test a standardized use of text messages issued from RBC to support the driver to perform an optimized brake to standstill at a train meeting. It is verified that the text display criterions are properly handled since this will guide the driver about when to stop the train.
Trackside independency	No
Degraded conditions	No
Starting condition	The opposite signal closest to the point track circuit (Si 31 in fig.) shall be parameterized as passage criterion to trigger "indication of rear end free". 
Train status before test	Executed Procedure 01 and TC_BL3_102. Train in FS The train shall be standing in front of an entry signal (Si 22 in fig.) to a station which is engineered with the function "Indication of rear end free". Train length shall be set 30 m longer than the station track between trigger criterion signal (Si 31) and the "inner station signal" (Si 24). Note that this concerns not only the OBU, but also the occupation logic simulated back to the track yard simulator.

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Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set entrance train route(s) into the station, ending at the last signal point in the station (Si 32 in fig.).	RBC sends M3 (MA) corresponding to the locked routes in front of the train	**OBU DMI displays extended MA**	
2	DRIVER: Move the train into the station.	When a passage is *initiated* (*) in the trigger signal (Si 31), the RBC sends M24 (General Message) including P72 to the train.	**OBU DMI displays a text message: "Avvakta hinderfrihetsinformation"** (the text does not prompt for acknowledge)	**) Initiated* = Track section beyond a joint becomes occupied
3	(train front moves at least 200m, or at latest passes the inner station signal (Si 24))		**OBU DMI removes the pre-announcement text**	
4	(train proceeds further into the station)	When a passage is *registered* (*) in the trigger signal (Si 31), the RBC sends M24 (General Message) including P72 to the train.	**OBU DMI displays a new text message: "Tåget är hinderfritt"** (the text prompts for acknowledge)	**) Registered* = Track section behind a joint becomes free
5	DRIVER: Acknowledge the text		**OBU DMI removes the text**	

3.2.7. TC_BL3_207 – TEXT MESSAGES ABOUT "INDICATION OF REAR END FREE" – SHORT TRAIN

Purpose	This test case is a complement to the previous test case, with a slightly different order of events.
Trackside independency	No
Degraded conditions	No
Starting condition	See previous test case.
Train status before test	Executed Procedure 01 and TC_BL3_102. Train in FS The train shall be standing in front of an entry signal (Si 22 in fig..) to a station which is engineered with the function "Indication of rear end free". **Train length shall be set short**, e.g. 100m. Note that this concerns not only the OBU, but also the occupation logic simulated back to the track yard simulator.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set entrance train route(s) into the station, ending at the last signal board in the station (Si 32 in fig.).	RBC sends M3 (MA) corresponding to the locked routes in front of the train	**OBU DMI displays extended MA**	
2	DRIVER: Move the train into the station.	When a passage is *initiated* (*) in the trigger signal (Si 31), the RBC sends M24 (General Message) including P72 to the train.	**OBU DMI displays a text message: "Avvakta hinderfrihetsinformation"** (the text does not prompt for acknowledge)	**) Initiated* = Track section beyond a joint becomes occupied
3	(train proceeds into the station)	When a passage is *registered* (*) in the trigger signal (Si 31), the RBC sends M24 (General Message) including P72 to the train.	No change of text message are observed on DMI!	**) Registered* = Track section behind a joint becomes free

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Step	Actions	RBC	OBU	Reference or comment
4	(train front moves at least 200m, or at latest passes the inner station signal (Si 24))		**OBU DMI removes the pre-announcement text**	
5	(train front passes the inner station signal, Si 24 in fig.)		**OBU DMI displays a new text message: "Tåget är hinderfritt"** (the text prompts for acknowledge)	
6	DRIVER: Acknowledge the text		**OBU DMI removes the text**	

3.2.8. TC_BL3_208 – TEXT MESSAGE TO TRAIN - WITH ACKNOWLEDGE TO TRACKSIDE

Purpose	To test that OBU can handle a text message requiring dispatcher's acknowledged routed back to the RBC
Trackside independency	Yes
Degraded conditions	No
Starting condition	A test tool interfacing the RBC is needed for issuing of text message and getting an acknowledge as response.
Train status before test	Executed Procedure 01 and TC_BL3_102. Train in FS.

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Send a text message to the train for the driver to acknowledge: The text used is "MSG IN FS TO ACK"	RBC sends M24 (General Message) including P72. Variables of interest: X_TEXT coded as the used text Q_TEXTCONFIRM = 1 Q_TEXTREPORT =1 NID_TEXTMESSAGE = x	**OBU displays the message on the DMI for the driver to acknowledge reporting the text:** **"MSG IN FS TO ACK"**	
2			OBU sends ACK related to M24	
3	DRIVER: Acknowledge the text		OBU sends M158 (Text Message Acknowledged by Driver) containing NID_TEXTMESSAGE=x (see step 1)	Depending on condition to end the text display, the text may be removed from the DMI at this point
4		The text confirmation (M158) is received and forwarded to the test tool.		

3.2.9. TC_BL3_209 – GEOGRAPHICAL POSITIONING

Purpose	To test that OBU is able to handle geographical positioning information (packet 79)
Trackside independency	Yes
Degraded conditions	No
Starting condition	The test track used must contain balise groups programmed with geographical positioning information, according to engineering rules stipulated by Trafikverket. It is recommended to use a location where the km value "incrementation" is not always continuous, for better validation. Note: This test case may be verified through the same test run as the nominal run!
Train status before test	Executed Procedure 01 and TC_BL3_102. Train in FS.

Step	Actions	RBC/track	OBU	Reference or comment
1	DISPATCHER: Set a sequence of routes in front of the train, through at least three stations with intermediate lines.	RBC sends M3 (MA) corresponding to the set routes.	**OBU displays extended MA**	
2	DRIVER: Toggle the geographical position symbol on the DMI to ON.		**OBU DMI activates the display of current km+m value**	At this point the display could be empty if a bg with P79 has not yet been passed.
3	DRIVER: Run the train along the routes set.	At each exit of station: The bg at the exit signal produces P79 (Geographical position info)	**OBU DMI displays the current km+m value.** Cross-check with km values on drawings!	At passage of the relevant bg it could be noticed that the km-value is adjusted due to accumulated odometry error
4	DRIVER: Stop the train, change direction, and do Start-of-Mission		**OBU DMI still displays the current km+m value.**	Do not power off!

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Step	Actions	RBC/track	OBU	Reference or comment
5	DISPATCHER: Set a sequence of routes in front of the train, at least passing one P79 bg	RBC sends M33 (MA) corresponding to the set routes.	**OBU displays extended MA**	
6	DRIVER: Start the train		**OBU DMI displays the current km+m value.** Ensure the value changes (+/-) in accordance with the new train orientation!	
7	DRIVER: Run the train along the routes set.	At exit of station: The bg at the exit signal produces P79 (Geographical position info)	**OBU DMI displays the current km+m value.** Cross-check with km values on drawings!	At passage of the relevant bg it could be noticed that the km-value is adjusted due to accumulated odometry error

3.2.10. TC_BL3_210 – SLEEPING

Purpose	To test mode transitions to and from Sleeping mode (SL)
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	Note: OBU must be configured with a sleeping status input. In a **field test context** a multi-coupled train is needed, whereas in a **lab test context** it is enough to have access to manipulating the Sleeping input signal. Train in FS mode, at standstill
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: 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	TOOL: Activate the sleeping status input (*)	RBC sends an order to close the connection (P42) 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 (P0) 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 (***) redundant event for Trafikverket

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Step	Actions	RBC	OBU	Reference or comment
3	(wait at least 25s before proceeding to next action, to allow for the connection/disconnection procedure in step 2 to be fully executed)			
4	TOOL: Inactivate the sleeping status input (*)	RBC sends an order to close the connection (P42) 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 (P0) 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) (**) redundant event for Trafikverket
5	(wait at least 25s before proceeding to next action, to allow for the connection/disconnection procedure in step 4 to be fully executed)			
6	DRIVER: Open the cab and perform the ordinary Start-of-Mission	Train is registered	OBU establishes a connection with the RBC and initiates the ordinary Start-of-Mission procedure.	

3.2.11. TC_BL3_211 – NON-LEADING

Purpose	To test Non-Leading mode in nominal train operation.
Trackside independency	Yes
Degraded conditions	No
Starting condition	Train in SB mode
Train status before test	Executed Procedure 01 (with train data entered) with train in SB mode and radio connection established Train configuration that allows the use of Non-Leading mode

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Activate non-leading input signal on driver desk		**OBU DMI displays "Non-Leading" button as enabled**	
2	DRIVER: Press "Non-Leading" button (press button for 3s)	Train is still registered in RBC The mode symbol is removed from the train number on the CMI	**OBU switches to NL mode**	
3	DISPATCHER: Set a train route in front of the train covering at least two stations			

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Step	Actions	RBC	OBU	Reference or comment
4	DRIVER: Run the train in NL mode at medium speed for at least two stations	(Train routes are not released by passage) Check that the train and position data is updated dynamically on the CMI (*)	OBU sends M136 (Position Report)	Position reports are sent at least when passing balise groups. *) Note: When running in NL mode the train number is not accessible as normally on the CMI. Check the “train location list” and request train data display by command “TDA 0x0nnn”, where ‘nnn’ is the automatically assigned train number.
5	DRIVER: Stop the train			
6	DRIVER: Disable the non-leading input signal on driver desk	Train is deregistered (visible on the DMI through the train data window; otherwise check logs for verification)	**OBU switches to SB mode** OBU performs End-of-mission according to normal procedure	
7	Driver: Close the desk			

3.3. MANAGEMENT OF TEMPORARY SPEED RESTRICTIONS

3.3.1. TC_BL3_301 – SENDING AND REVOKING A TSR TO/FROM THE TRAIN

Purpose	To test the basic function of sending a TSR and revoking a TSR to a train in FS.
Trackside independency	No
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: Set a TSR covered by the second route in front of the train Set TSR reason “TSR for TC_BL3_301” during the TSR definition Set at least three FS routes in front of the train	RBC regards the TSR as activated		
2	DRIVER: Press “START”		OBU sends M132 (MA request)	Q_MARQSTREASON=1
3		RBC sends M24 (General Message) with P72 including the text “Startbegäran mottagen”	**OBU DMI displays text message “Startbegäran mottagen”**	

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Step	Actions	RBC	OBU	Reference or comment
4		M11: RBC sends M24 (General Message) with P65 (TSR)	OBU sends ACK related to the general message with TSR	
5		M11: RBC sends M3 (MA) with OS profile covering the berth section of the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	
6		M95: RBC sends M3 (MA) with OS profile covering the berth section of the route in front of the train and P65 (TSR)	**OBU switches to OS mode** OBU sends ACK related to the MA	
7		RBC sends M24 (General Message) with P72 including the text “TSR for TC_BL3_301”	**OBU DMI displays the text message “TSR for TC_BL3_301”**	This may occur after step 8-10, depending on the location of the TSR in relation to the start of the train route
8	DRIVER: Run inside TAF window	RBC sends M34 (TAF request)	**OBU displays “TAF Request” on the DMI**	
9	DRIVER: Confirm the TAF		OBU sends M149 (TAF granted)	
10		RBC sends M3 (MA), covering the berth section and the subsequent routes, without OS profile.	**OBU switches to FS mode; the TSR is visible on the planning area, with extension according to the length of the 2nd train route.** OBU sends ACK related to the MA	
11	DISPATCHER: Set to STOP the signal protecting the route included in the TSR	RBC sends M3 (MA) with EoA at the signal just set to STOP	OBU sends ACK related to the MA	

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Step	Actions	RBC	OBU	Reference or comment
12		RBC sends M24 (General Message) with P72 including the text “Tekniskt körtillstånd avkortat”	**OBU DMI displays the text message “Tekniskt körtillstånd avkortat**”	
13		RBC sends M24 (General Message) with P66 (TSR revocation)	As the MA is shortened ahead of the TSR on the planning area the TSR is also erased. OBU sends ACK related to the general message with TSR revocation.	
14		RBC sends M24 (General Message) with P72 including the text “Hastighetsnedsättning återtagen”	**OBU DMI displays the text message “Hastighetsnedsättning återtagen”**	

3.3.2. TC_BL3_302 – TSR VALID FOR THE FULL LENGTH OF THE TRAIN

Purpose	To test that OBU handles the train length delay property of the TSR as expected.
Trackside independency	No
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	DISPATCHER: Set a TSR covered by the route in front of the train. Set TSR reason “TSR for TC_BL3_302” during the TSR definition. Set the TSR with validity for the full length of the train.			
2	DISPATCHER: Activate the TSR Set a train route in front of the train	RBC regards the TSR as activated		
3	DRIVER: Press “START”		OBU sends M132 (MA request)	Q_MARQSTREASON=1
4		RBC sends M24 (General Message) with P72 including the text “Startbegäran mottagen”	**OBU DMI displays text message “Startbegäran mottagen”**	

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Step	Actions	RBC	OBU	Reference or comment
5		M11: RBC sends M24 (General Message) with P65 (TSR) including the variable: Q_FRONT=0	OBU sends ACK related to the general message with TSR	
6		M11: RBC sends M3 (MA) with OS profile covering the berth section of the route in front of the train	**OBU switches to OS mode** OBU sends ACK related to the MA	
7		M95: RBC sends M3 (MA) with OS profile covering the berth section of the route in front of the train, with P65 (TSR) including the variable: Q_FRONT=0	**OBU switches to OS mode** OBU sends ACK related to the MA	
8		RBC sends M24 (General Message) with P72 including the text “TSR for TC_BL3_302”	**OBU DMI displays the text message “TSR for TC_BL3_302”**	
9	DRIVER: Run inside TAF window	RBC sends M34 (TAF request)	**OBU DMI displays “TAF Request”**	
10	DRIVER: Confirm the TAF		OBU sends M149 (TAF granted)	
11		RBC sends M3 (MA), covering the berth section and the subsequent routes, without OS profile.	**OBU switches to FS mode; the TSR is visible on the planning area, with extension according to the length of the train route.** OBU sends ACK related to the MA	

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Step	Actions	RBC	OBU	Reference or comment
12	DRIVER: Run on the subsequent route inside TSR extension		**OBU DMI displays the permitted speed related to the TSR**	
13	DRIVER: Stop the train with the train front beyond the signal regarded as ending point of the TSR Let the train tail still be located inside the TSR extension!		**OBU DMI still displays the permitted speed related to the TSR**	
14	DISPATCHER: Deactivate the TSR under the train	RBC sends M24 (General Message) with P66 (TSR revocation)	OBU sends ACK related to the general message with TSR revocation	Ensure some part of the TSR is still within the track beyond the reported LRBG
15		RBC sends M24 (General Message) with P72 including the text “Hastighetsnedsättning återtagen”	**OBU DMI displays the text message “Hastighetsnedsättning återtagen”** **OBU removes the TSR from the DMI**	

3.3.3. TC_BL3_303 – MULTIPLE TSRs SUPERVISED BY OBU

Purpose	To test that OBU can handle multiple TSR:s properly
Trackside independency	No
Degraded conditions	No
Starting condition	Totally 11 TSRs (from dispatcher or maintainer) including TSR reason text need to be prepared, covering the routes in front of the train (to be included in the MA). It is suggested that the TSR:s be designed to have incremental speed limitations in steps of 10 km/h, e.g. from 30 to 130 km/h, and without train length delay. The length of each TSR should be easy to verify, e.g. 100m. The TSR:s should be assigned with reason text "TSR for TC_BL3_303_XX" with [XX=1..11]. These measures will facilitate the verification. Note that the distance ahead for display of informative text should 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 and TC_BL3_101. (Train with KNOWN position in FS mode).

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Activate all the 11 TSRs.	RBC regards the 11 TSRs as activated		
2	DISPATCHER: Set the route(s) covering the activated TSR:s.	M11: RBC sends M24 (General Message) with 10 packets 65 (TSR) related to the first 10 TSR:s	OBU sends ACK related to M24 with TSRs	
3		M11: RBC sends M24 (General Message) with one more packet P65 (TSR) related to the 11th TSR	OBU sends ACK related to M24 with TSR	
4		M11: RBC sends M3 (MA) corresponding to the set route(s)	OBU sends ACK related to the MA **The TSR:s are visible on the DMI planning area.**	

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Step	Actions	RBC	OBU	Reference or comment
5		M95: No MA is sent (applies if all TSR:s are covering the 1st train route)		Rule: Max 10 TSR in one M3. 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 M95: DISPATCHER: Deactivate one TSR	M95: RBC sends M3 (MA) with 10 P65 (TSR) related to the 10 active TSR:s	OBU sends ACK related to M3 with TSR **The TSR:s are visible on the DMI planning area.**	
7		M11: RBC sends 11 messages 24 (General Message) with P72 including the text “TSR for TC_BL3_303_XX” with XX incrementing from 01 to 11	**OBU DMI displays the text message “TSR for TC_BL3_303_XX” with XX incrementing from 01**	The OBU may limit the number of displayed texts because the text display capacity limit is exceeded.
8		M95: RBC sends 10 messages 24 (General Message) with P72 including the text “TSR for TC_BL3_303_XX” with XX incrementing from 01 to 10	**OBU DMI displays the text message “TSR for TC_BL3_303_XX” with XX incrementing from 01**	The OBU may limit the number of displayed texts because the text display capacity limit is exceeded.
9	DRIVER: Run the train slowly through the route(s) covering the active TSR:s		While the train runs through the route: **OBU DMI displays the permitted speed corresponding to each of the active TSR:s** (verify that the extension of each TSR is correct!)	

3.3.4. TC_BL3_304 – TSR HANDLING IN A "SHIFTED LOCATION" SITUATION

Purpose	To test that the OBU can handle TSR:s while in a "shifted location situation"
Trackside independency	No
Degraded conditions	No
Starting condition	Totally 5 TSRs (from dispatcher or maintainer) including TSR reason text need to be prepared with an allocation between train front and the reference BG. At least two TSR:s should extend beyond the reference BG. It is suggested that the TSR:s be designed to have incremental speed limitations in steps of 10 km/h, e.g. from 30 to 70 km/h, and without train length delay. The length of each TSR should be easy to verify, e.g. 100m. The TSR:s should be assigned with reason text "TSR for TC_BL3_304_XX" with [XX=1..11]. These measures will facilitate the verification.
Train status before test	Executed Procedure 01; Train with KNOWN position referred to a BG **beyond** train front

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Activate all the TSR	RBC regards the 5 TSR:s as activated		
2	DRIVER: Press "START"		OBU sends M132 (MA request)	Q_MARQSTREASON=1
3		RBC sends M2 with a permitted distance D_SR = 60m.	**OBU switches to SR mode**	
4		RBC sends M24 (General Message) with P72 including the text "Startbegäran mottagen"	**OBU DMI displays text message "Startbegäran mottagen"**	
5	DISPATCHER: Set a train route in front of the train, covering the active TSR:s	RBC sends M33 (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

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Step	Actions	RBC	OBU	Reference or comment
6	DRIVER: Run train at slow speed, without passing a BG		While train running: **OBU DMI displays the permitted speed corresponding to each of the active TSR:s** (verify that the extension of each TSR is correct!)	
7	DRIVER: Continue passing the BG	RBC sends 5 messages 24 (General Message) with P72 including the text "TSR for TC_BL3_304_XX" with XX a progressive ID from 01 to 05	**OBU DMI displays the text message "TSR for TC_BL3_304_XX" with XX incrementing from 01 to 05** **OBU DMI continues displaying the permitted speed corresponding to each of the active TSR:s**	Note: For TSR:s located before the bg, their texts will not be displayed! M11: Texts may be visible before the BG is passed.

3.3.5. TC_BL3_305 – TSR "UNDER THE TRAIN"

Purpose	To test that OBU correctly supervises a TSR with a start location behind the train
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS mode within a station, standing in front of a signal point, with EOA to train front, i.e. no routes are locked in the station. It is presumed that a Dispatcher TSR is available for the station (extension according to Trafikverket's standard engineering rules).
Train status before test	Executed Procedure 01 and TC_BL3_101. (Train with KNOWN position in FS mode).

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Activate a TSR covering the whole station	RBC regards the TSR as activated (TSR indication is lit beside the station label)		It is advised to activate the ordinary 'Dispatcher's TSR' for the station. It is important that the TSR has an extension starting behind the current LRBG!
2	DISPATCHER: Set a sequence of train routes in front of the train			At least including a block section of the line in order to avoid influence from the target supervision
3		M11: RBC sends M24 (General Message) with P65 (TSR) including variables: Q_FRONT=0; D_TSR=0 (*	OBU sends ACK related to the general message with TSR	*) D_TSR may also be set to the train front as reported by the train

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Step	Actions	RBC	OBU	Reference or comment
4		M11: RBC extends the MA according to the set routes by sending M3 with reference to current LRBG	**OBU DMI displays extended MA; the TSR is visible on the planning area with the correct extension**	
5		M95: RBC extends the MA according to the set routes by sending M3 including P65 (TSR) with reference to current LRBG, including variables: Q_FRONT=0; D_TSR=0 *)	**OBU DMI displays extended MA; the TSR is visible on the planning area with the correct extension** Ensure the TSR is valid from the current position!	*) D_TSR may also be set to the train front as reported by the train
6		RBC sends the message 24 (General Message) with packet 72 including the text configured for the present TSR.	**OBU DMI displays the text message related to the TSR (*)**	*) Note: The text display may be visible only after the train starts moving since the start condition may be at train front.
7	DRIVER: Select SR with override		**OBU DMI displays SR mode**	
8	DRIVER: Press “Start”	An MA is sent with TSR. See steps 3-6 for details	**OBU DMI displays FS mode with MA; the TSR is visible on the planning area with the correct extension** Ensure the TSR is valid from the current position!	
9	DRIVER: Drive the train past the extension of the TSR		**OBU supervises the TSR speed until the TSR extension plus train length is passed.** **Once the TSR is past the TSR is no more visible on OBU DMI**	Verify that the TSR extension on the DMI matches the activated TSR.

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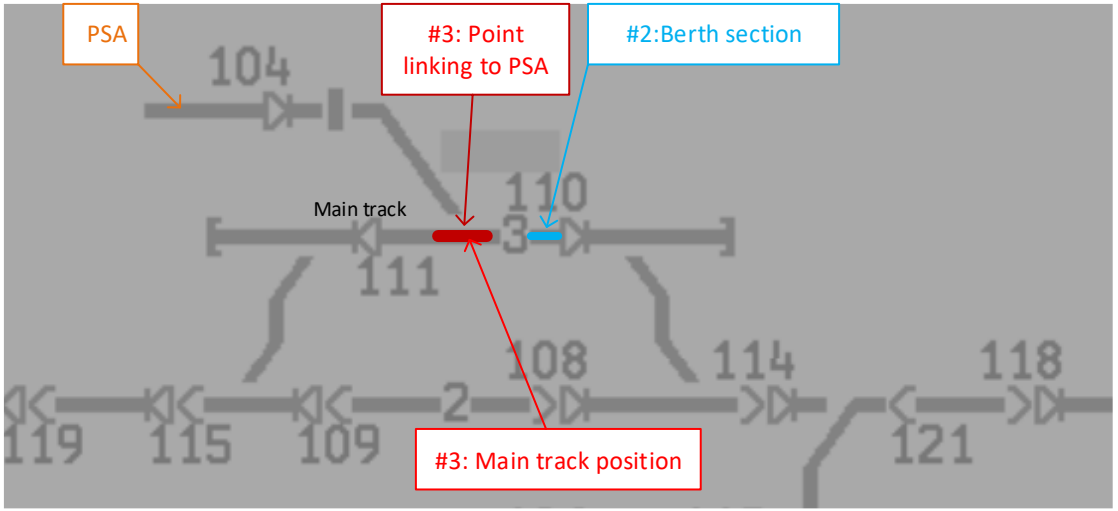
3.3.6. TC_BL3_306 –PREMATURE ACCELERATION WHEN ENTERING FROM A PSA

Purpose	To test the inter-action between OBU and RBC when obtaining and supervising an MA containing a speed reduction.
Trackside independency	No
Degraded conditions	Yes
Starting condition	The test yard need to contain a location which by definition can be *compromised by an open PSA* . Ensure the point (red object in figure) is in deviating position, i.e. in direction towards PSA. 
Train status before test	Executed Procedure 01 or 02, implying train in SB mode with or without known position, located in PSA well ahead of the signal point 104. Let the train have a considerable train length, e.g. 400 (The test case is written based on this train length and has therefore to be adapted to the selected train length)

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Step	Actions	RBC	OBU	Reference/comment
1	DRIVER: Select Override and move the train in SR mode across the balise group corresponding to the Signal point at the PSA border (Si 104 in fig.). DRIVER: Stop at next signal point (Si 110 in fig.)			If not possible to start at Si 104 the train may start in the middle of the track before Si 110 (But in any case passage of BG is necessary).
2	DISPATCHER: Lock a normal train route from the signal in front of the train.	An MA is sent to the train, composed as: **Alt 1**: MA (M3) with a TSR (*) (P65) with V_TSR=Vx covering the distance from the point to the start-of-route signal. **Alt 2:** MA (M33) with a relocation of the reference (D_REF) starting at the point, and with an SSP segment containing a low V_STATIC=Vx (*) from the point to the start-of-route signal. Check in logs and take note of the method applied!	OBU switches to OS mode **OBU DMI indicates permitted speed Vx** (if lower than the OS mode speed 40 km/h) **OBU DMI** displays a text message: “Sänkt hastighet pga infart från sidospår”	*) The speed reduction Vx is site specific (reflecting the allowed speed inside the PSA) and it is presumably lower than the ordinary line speed of the current main track. The tester must check to be sure to discriminate the speed reduction Vx from the ordinary line speed.
3	DRIVER: When OS ack prompted: Confirm OS mode on the DMI and start the train (do not confirm TAF if this is prompted)		When passing the signal OBU switches to FS mode. **OBU DMI continues indicating permitted speed Vx**	

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Step	Actions	RBC	OBU	Reference/comment
4	DRIVER: Continue running the train according to permitted speed		Having moved one train length beyond the signal (=400m) the permitted speed increases to ordinary line speed.	

3.4. TRACK DESCRIPTION AND MODE PROFILES

3.4.1. TC_BL3_401 – PERMITTED SPEED DEPENDING ON CANT DEFICIENCY TRAIN CATEGORY

Purpose	To test that train categories are managed by OBU as expected, both regarding train data entry and deduction from SSP.
Trackside independency	Yes (if the site contains a full set of categories)
Degraded conditions	No
Starting condition	Train in FS mode inside a berth section. Train routes shall be set long enough so that the EoA does not influence the indicated permitted speed. The used train routes shall be parameterized with a variety of cant deficiencies. Ensure the berth is also covered with the same parameterization, or alternatively, move the train into the track section where cant deficiencies are applied in the SSP. For information: Cross-reference table of the definition of train categories: *Label DMI* — *Cant def.(mm)* — *CD Category (ref. SS-026)* PASS 1 — 80 — 0 PASS 2 — 130 — 2 PASS 3 — 150 — 3 TILT 1 — 165 — 4 TILT 2 — 180 — 5 TILT 3 — 210 — 6 TILT 4 — 225 — 7 TILT 5 — 245 — 8 TILT 6 — 275 — 9 TILT 7 — 300 — 10 FP 1 / FG 1 — 80 — 0 FP 2 / FG 2 — 100 — 1 FP 3 / FG 3 — 130 — 2 FP 4 / FG 4 — 150 — 3
Train status before test	Executed Procedure 01 and TC_BL3_101

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Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Initiate a train data entry procedure and select entry for a train category		**OBU DMI displays a list of different train categories**	Depending on parameterization of the onboard regarding train data the list presented for train category may not be exhaustive. Verify that the name standard according to ERA DMI (ERA_ERTMS_015560) is used. (The speed related to train category should be visible on the track drawings)
2	DRIVER: Modify a train category and finish the train data entry	RBC revalidates the train data.	**OBU DMI displays permitted speed corresponding to the selected train category**	Repeat step 1 and 2 for at least the train categories PASS3, TILT5 and FP3. Note: The OBU may memorize the previous permitted speed for the track under the train, meaning that an increase may not be directly visible at standstill: If an expected increase does not occur, move the train one train length forward.

3.4.2. TC_BL3_402 – PERMITTED SPEED DEPENDING ON AXLE LOAD CATEGORY

Purpose	To test that axle load categories are managed by OBU as expected, both regarding train data entry and deduction from axle load speed profile.
Trackside independency	Yes
Degraded conditions	No
Starting condition	Train inside a berth section in SB mode. The train routes to be used ahead of the train shall be parameterized with a variety of axle load speed profiles. The selected train data (in procedure 1) shall comprise an axle load category which is not affected by the configured axle load profiles of the train route, e.g. “A”. For information: Cross-reference table of the definition of axle load categories: *Label DMI* — *Load/axle* — *Load/m* — *Category value (ref. SS-026)* A — 16 — 5,0 — 0 HS17 — 17 — ¿ — 1 B1 — 18 — 5,0 — 2 B2 — 18 — 6,4 — 3 C2 — 20 — 6,4 — 4 C3 — 20 — 7,2 — 5 C4 — 20 — 8,0 — 6 D2 — 22,5 — 6,4 — 7 D3 — 22,5 — 7,2 — 8 D4 — 22,5 — 8,0 — 9 D4XL — 22,5 — 7,2 — 10 (boogie with 3 axles) E4 — 25 — 8 — 11 E5 — 25 — 8,8 — 12
Train status before test	Executed Procedure 01

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Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set 2-3 train routes ahead of the train DRIVER: Press Start	An MA (M3) is sent to the train corresponding to the set routes. Axle load profiles (P51) are attached to the MA.	**OBU DMI displays MA with permitted speed equal to line speed**	
2	DRIVER: Initiate a train data entry procedure and select entry for another axle load category		**OBU DMI displays a list of different axle load categories**	Depending on parameterization of the onboard regarding train data the list presented for axle load category may not be the complete list. Check that the name standard according to ERA DMI (ERA_ERTMS_015560) is used.
3	DRIVER: Modify the axle load category to a higher value and finish the train data entry. (the selected value should be conditioned by the axle load profile of the train route(s))	RBC revalidates the train data. **New axle load category for the current train is visible on CMI**.	**OBU DMI displays a permitted speed corresponding to the selected axle load category**	Repeat step 2 and 3 for a selected number of axle load categories.

3.4.3. TC_BL3_403 – TRACK CONDITION: POWERLESS SECTION

Purpose	To test scenario with track condition of type “powerless section”
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	Train in FS mode with MA
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route beyond the signal where the current EoA is located. (There should be a powerless section on the route just locked)	RBC regards the route as FS proved		M_TRACKCOND=1001
2			OBU sends the cyclic M132 (MA request)	Q_MARQSTREASON=2
3		RBC sends M3 (extended MA) with EoA at the end signal of the route just locked including P68 with variable: M_TRACKCOND=9	OBU sends ACK related to the MA	
4	DRIVER: Run until the EoA		**OBU DMI displays the powerless section**	Whether the OBU has an interface for automatic control of the power switch is a matter of onboard design. Take note in the test records for informative purpose! vehicles

3.4.4. TC_BL3_404 – INTENTIONALLY DELETED

3.4.5. TC_BL3_405 – TRACK CONDITION: CHANGE OF TRACTION SYSTEM

Purpose	To test scenario with track condition of type “change of traction system”
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	Train in FS mode with MA The train route to be used ahead of the train shall be parameterized with a track condition “CHANGE OF TRACTION SYSTEM”.
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route beyond the signal where the current EoA is located.	RBC sends M3 (extended MA) with EoA at the end signal of the route just locked, including P39 with variable: M_VOLTAGE=variable*	OBU sends ACK related to the MA **OBU DMI displays MA correspondingly**	(*) If possible, try different values of M_VOLTAGE: 0 = line not fitted 1 = 25kv 2 = 15kv
2	DRIVER: Run until the EoA		**OBU DMI displays the symbol for change of traction system (*):** The forthcoming track condition will first be announced in the planning area and then, while active, under the CSG.	(*) Different symbols displayed depending on the value for M_VOLTAGE Whether the OBU has an interface for automatic control of the traction system is a matter of onboard design. Take note in the test records for informative purpose!

3.4.6. TC_BL3_406 – TRACK CONDITION: CHANGE OF ALLOWED CURRENT CONSUMPTION

Purpose	To test scenario with track condition of type “change of allowed current consumption”
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	Train in FS mode with MA A test tool interfacing the RBC is needed for feeding of current consumption data
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run at slow speed towards the EoA			
2	TOOL: Inject a new current value, e.g. with current 300 ampere and informative text “Reducerat strömuttag 300A”	RBC sends P40 with the chosen value for variable M_CURRENT, and P72 with a text to inform the driver	OBU sends ACK related to P40 and P72 **OBU displays the message on the DMI reporting the selected text** Check that no disturbance occurs when the OBU receives P40	Repeat the test step 2 for some different current values via the testtool Whether the OBU has an interface for automatic current control is a matter of onboard design. Take note in the test records for informative purpose!

3.4.7. TC_BL3_407 – ROUTE SUITABILITY

Purpose	To test handling of the “Route Suitability” condition with regard to traction system “not electrified”
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	Train close to a signal board in FS mode (or SR with known position). The next train route shall be designed with a route suitability condition representing a non-electrified track (“line not fitted”).
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Ensure the OBU is configured **compatible** with the Route suitability condition!			An OBU on SA level may have a frozen configuration with M_VOLTAGE<>0, in which case test steps 1-2 are not possible. Take note in the test record!
2	DISPATCHER: Set a train route over a track where a route suitability condition for traction system is defined.	RBC sends M3 (MA) with P70; variables of interest in P70: Q_SUITABILITY=2; M_VOLTAGE=0	The **DMI displays the received FS MA**	
3	TOOL: Ensure the OBU is configured **incompatible** with the Route suitability condition!			An OBU on SA level may have a frozen configuration with M_VOLTAGE=0, in which case test steps 3-4 are not possible. Take note in the test record!

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Step	Actions	RBC	OBU	Reference or comment
4	DISPATCHER: Set a train route over a track where a route suitability condition for traction system is defined.	RBC sends M3 (MA) with P70; variables of interest in P70: Q_SUITABILITY=2; M_VOLTAGE=0	The MA is not extended to the end of the route (the DMI displays the MA with EoA at the start of the route) **DMI displays a text message telling there is a route incompatibility for the traction system.**	

3.4.8. TC_BL3_408 – REVERSING

Purpose	To test handling of reversing areas.
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS mode with long MA
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route including two areas where reversing is possible	M11: RBC sends M3 (MA), including packets 138 and 139 for the 1st reversing area		
2		M95: RBC sends M3 (MA) and M24 (General Message) including P138 and P139 for the 1st reversing area		
3	DRIVER: Run the train into the 1st area and stop		**OBU DMI displays an icon that reversing is possible**	
4	DRIVER: Run the train outside the 1st area	M11: RBC sends M3 (MA), including packets 138 and 139 for the 2nd reversing area		
5		M95: RBC sends M3 (MA) and M24 (General Message) including P138 and P139 for the 2nd reversing area		
6	DRIVER: Stop the train before the 2nd reversing area		**OBU DMI does not display that reversing is possible**	

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Step	Actions	RBC	OBU	Reference or comment
7	DRIVER: Run the train into the 2nd area where reversing is possible and stop the train		**OBU DMI displays an icon that reversing is possible**	
8	DRIVER: Put the direction controller in reverse position		**OBU DMI displays a requests for Reversing-acknowledgement**	
9	DRIVER: Acknowledge transition to Reversing mode		**OBU switches to RV mode** and sends a position report to the RBC including the RV mode	
10	DRIVER: Reverse the train inside the permitted distance and stop the train		OBU sends position reports to the RBC including the RV mode and reversing movement information	
11	DRIVER: Reverse the train and pass the permitted distance		**OBU applies brakes**	
12	(The train comes to stop)		OBU sends position reports to the RBC including the RV mode	
13	DRIVER: Acknowledge the brake release		**OBU releases the brakes**	
14	DRIVER: Close the desk		**OBU switches to SB mode** OBU sends M150 (EOM) to the RBC	
15		RBC sends M24 including P42, with a disconnection order	OBU sends M156 (Termination of a Comm. Session)	
16		RBC sends M39 (ACK of Termination of a Comm. Session)		

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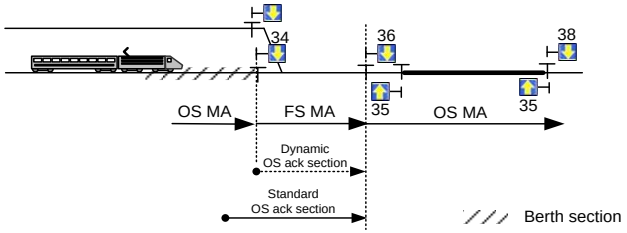
3.4.9. TC_BL3_409 – TWO OS PROFILES IN THE SAME MA

Purpose	To test that two OS profiles in the same MA are properly handled by OBU, with special attention to the case where next OS ack distance starts while the train is still within the 1st OS profile.
Trackside independency	Yes
Degraded conditions	No
Starting condition	Proposed situation: 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 part of the 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: Set a train route (2nd route in figure above), with OS profile.	Requested train route is locked.		The route is not yet proven (signal point red)
2	DISPATCHER: Confirm the route for OS (command KOS)	The route is indicated for OS on the CMI.		

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Step	Actions	RBC	OBU	Reference or comment
3	DISPATCHER: Set a train route (1st route in figure above)	Requested train route is locked.		
4	DRIVER: Press ”START”		OBU sends M132 (MA request)	Q_MARQSTREASON=1
5		RBC sends M3 (MA) including P80 (Mode Profile); variables of interest: 1st OS profile: Q_MAMODE=0 D_MAMODE=0; M_MAMODE=0 L_MAMODE=[distance between LRBG and the joint of next route] L_ACKMAMODE=450m 2nd OS profile: Q_MAMODE=0 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 M3	
6	DRIVER: Acknowledge OS mode		**OBU switches to OS mode** and it sends M136 (Position Report) with M_MODE=1	

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Step	Actions	RBC	OBU	Reference or comment
7	DRIVER: Run inside TAF window	RBC detects the train inside TAF window and next route FS proved RBC sends M34 (TAF request)		
8			**OBU displays the message "TAF Request" on DMI**	
9	**Do <u>not</u> confirm the TAF request!**			
10	(Train passes signal 34)		**OBU switches to FS mode** and it sends M136 (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. If so, it may not display an OS ack request because the train is already in OS.
11	DRIVER: Acknowledge OS mode		**OBU switches to OS mode** and it sends M136 (Position Report) with M_MODE=1	

3.4.1. TC_BL3_410 – MANAGING OF BIG METAL MASSES

Purpose	To test that the basic function related to managing Big Metal Masses (BMM) is in place in the OBU, thus allowing for this to be engineered at trackside as needed.
Trackside independency	Yes
Degraded conditions	No
Starting condition	Train standing on a track previous to a location where a BMM track condition is engineered in the track. The BMM track conditions distance in P67 (L_TRACKCOND) is expected to last over the next two consecutive balise groups.
Train status before test	Executed Procedure 01, train in FS before a signal point, after which there is a bg loaded with BMM.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set at least two train routes in front of the train (*)	Requested train routes are locked.	MA is extended with EOA at the end of the last train route.	*) ensuring that there will be enough track to pass across the entire length given by L_TRACKCOND
2	DRIVER: Run the train (in FS mode) towards the EOA.		At each bg passage, check in the logs that the LRBG is updated as expected through the entire journey. When bg with BMM track condition is passed the LRBG is also updated, and no other visible event occurs on the DMI. (*)	*) Check with OBU supplier if it is possible to get confirmed through OBU logs that the BMM function becomes active through the track given by L_TRACKCOND. Take notes!

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Step	Actions	RBC	OBU	Reference or comment
3	*[Move or re-locate the train back to the original position before proceeding to this step]:* DRIVER: Press Override, and run the train in SR mode across the entire length of L_TRACKCOND		At each bg passage, check in the logs that the LRBG is updated as expected. When bg with BMM track condition is passed the LRBG is also updated, and no other visible event occurs on the DMI. (*)	*) If a bg with “Stop if in SR” is passed, it is expected the train will be tripped.

3.4.2. TC_BL3_411 – BRAKE APPLICATION DUE TO CSM WITHIN A TSM SITUATION

Purpose	To test that a brake application is not released too soon while being supervised by CSM within a TSM situation when passing the permitted speed (which is under the release speed). This test case is developed due to hazard H0123 in Subset-113.
Trackside independency	Yes
Degraded conditions	No
Starting condition	The train should preferably be set with the following train data, train length = 110m and brake percentage = 155.
Train status before test	Executed Procedure 01 and TC_BL3_101. (Train with KNOWN position in FS mode).

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Define a TSR located at the end of the signal section which is planned to be used for the test TSR covering the distance 300m to 170m before end of route (EOA) with TSR speed 10km/h Ensure that the release speed at EOA is 40km/h Set TSR reason “TSR for TC_BL3_411” during the TSR definition			

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Step	Actions	RBC	OBU	Reference or comment
2	DISPATCHER: Activate the TSR Set a train route with its end point located shortly beyond the TSR	RBC regards the TSR as activated		
3	DRIVER: Locate the train in front of the start-of-route signal point and run the train according to permitted speed and approach the TSR		**OBU DMI enter TSM (yellow bar displayed on the CSG) when approaching the TSR gradually enforcing the permitted speed down to 10 km/h**	
4	Driver: When TSR restriction is entered: immediately accelerate to 20km/h (above TSR speed)		- Brake (SB or EB) is applied (train speed decreases) - When speed < 10 km/h the brakes are released (*) (**)	*) If the brake is released or not is due to OBU implementation of automatic brake release. (**) Important to check that the brake is not released immediately after brake application or before reaching 10km/h.
5	When possible accelerate again to 20 km/h		Same result as in step 4	

3.5. EMERGENCY STOP AND MA SHORTENING

3.5.1. TC_BL3_501 – CoSMA, WITH NEW EOA CLOSE TO TRAIN FRONT /GRANTED

Purpose	To test Co-operative MA shortening, with proposed EOA rather close to train front (granting scenario)
Trackside independency	No
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_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Move 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	When train at standstill: DISPATCHER: Release the train route immediately in front of the train (command FRU)	RBC sends M9 (Request to Shorten MA) with P15 including the variable: L_ENDSECTION= distance to the signal in front of the train Q_DANGERPOINT=1	OBU checks its braking curves OBU sends M137 (Request to shorten MA is granted)	
3		The requested train route is released.	**OBU DMI displays a shortened MA, with EoA set to the start of next route in front.**	
4	DISPATCHER: Set the subsequent train route	RBC sends M3 (MA) with FS profile until the end of next route	**OBU DMI displays an extended MA**	

3.5.2. TC_BL3_502 – CoSMA, FURTHER BEYOND THE TRAIN /REJECTED

Purpose	To test Co-operative MA shortening (CoSMA), with proposed MA further beyond train front under a reject condition. It is verified that any attached packet in the CoSMA message is also rejected.
Trackside independency	Yes: Test case designed based on hazard in subset-113, it is sufficient to run against 1 trackside only
Degraded conditions	No
Starting condition	
Train status before test	Executed Procedure 01

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Occupy 1-2 track sections far beyond the train front, (e.g. 3-4 signal sections away). The occupation should cause two train routes in sequence to be disqualified for FS. Ensure there are no level crossings between train front and last train route!			It is suggested to use the point track circuit at the farther end of a simple meeting station (disqualifies both the entrance route and the short route between inner and outer station signal)
2	DISPATCHER: Set train routes in front of the train, including the two routes affected by the occupied track section.	Train routes are locked. (routes affected by the occupation are not proven for FS) RBC sends M3 (MA) to train.	**OBU DMI displays extended MA** (planning area with MA up to the end of the last FS route)	
3	DISPATCHER: Confirm relevant train routes for On-sight operation (command KOS).	RBC extends the MA corresponding to the OS train routes, (M3 with P80).	**No change on DMI** (planning area indicating MA up to what is now the start of	

Step	Actions	RBC	OBU	Reference or comment
			the OS-profile to be supervised)	
4	DRIVER: Start the train and run at medium speed, e.g. 80 km/h			
5	When train approaching the signal board previous to the signal board of the 1st OS route, at a distance of approx. 200m: DISPATCHER: Release the train route in front of the train	RBC sends M9 (Request to Shorten MA) with P15	See comment (*) OBU sends M138 (Request to shorten MA is rejected)	*) OBU checks the braking curve and concludes it has not enough distance to stop at the proposed EoA.
6			**OBU DMI does not display a shortened MA. The same EoA is shown as before on the planning area.**	This ensures the proposed MA in the CoSMA message does not cancel the OS profile currently supervised
7	DRIVER: Continue driving according to permitted speed (which will be reduced while approaching the OS profile)		**OBU DMI prompts the driver to acknowledge On-sight operation**	
8	DRIVER: Acknowledge OS mode and continue running in 35-40 km/h		**OBU switches to OS mode**	
9	When train approaching the signal board of the 2nd OS route, at a distance of approx. 100m: DISPATCHER: Release the train route in front of the train	RBC sends M9 (Request to Shorten MA) with P15 and P80, corresponding to the 1st OS route.	See comment (*) OBU sends M138 (Request to shorten MA is rejected)	*) OBU checks the braking curve and concludes it has not enough distance to stop at the proposed EoA.

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Step	Actions	RBC	OBU	Reference or comment
10			When train enters 2nd OS route: **OBU DMI continues indicating OS mode.**	This ensures P80 attached to the proposed MA in the CoSMA message does not affect the OS profile currently supervised

3.5.3. TC_BL3_503 – CoSMA, WITH NEW EOA DIRECTLY AT TRAIN FRONT /GRANTED

Purpose	To test Co-operative MA shortening, with proposed EOA directly at train front, position calculated by RBC as a result of a train route being released under the train.
Trackside independency	No (in long term this may change, but currently it is not certain that both trackside suppliers will act identically)
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_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Move to the EoA and stop the train within the route release zone (*) relative to next signal.			* The distance depends on data parameterisation but should not be less than 30m
2	(Train at standstill)	RBC supervises the standstill release conditions (*)		*) The OBU shall have reported the same position for at least 7 seconds. (in FP 5.2.1 or older the condition is zero speed through 10s)
3	(Wait until conditions fulfilled)	RBC sends M9 (Request to Shorten MA) with P15; variables of interest: L_ENDSECTION= at train front end + margin_1 Q_DANGERPOINT=1 D_DP=L_DOUBTUNDER + margin_2		Recommended margin values: - margin_1 = 2m - margin_2 = 5m

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Step	Actions	RBC	OBU	Reference or comment
		V_RELEASEDP = 1 (i.e. 5 km/h)		
4		Train route under the train is indicated as released.	OBU checks its braking curves **OBU DMI displays a shortened MA , with EoA set to the train front. It is coherently displayed (*) both on planning area and CSG.** **Release speed 5 is visible** OBU sends M137 (Request to shorten MA is granted)	*) meaning that the permitted speed indicated on the CSG corresponds to the target, thus not indicating any permissive speed.
5	DISPATCHER: Set the subsequent train route	RBC sends M3 (MA) with FS profile until the EoA	**OBU DMI displays an extended MA**	
6	DRIVER: Move to the new EoA			

3.5.4. TC_BL3_504 – CES ACCEPTED BY TRAIN

Purpose	To test conditional emergency stop (CES), causing an acceptance and EOA update situation.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS mode with long MA
Train status before test	Executed Procedure 01 and TC_BL3_102 with route under the train NOT LOCKED

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train slowly, without passing the start of route. TOOL: Occupy the track section beyond start of route signal board (using a simulated method)			
2		RBC sends M15 (Conditional Emergency Stop)	OBU sends M147 (ACK to Conditional Emergency Stop) with Q_EMERGENCYSTOP=0 **OBU applies the brakes in order not to pass the requested stop position (signal board).** **A shortened MA is displayed on the DMI, including an emergency stop message.**	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 M18 (Revocation to the CES)	OBU sends ACK related to M18	

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Step	Actions	RBC	OBU	Reference or comment
4		RBC sends M3 (Shortened MA) with EoA at signal just ahead of TC unduly occupied	OBU sends ACK related to the MA	
5	TOOL: Remove the track section occupancy			The system may be able to send MA extension (as expected in step 6) already here
6	(optionally, if MA is not extended in step 5) DISPATCHER: Release the train route in front of the train. DISPATCHER: Lock the same train route again. DRIVER: Press “Start”	The train route is released. The train route is locked. RBC sends M3 (extended MA) with ACK request	OBU sends ACK related to the extended MA	
7	DRIVER: Move the train in FS mode on the last track section of the next route (route under the train is locked) TOOL: Occupy the track section beyond start of route signal board of next route	RBC sends M15 (Conditional Emergency Stop)	OBU sends M147 (ACK to Conditional Emergency Stop) with Q_EMERGENCYSTOP=0 **OBU applies the brakes in order not to pass the requested stop position (signal board).** **A shortened MA is displayed on the DMI, including an emergency stop message.**	

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Step	Actions	RBC	OBU	Reference or comment
8		Optional: RBC sends M16 (Unconditional Emergency Message)	OBU sends M147 (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 M136 (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
9		Optional: RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to M6.	
10		RBC sends M18 (Revocation of CES) with ACK request	OBU sends ACK related to M18	
11		Optional: RBC sends M18 (Revocation of UES) with ACK request	OBU sends ACK related to M18	
12			Optional: **OBU DMI enables the ”START”**	
13	DISPATCHER: Release the train route in front of the train. DISPATCHER: Lock the same train route again.	The train route is released.		

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Step	Actions	RBC	OBU	Reference or comment
		The train route is locked, but with the start signal point in stop.		
14	TOOL: Remove the track section occupancy	The start signal point of the train route in front of the train is cleared (green indication)		
15	Optional (*): DRIVER: Press ”START”	RBC sends M3 (MA) with an OS profile (**) for the track up to the start signal point.	OBU sends M132 (MA Request) **OBU switches to OS mode** OBU sends ACK related to M3	Q_MARQSTREASON=1 *) Pressing START is only necessary if the train was tripped due to UES; otherwise the MA should be sent automatically. **) FS mode may be obtained directly, if interlocking conditions are OK
16		Optional: RBC sends M24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	OBU sends ACK related to M24	
17	DRIVER: Start the train and pass the start signal point.		**OBU switches to FS mode (*)**	*) FS mode may have been obtained already in step 15, if interlocking conditions are OK

3.5.5. TC_BL3_505 – CES REJECTED BY TRAIN, WHILE ENTERING A LOCKED TRAIN ROUTE

Purpose	To test conditional emergency stop (CES), causing a reject situation. The used scenario is a train with long FS MA passing onto the subsequent train route. The RBC performs a safety check for legitimate train route release by use of the CES method.
Trackside independency	No
Degraded conditions	No
Starting condition	To ensure the intended scenario is obtained, it is advised to disable the bg at the signal point, or choose a location where there is no bg at the signal point. Train in FS mode running on a train route, with MA covering at least one additional train route.
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Approach the end of the current train route at a low speed, e.g. 15 km/h. (The train passes onto next locked train route, i.e. occupying the 1st track section of next route.)	RBC sends M15 (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 M147 (ACK to Conditional Emergency Stop) with Q_EMERGENCYSTOP=3 (CES rejected) **OBU does not brake and the OBU DMI displays no emergency stop.**	Make sure that M15 is really sent! Note that the RBC may omit sending M15 if it gets a position report from the train with an LRBG confirming it is already inside the train route. (It may be necessary to disable the bg at the signal.)

3.5.6. TC_BL3_506 – UES SCENARIO, WITH REVOKATION FROM RBC

Purpose	To test the basic function of sending an unconditional emergency stop (UES) to OBU, then to recover normal train operation by producing of a new MA.
Trackside independency	No
Degraded conditions	Yes (due to operational issue)
Starting condition	The train running within an area which is designed as an Emergency Stop Area (ESA)
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Activate an ESA covering the route where the train is located	RBC sends M16 (Unconditional Emergency Message)	OBU sends M147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2. **OBU switches to TRIP mode and applies the emergency brake**	
2	When train at standstill: DRIVER: Acknowledge the trip		**OBU DMI displays a text message for train trip confirmation.** **OBU switches to POST TRIP mode and releases the emergency brake**. OBU sends M136 (Position Report) with M_MODE=8 (POST TRIP)	The OBU may display an acknowledge icon instead of a text
3		RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to M6	
4		RBC sends M18 (Revocation of UES) with ACK request	OBU sends ACK related to M18	

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Step	Actions	RBC	OBU	Reference or comment
5		RBC sends M24 (General Message) with P72 including the text “Nödstoppsområde aktiverat”	**OBU displays on the DMI the message “Nödstoppsområde aktiverat”** **OBU DMI enables the ”START”**	The text may also contain a reference to the specific ESA
6	DRIVER: Press ”START”		OBU sends M132 (MA Request)	Q_MARQSTREASON=1
7		Optional: RBC sends M24 “General message” with packets 57 “Movement authority request parameters”, 58 “Position report parameters” with acknowledgment request	OBU sends ACK related to M24	
8		Optional: RBC sends M2 with a permitted distance D_SR = 60m.	**OBU switches to SR mode**	
9	DISPATCHER: Deactivate the ESA	RBC sends M3 (MA) in FS mode M11: For the MA to be extended an MA request is needed from the OBU.	**OBU switches to FS mode** OBU sends ACK related to M3. **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 Signal board was passed while braking, the roll-in supervision might not allow continued running in FS)

3.5.7. TC_BL3_507 – UES SCENARIO, WITH OVERRIDE ACTION BY DRIVER

Purpose	To test that an emergency stop situation (created with UES from RBC) can be overridden by the driver.
Trackside independency	No
Degraded conditions	No
Starting condition	Train with MA in FS located out of berth section
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train slowly, without entering the berth section of next route.			
2	DISPATCHER: Issue an Emergency Stop for the train (command NST)	RBC sends M16 (Unconditional Emergency Message)	OBU sends M147 (ACK to the emergency stop) with variable: Q_EMERGENCYSTOP=2. **OBU switches to TRIP mode and applies the emergency brake**	
3			**OBU displays a text message for train trip confirmation**	The OBU may display an acknowledge icon instead of a text
4	DRIVER: Acknowledge the trip		**OBU switches to POST TRIP mode and releases the emergency brake** OBU sends M136 (Position Report) with M_MODE=8 (POST TRIP)	

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Step	Actions	RBC	OBU	Reference or comment
5		RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to M6	
6	DRIVER: Select “OVERRIDE”		**OBU switches to SR mode (*)** OBU sends M136 (Position Report) with M_MODE=2	(*) If the OBU issues an MA request due to this Override, the RBC will send an SR Authorisation with 60m distance. For M11 RBC this would require another OVERRIDE action to obtain a distance to run.
7		RBC regards the emergency as “revoked” for the train		
8	DRIVER: Press ”START”		OBU sends M132 (MA Request)	Q_MARQSTREASON=1
9		M11: SR Authorisation with 60m is sent		
10		M95: RBC sends M3 (FS MA *) with ACK request	**OBU switches to FS/OS mode** OBU sends ACK related to M3	*) Conditions may not be enough for FS; if so, an OS profile is added.
11	M11: DRIVER: Select OVERRIDE to obtain distance to run, then move the train	Once train enters the berth section of next route, RBC sends M3 (FS MA) with ACK request	**OBU switches to FS/OS mode** OBU sends ACK related to M3	For M11: The DMI may display the “hour glass” while the train is moved into the berth of next route.
12	M95+M11: DRIVER: Run the train past next signal board		**OBU switches to FS mode** (if not already in FS mode)	

3.5.8. TC_BL3_508 - MA SHORTENING AT SIGNAL IN FRONT OF A RUNNING TRAIN

Purpose	To test that a Shortening of MA situation is correctly handled by OBU.
Trackside independency	No
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 signal board
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the signal in front of the train to STOP	RBC sends M3 (shortened MA) with ACK request	OBU sends ACK related to the shortened MA **OBU applies the service brake.** **OBU DMI displays the MA shortened, with EoA at next signal** **OBU DMI displays text "tekniskt körtillstånd avkortat"**	The braking effort depends on the current speed in relation to the distance to the signal.
2	DISPATCHER: While the train is braking, select the command to release the route in front of the train previously included in the MA	RBC rejects the release command		
3	DRIVER: Stop the train ahead of the signal set to STOP			
4	DISPATCHER: Select the command to release the route in front of the train previously included in the MA	RBC accepts the command and releases the route		

3.5.9. TC_BL3_509 – MA SHORTERNING TO A TRAIN AT STANDSTILL WITH SHIFTED LOCATION

Purpose	To test that a train with shifted location correctly handles a shortened MA. This is the ordinary method applied towards a train having shifted location when an authorized train route need to be released. The scenario used is: Train is located in a station. It exits beyond the station border, then changes the orientation. While having shifted location it gets an MA for entrance to the station, then the MA is shortened (due to train route release), and then extended again (due to new train route)
Trackside independency	No
Degraded conditions	No
Starting condition	Train in SB mode (may also be FS, OS, or SR mode)
Train status before test	Executed Procedure 01

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

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route out of the station	RBC sends OS-MA to the train	**OBU DMI displays a request for OS acknowledgement**	May be FS MA if roll-in conditions is clear
2	DRIVER: Acknowledge OS DRIVER: Run the train out of the station and stop after the entry signal to the station.		**OBU enters OS mode** **Having passed the signal board of the train route, OBU switches to FS.**	OS and OS Ack not relevant if FS MA was sent in step 1
3	DRIVER: Deactivate the cabin		OBU sends msg 150, indicating End of Mission	

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Step	Actions	RBC	OBU	Reference or comment
4		RBC orders disconnection of the radio connection	OBU disconnects the radio	
5	DRIVER: Activate 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: Set a train route to track 3 at the station		**OBU DMI displays a request for OS acknowledgement**	
7	DRIVER: Press “start” DRIVER: Acknowledge OS	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** **OBU enters OS mode** **OBU DMI displays permitted speed 40 km/h**	*) Depending on distance the RBC may also send M34/Track ahead free request. OBU would switch to FS subsequent to driver’s ack. This event is not relevant for the purpose of the test.
8	DISPATCHER: Release the train route to track 3 (the train is supposed to go to track 2 instead)	RBC sends a new 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 “tekniskt körtillstånd avkortat”** Ensure trip mode is not entered!	Train need to be at standstill to allow train route release
9	DISPATCHER: Set a train route to track 2 at the station	RBC sends OS-MA (*) with shifted location, ending at track 2	**OBU DMI displays permitted speed 40 km/h**	*) See note to step 7

3.6. SHUNTING

3.6.1. TC_BL3_601 – SHUNTING REQUEST FROM SB/SR MODE WITH UNKNOWN/INVALID POSITION

Purpose	To test that an OBU with unknown or invalid position can be given “shunting granted”
Trackside independency	No
Degraded conditions	No
Starting condition	Train in SB mode
Train status before test	Executed Procedure 02, except the train data entry procedure! Note: ensure the train is either reporting *unknown* or *invalid position*, but not *valid position* which may be the case if the OBU is equipped with an acting CMD, see description of Procedure 2 for more information.

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
2		RBC sends M28 (SH authorised) and P3 (National Values) with variable D_VALIDNV set to “Now”	**OBU switches to SH mode**. OBU sends M136 (Position Report) with M_MODE=3 OBU sends M150 (End of Mission)	P3 may be sent as an optional packet in M3 or separately in a General Message
3		RBC sends M24 (General Message) including P42 (Session Management).	OBU sends M156 (Termination of a Comm. Session)	
4		RBC sends M39 (ACK of Termination of a Comm. Session)		
5	DRIVER: Select “Exit Shunting”	Communication is established with OBU according to normal procedure	**OBU switches to SB mode**.	

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Step	Actions	RBC	OBU	Reference or comment
			OBU sends M136 (Position Report) with M_MODE=6	
6	DRIVER: Select “Train data entry” (*), and enter train data according to normal procedure		OBU sends M129 (validated train data) with P0 and P11	*) The driver may need to re-validate the level in the Start-of-Mission procedure *) Level redundant for Trafikverket
7	DRIVER: Select “override”		**OBU switches to SR mode**. OBU sends M136 (Position Report) with M_MODE=2	
8	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
9		RBC sends M28 (SH authorised) Optional (*): P3 (National Values) including variable D_VALIDNV set to “Now” is sent	**OBU switches to SH mode**. OBU sends M136 (Position Report) with M_MODE=3	*) P3 may be omitted if it was sent at the SoM in step 5; P3 may be appended to M28 or sent separately via M24 (RBC design dependent)
10		(End of Mission sequence continued equally as in steps 2-4)	(End of Mission sequence continued equally as in steps 2-4)	

3.6.2. TC_BL3_602 – SHUNTING ACROSS ”DANGER FOR SHUNTING”

Purpose	To test that OBU handles the message “Danger for shunting”as expected. Additionally, as a variation the mode transition to SH is done from OS mode.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	The train shall be located in front of a balise group programmed with P132 (“Danger for shunting”)
Train status before test	Executed Procedure 01 and train in OS mode

Step	Actions	RBC/track	OBU	Reference or comment
1	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
2		RBC sends M28 (SH authorized)	**OBU switches from OS to SH mode** OBU sends M136 (Position Report) with M_MODE=3	
3		End of Mission is performed according to normal procedure	End of Mission is performed according to normal procedure	
4	DRIVER: Run the train (in SH mode)	The relevant bg is producing “Danger for shunting”	When bg is passed: **OBU switches to TRIP mode and applies the emergency brake**	
5	When train at standstill: DRIVER: Acknowledge the trip		**OBU DMI displays a text message for train trip confirmation.** **OBU switches to POST TRIP mode and releases the emergency brake**.	

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Step	Actions	RBC/track	OBU	Reference or comment
			OBU establishes contact with RBC (*) according to normal procedure and sends M136 (Position Report) with M_MODE=8 (POST TRIP)	*) Note: If the bg contains an LTO enforcing a level transition from L2 the contacting of RBC should not be expected
6	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
7		RBC sends M28 (SH authorised)	**OBU switches from PT to SH mode** OBU sends M136 (Position Report) with M_MODE=3	
8	(wait until the radio session is closed)	RBC acknowledges the session termination (M39)	OBU terminates the radio session (M156)	Wait at least 90s. Note: there is no EOM in this case (compare step 3)

3.6.3. TC_BL3_603 – SHUNTING ORDERED FROM TRACKSIDE, (FROM FS AND OS)

Purpose	To test that the OBU is able to switch to shunting mode based on a mode profile given by trackside
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS mode
Train status before test	Executed Procedure 01

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route and a subsequent shunting route (the shunting route should either end in a PSA or it must be extended with another shunting route)	RBC sends M3 including P80 (SH profile with start at shunting signal)		The selected shunting route must be parameterized to allow for shunting order from trackside!
2	DRIVER: Move the train into the train route and approach the end-of-route/shunting signal.		**OBU DMI displays an acknowledgement request for shunting**	The ack area starts approx. 400m ahead of the shunting signal
3	When entering the acknowledge area for transition to shunting: DRIVER: Acknowledge transition to shunting		**OBU switches to SH mod**e	If the train moves past the shunting signal without driver having acknowledged, OBU will switch to SH mode anyway
4		End of Mission is performed according to normal procedure	End of Mission is performed according to normal procedure	

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Step	Actions	RBC	OBU	Reference or comment
5	While train is still running (run slowly, so that the end-of-route signal point is not passed): DISPATCHER: Try to release the train route	**Train route is not released**		
6	Wait 180 s (*) from train deregistration by the RBC: DISPATCHER: Try to release the train route again	**Train route is released**		*) The time is configurable and may be set longer. Wait additional time, (+120s) before the final result is recorded.
7	TOOL: Re-locate the train to the same starting position as in step 1 (so that the same routes can be run again.)			
8	TOOL: Occupy the last track section in the intended train route			
9	DISPATCHER: Set the same train route and shunting route as in step 1.	Routes are locked		
10	DISPATCHER: Confirm the route for operation in On-Sight (command KOS)	Start signal point indicates “proven for OS” RBC sends M3 including P80 with an OS profile for the entire train route and a SH profile starting at the shunting signal)	**A prompt for confirmation to OS is shown on the DMI**	
11	DRIVER: Confirm On-Sight		OS mode is shown in the DMI	
12	Repeat steps 2-4	Same result as in step 2-4	Same result as in step 2-4	

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Step	Actions	RBC	OBU	Reference or comment
13	DRIVER: Continue in SH mode into the shunting route without slowing down. Continue into the PSA (or next shunting route)	The shunting route is released by passage (*)		*) The entire train route may not be released since a passage cannot be registered at the end of the route due to the manipulated track section.

3.6.4. TC_BL3_604 – SHUNTING CONDITIONED BY TRACKSIDE

Purpose	To test that the OBU can handle that a shunting request is refused by the RBC. This test case addresses the situation when the RBC applies a trackside condition related to active temporary shunting area to grant a shunting request. This is typically used on the line between stations.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	At least one temporary shunting area (TSA) must be engineered as *shunting conditional*, i.e. to require the TSA as active before RBC can give shunting granted. The TSA shall be inactive.
Train status before test	Executed Procedure 01 and train in FS mode. The train should be standing within a conditional TSA., with at least 2 balise groups included in the TSA ahead of the train front.

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
2		RBC sends M27 (SH refused) (*)	**A “Shunting refused” message is shown on the DMI.** **OBU does not switch to SH, but stays in FS**	*) The RBC notes that the train’s position is conditioned with regard to shunting operation; however the TSA in question is inactive
3	DISPATCHER: Activate the TSA where the train is located	The TSA is indicated as active on the CMI		
4	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	

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Step	Actions	RBC	OBU	Reference or comment
5		RBC sends M28 (SH authorised) (*), including P49 “List of balises for SH area”	**OBU switches to SH mode** OBU sends M136 (Position Report) with M_MODE=3	*) The RBC notes that the train’s position is conditioned; and the TSA in question is now active
6		End of Mission is performed according to normal procedure	End of Mission is performed according to normal procedure	
7	DRIVER: Move the train forward in SH mode		When train passes bg inside the TSA: No brake intervention imposed by OBU	
8	DRIVER: Continue moving		When train passes bg at the TSA border: **OBU switches to TRIP mode and applies the emergency brake**	
9	When train at standstill: DRIVER: Acknowledge the trip		**OBU switches to POST TRIP mode and releases the emergency brake** OBU establishes contact with RBC according to normal procedure and sends M136 (Position Report) with M_MODE=8 (POST TRIP)	
10	DRIVER: Put the direction controller in reverse Move the train backward (while in PT mode) until the bg is passed			

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Step	Actions	RBC	OBU	Reference or comment
11	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
12		RBC sends M28 (SH authorised) (*), including P49 “List of balises for SH area”	**OBU switches to SH mode** OBU sends M136 (Position Report) with M_MODE=3	
13	(wait until the radio session is closed)	RBC acknowledges the session termination (M39)	OBU terminates the radio session (M156)	Wait at least 90s. Note: there is no EOM in this case (compare step 6)
14	DRIVER: Put the direction controller in forward Select OVERRIDE Move the train forward passing the same bg again		When train passes bg at the TSA border: No brake intervention imposed by OBU	
15	DRIVER: Continue moving		When train passes the next bg (outside of the active TSA): **OBU switches to TRIP mode and applies the emergency brake**	

3.6.5. TC_BL3_605 – PASSIVE SHUNTING

Purpose	To test the basic passive shunting scenario for a single engine.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	The train is located at any location where shunting is allowed by trackside
Train status before test	Train in SB, SR or FS mode with radio connection established Train configuration that allows the use of passive SH

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
2		RBC sends M28 (SH authorized)	**OBU switches to SH mode** OBU sends M136 (Position Report) with M_MODE=3	
3		End of Mission is performed according to normal procedure	End of Mission is performed according to normal procedure	
4	DRIVER: Move the train 10-20m in SH mode			
5	DRIVER: Stop the train and select “Maintain Shunting” Close the desk		**OBU switches to Passive SH mode** OBU sends M136 (Position Report) with M_MODE=15 (*)	This button is only enabled if the train configuration allows it *) Redundant event for Trafikverket

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Step	Actions	RBC	OBU	Reference or comment
6	DRIVER: Activate the other cabin, to continue shunting operation in the opposite direction		**OBU switches to SH mode** (without contacting the RBC)	
7	DRIVER: Move the train 10-20m in SH mode			
8	DRIVER: Select “Exit shunting”	RBC orders closing of radio session	**OBU switches to SB mode**. OBU establishes a session to inform about the mode change [M136 with M_MODE=6]	
9	DRIVER: Perform Start-of-Mission according to normal procedure (*)	SoM procedure develops according to procedure 1	SoM procedure develops according to procedure 1	*) See procedure 1

3.6.6. TC_BL3_606 – UPDATE OF NATIONAL VALUES AT ENTRY TO SHUNTING

Purpose	To test that an OBU updates the national values at entry to shunting, based on variable “now”
Trackside independency	Yes
Degraded conditions	No
Starting condition	OBU is powered off (ensure the train is reporting “Invalid position” at start-up which may not be the case if the OBU is equipped with an acting CMD, see description of Procedure 2 for more information.
Train status before test	- Last used level before power-off shall be Level 2 - The national values onboard shall be set according to the default values

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Power-on the OBU and open a cab desk			Purpose of steps 1-5 is to have a reference value of V_NVSHUNT to be able to verify that NV are updated at a later step.
2	DRIVER: Enter driver ID			
3	DRIVER: Select Level Change: Select Level 1 and acknowledge (*)		**OBU DMI displays level 1** **OBU DMI displays radio connection OFF**	*) Use of L1 in order to avoid that RBC updates NV
4	DRIVER: Select “Shunting request”		**OBU switches to SH mode** Check the maximum speed in SH: According to default national values the maximum speed shall be 30km/h	The maximum speed is shown by using the toggle function on the DMI

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Step	Actions	RBC	OBU	Reference or comment
5	DRIVER: Select “Exit Shunting”		**OBU switches to SB mode**	
6	DRIVER: Re-validate/re-enter ERTMS/ETCS Level 2		OBU: ERTMS/ETCS Level valid	
7		SoM inter-action with train according to normal procedure	SoM inter-action with RBC according to normal procedure	For details see Procedure 02
8	(train data entry not needed!) DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
9		RBC sends M28 (SH authorised) including P3 (National Values) with variable D_VALIDNV set to “Now” (*)	**OBU switches to SH mode**. OBU sends M136 (Position Report) with M_MODE=3 OBU sends M150 (End of Mission)	*) Note that P3 may also be sent through a separate message, typically M24
10		End of Mission is performed according to normal procedure	End of Mission is performed according to normal procedure	
11			Check the maximum speed in SH: According to Trafikverket national values the max speed shall be 40km/h	The maximum speed is shown by using the toggle function on the DMI

3.6.7. TC_BL3_607 – SHUNTING REQUEST WITH REF. LOCATION AHEAD OF TRAIN FRONT

Purpose	To test that the OBU properly reports its orientation so that shunting authorization can be achieved consistently between trackside and onboard.
Trackside independency	Yes
Degraded conditions	No
Starting condition	At least one temporary shunting area (here referred to as the "line TSA") must be engineered as *shunting conditional*, i.e. to require the TSA as active before RBC can give shunting granted. This "line TSA" should be located on the line, directly adjacent to a station which is engineered without any shunting condition (=normal design). The line TS shall be inactive.
Train status before test	Executed Procedure 01 and train in FS, OS or SR mode. Recommended train length: 20 m. The train should be standing in the station with the train front located towards the line TSA

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Move the train out to the line and…			The train can be run in FS on a train route, or just in SR
2	DRIVER: …stop the train just outside the entrance signal to the station (ensure the rear of the vehicle is also located on the line, 20-30m beyond the entrance signal, i.e. within the *Free Shunting authorization distance* of the station TSA.			The *free shunting authorization distance* is normally <60 m relative to the entrance signal to the station
3	DRIVER: Select "Shunting Request" (from the same cab)		OBU sends M130 (SH request)	

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Step	Actions	RBC	OBU	Reference or comment
4		RBC sends M27 (SH refused) (*)	**A "Shunting refused" message is shown on the DMI.** **OBU does not switch to SH, but stays in the current mode**	*) The RBC notes that the TSA relative to the train front is inactive
5	DRIVER: Close the cab and activate the opposite cab			
6	DRIVER: Select "Shunting Request"		OBU sends M130 (SH request)	
7		RBC sends M28 (SH authorised)	**OBU switches to SH mode** OBU sends M136 (Position Report) with M_MODE=3	*) The RBC notes that the TSA relative to the active cab is not conditional.
8		End of Mission is performed according to normal procedure	End of Mission is performed according to normal procedure	
9	DRIVER: Move the train forward in SH mode		When train passes bg inside the TSA: No brake intervention imposed by OBU	

3.6.8. TC_BL3_608 – STOP OF PASSIVE SHUNTING AT DESK OPENING

Purpose	To test the consequence of message “stop SH on desk opening” from bg.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	The train is located shortly beyond a balise group loaded with “stop SH on desk opening” (P135). The active cab is oriented away from the bg. Ensure the P135 will applicable with regard to directionality (Q_DIR) when the train returns and crosses the balise.
Train status before test	Train in SB, SR or FS mode with radio connection established Train configuration that allows the use of passive SH. It must be possible to run the train in Passive Shunting, i.e. as a slave engine behind a leading engine.

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Select “Shunting Request”		OBU sends M130 (SH request)	
2		RBC sends M28 (SH authorized)	**OBU switches to SH mode** OBU sends M136 (Position Report) with M_MODE=3	
3		End of Mission is performed according to normal procedure	End of Mission is performed according to normal procedure	
4	DRIVER: Move the train 10-20m in SH mode (leaving the bg behind)			
5	DRIVER: Stop the train and select “Maintain Shunting” Close the desk		**OBU switches to Passive SH mode**	This button is only enabled if the train configuration allows it

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Step	Actions	RBC	OBU	Reference or comment
			OBU sends M136 (Position Report) with M_MODE=15 (*)	*) Redundant event for Trafikverket
6a	Case *real environment with two shunting engines:* DRIVER: Activate the other engine (which now becomes leading), to continue shunting operation in the opposite direction, DRIVER: select “Shunting request”	RBC sends M28 (SH authorized)	**Leading engine OBU: switches to SH mode** OBU sends M136 (Position Report) with M_MODE=3 (slave engine OBU: is already in PS mode)	
6b	Case *simulated environment (implying just one shunting engine available):* (No action needed)		(slave engine OBU: is already in PS mode)	
7a	Case *real environment with two shunting engines:* DRIVER: Move train until the slave engine has passed the bg containing P135		The leading engine OBU, moving in SH, reads the bg with P135 The slave engine OBU, moving in PS, reads the balise with P135	
7b	Case *simulated environment:* TOOL: Simulate movement of a leading engine (pulling the slave engine) until it has passed the bg containing P135		The slave engine OBU, moving in PS, reads the balise with P135	
8	DRIVER: Activate the cab of the slave engine (which is currently in PS mode)	RBC registers the train according to the normal SoM procedure	Continued shunting operation is not allowed! **OBU switches to SB mode** OBU sends M136 (Position Report) with M_MODE=6	

3.7. RBC/RBC and LEVEL TRANSITIONS

3.7.1. TC_BL3_701 – RBC -> RBC TRANSITION – NOMINAL CASE

Purpose	To test the capability of running across an RBC/RBC border according to the normal procedure, i.e. maintaining simultaneous communication with two RBC:s. The test case can be run either between two RBC:s homologated* by Trafikverket or between an RBC homologated by Trafikverket and a foreign RBC at a Swedish national border. *) Homologated in this context means an RBC application compliant to ERTMS Baseline 3 and which is also proved as compliant to a defined set of specifications for a trackside ETCS level 2 system issued by Trafikverket.
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS mode heading towards an RBC/RBC border, located before the configured distance in the test track for sending of packet 131 to the train. Train length should be 200m.
Train status before test	Executed Procedure 01 and TC_BL3_102

a) Hand-over at full speed

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a sequence of train routes in front of the train, across the RBC-RBC border	HOV (Handing Over) RBC sends an MA, stretching to the RBC-RBC border	**OBU DMI displays MA correspondingly**	Train Handover between HOV RBC and ACC RBC is initiated, by HOV RBC sending a pre-announcement.
2		HOV RBC sends an MA, stretching beyond the RBC-RBC border	**OBU DMI displays MA correspondingly**	

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Step	Actions	RBC	OBU	Reference or comment
3	DRIVER: Run the train slowly, passing the location configured for sending of P131 (*)	HOV RBC orders the train to contact ACC RBC (P131) **The train is registered in ACC RBC**	OBU establishes a communication session with ACC RBC	To properly verify registration in ACC RBC it may be needed to check the RBC maintenance terminal *) When running on a foreign RBC such location may not exist, in which case P131 will be sent directly when routes are set.
4	DRIVER: Accelerate and run the train across the border at full line speed and continue running at least as long as T_NVCONTACT is defined (*).	HOV RBC orders the train to close the radio connection (P42)	OBU closes the radio connection with HOV RBC OBU continues sending position reports cyclically to ACC RBC. OBU continues supervising the MA and there is no visible disturbance.	*) Swedish National Value for T_NVCONTACT = 60s.

b) Hand-over at slow speed

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a sequence of train routes in front of the train, across the RBC-RBC border	HOV (Handing Over) RBC sends an MA, stretching to the RBC-RBC border	**OBU DMI displays MA correspondingly**	Train Handover between HOV RBC and ACC RBC is initiated, by HOV RBC sending a pre-announcement.
2	Driver: Run the train at medium speed	HOV RBC sends an MA, stretching beyond the RBC-RBC border	**OBU DMI displays MA correspondingly** OBU establishes a communication session with ACC RBC (*)	*) May occur a bit later when P131 is sent to the train.
3	DRIVER: When approaching the border reduce the speed (5-10km/h) and pass the RBC border with max safe front end		OBU sends a position report to both HOV RBC and ACC RBC	
4	DRIVER: Run the train entirely across the border, then accelerate and continue running at least as long as T_NVCONTACT is defined.	HOV RBC orders the train to close the radio connection (P42) (*)	OBU closes the radio connection with HOV RBC OBU continues sending position reports cyclically to ACC RBC. OBU continues supervising the MA and there is no visible disturbance.	*) This may occur already when the train's min safe front end has passed the border.

c) Opposite direction, hand-over at full speed

Repeat test (a) in opposite direction. This test is only necessary if the train is run towards a foreign RBC.

d) Opposite direction, hand-over at slow speed

Repeat test (b) in opposite direction. This test is only necessary if the train is run towards a foreign RBC.

3.7.2. TC_BL3_702 – RBC -> RBC TRANSITION - MODEM FAILURE

Purpose	To test the capability of running across an RBC/RBC border when one of the modems is out of control. The test can be run either between two RBC:s homologated* by Trafikverket or between an RBC homologated by Trafikverket and a foreign RBC at a Swedish national border. *) Homologated in this context means an RBC application compliant to ERTMS Baseline 3 and which is also compliant to a defined set of specifications for a trackside ETCS level 2 system issued by Trafikverket.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS mode heading towards an RBC/RBC border, located before the configured distance in the test track for sending of packet 131 to the train.
Train status before test	Executed Procedure 01 and TC_BL3_102

a) Hand-over at full speed

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Disable the inactive modem		**There might be a failure indication on the DMI (*)**	*) Depends on the individual OBU design
2	DISPATCHER: Set a sequence of train routes in front of the train, across the RBC-RBC border	HOV (Handing Over) RBC sends an MA, stretching beyond the RBC-RBC border	**OBU DMI displays MA correspondingly**	Train Handover between HOV RBC and ACC RBC is initiated, by HOV RBC sending a pre-announcement.
3	DRIVER: Run the train across the border at full line speed	HOV RBC orders the train to close the radio connection (P42)	OBU closes the radio connection with HOV RBC. **OBU DMI displays radio connection OFF**	

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Step	Actions	RBC	OBU	Reference or comment
4	(wait for 10-15 s)	Train is registered in ACC RBC	OBU opens a communication session to ACC RBC **OBU DMI displays radio connection ON**	
5	DRIVER: Continue running at least as long as T_NVCONTACT is defined (*)		OBU sends a position cyclically to ACC RBC. OBU continues supervising the MA and there is no visible disturbance (**)	*) Swedish National Value for T_NVCONTACT = 60s. **) Before the communication with ACC RBC is established, service brake might be applied due to expiration of T_NVCONTACT, depending on the time needed for termination and establishment of the comm. Sessions. If so, verify that train operation can be resumed and normalized.

b) Hand-over at slow speed

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Disable the inactive modem		**There might be a failure indication on the DMI (*)**	*) Depends on the individual OBU design
2	DISPATCHER: Set a sequence of train routes in front of the train, across the RBC-RBC border	HOV (Handing Over) RBC sends an MA, stretching beyond the RBC-RBC border	**OBU DMI displays MA correspondingly**	Train Handover between HOV RBC and ACC RBC is initiated, by HOV RBC sending a pre-announcement.
3	DRIVER: Run the train at medium speed		**OBU DMI displays MA correspondingly**	
4	DRIVER: When approaching the border reduce the speed (5-10km/h) and pass the RBC border with max safe front end		OBU sends a position report to HOV RBC	
5	DRIVER: Pass the RBC border with min safe front end	HOV RBC orders the train to close the radio connection (P42) (*) HOV RBC sends M39 (Ack. of termination of a comm. session)	OBU closes the radio connection with HOV RBC. **OBU DMI displays radio connection OFF**	*) When running with a foreign RBC HOV this may occur not occur at this step (see step 7)
6	(wait for 10-15 s)	Train is registered in ACC RBC	OBU opens a communication session with ACC RBC. **OBU DMI displays radio connection ON**	

Step	Actions	RBC	OBU	Reference or comment
7	DRIVER: Run the train entirely across the border	If disconnection order was not sent in step 5, it shall occur at this moment	OBU continues supervising the MA and there is no visible disturbance. Check that OBU does not call the former RBC HOV to report the position (*)	*) A possible outcome of SS-026 chapter 3.15.1.3.1.c, which Trafikverket considers relevant only as long as communication with HOV RBC is still ongoing.

c) Opposite direction, hand-over at full speed

Repeat test (a) in opposite direction. This test is only necessary if the train is run towards a foreign RBC.

d) Opposite direction, hand-over at slow speed

Repeat test (b) in opposite direction. This test is only necessary if the train is run towards a foreign RBC.

3.7.3. TC_BL3_703 – TRANSITION SYSTEM H (ATC) -> E2, IN FS-MODE

Purpose	To test the basic transition scenario from Level NTC to Level 2, train in FS mode. Note: this test case shall be executed at different speeds, e.g. low speed (30 km/h) and full line speed
Trackside independency	No
Degraded conditions	No
Starting condition	Train starts from ATC area, in level NTC. The test site used must be parameterized in the RBC not to require the track ahead free method (compare TC_BL3_707).
Train status before test	Executed Procedure 03

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train in SN mode towards the E2 border	(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 M136 (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. M95: P3 (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. (*) Not applicable for OBU implementing CR#1166

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Step	Actions	RBC	OBU	Reference or comment
4	DRIVER: Acknowledge the level transition (*)			(*) Not applicable for OBU implementing CR#1166
5	(Train performs the level transition to L2 based on LT announcement or LTO BG)		OBU sends M136 (Position Report) with Mode FS and level 2. **OBU DMI displays Level 2 and FS mode.**	
6		M11: RBC sends M24 (General Message) with P3 (National Values) (M95: national values already sent in step 4)	OBU sends ACK related to M24 with P3	
7		RBC sends M3 (MA without time limitation)	OBU sends ACK related to M3	

3.7.4. TC_BL3_704 – TRANSISTION SYSTEM H (ATC) -> E2, IN OS-MODE

Purpose	To test transition from Level NTC to Level 2, with train in OS mode.
Trackside independency	No
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 (compare TC_BL3_707). The track section covering the entrance area (between LTO bg and start-of-route signal) shall be set occupied (Note: the track section may have a longer extension than the entrance area!)
Train status before test	Executed Procedure 03

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train in SN mode towards the E2 border	(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 M136 (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. (*)**	(*) Not applicable for OBU implementing CR#1166

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Step	Actions	RBC	OBU	Reference or comment
3		RBC sends the entry MA with a section timer defined for the end-section, including P80 with OS mode profile for the entrance area. M95: P3 (National Values) is included in the MA This MA is repeated every 10 s.	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 entrance area.
4	DRIVER: Acknowledge the transition to level 2 (*)			(*) Not applicable for OBU implementing CR#1166
5	(Train performs the level transition to L2 based on LT announcement or LTO BG)		OBU sends M136 (Position Report) with Mode OS and level 2 **OBU DMI displays Level 2 and OS mode and a request for OS acknowledgement.**	
6		M11: RBC sends M24 (General Message) with P3 (National Values)	OBU sends ACK related to M24 with P3	
7	DRIVER: Acknowledge the OS mode			
8		RBC sends M3 (MA without time limitation) including P80 with OS profile for the entrance area.	OBU sends ACK related to M3	
9	(Train passes the Start-of-Route Signal board)		**OBU switches to FS mode**	

3.7.5. TC_BL3_705 – TRANSITION SYSTEM H (ATC) -> E2, IN FS-MODE WITH TSR

Purpose	To test transition from Level NTC to Level 2, and there is an active TSR in the MA.
Trackside independency	No
Degraded conditions	No
Starting condition	Train starts from ATC area, in level 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 (compare TC_BL3_707).
Train status before test	Executed Procedure 03

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train in SN mode towards the E2 border	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	
2	DISPATCHER: Activate a TSR on the 1st route in the ERTMS area			
3	(Train reads the LTA BG)		OBU sends M136 (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. (*)**	(*) Not applicable for OBU implementing CR#1166
4		M11: RBC sends M24 (General Message) with P65 (TSR) This message is repeated every 10 sec.	OBU stores the TSR in the buffer	

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Step	Actions	RBC	OBU	Reference or comment
5		M11: RBC sends M3 (MA) This message is repeated every 10 sec.	OBU stores the new MA in the buffer	
6		M95: RBC sends M3 (MA) with P65 (TSR) and P3 (National Values) This message is repeated every 10 sec.	OBU stores the new MA and TSR in the buffer	
7	DRIVER: Acknowledge transition to level 2 (*)			(*) Not applicable for OBU implementing CR#1166
8	(Train performs the level transition to L2 based on: LT announcement or LTO BG)		OBU sends M136 (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.**	
9		M11: RBC sends M24 (General Message) with P3 (National Values)	OBU sends M146 (ACK) related to M24 with P3	
10		M11: RBC sends M24 (General Message) with P65 (TSR)	OBU sends M146 (ACK) related to M24 with P65	
11		M11: RBC sends M3 (MA without time limitation)	OBU sends M146 (ACK) related to M3	
12		M95: RBC sends M3 (MA without time limitation) with P65 (TSR)	OBU sends M146 (ACK) related to M3	

3.7.6. TC_BL3_706 – TRANSITION SYSTEM H (ATC) -> E2, WITH LOSS OF CONNECTION

Purpose	To test transition from Level NTC to Level 2, combined with a loss of connection provoking an MA section timeout within the OBU.
Trackside independency	Yes
Degraded conditions	Yes
Starting condition	Train starts from ATC area. At least one train route must be locked from the border into the E2 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 (compare TC_BL3_707).
Train status before test	Executed Procedure 03

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train in SN mode towards the E2 border	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	
2	(Train reads the LTA BG) DRIVER: Reduce the speed so that the shortened EoA can be respected (see step 5)		OBU sends M136 (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. M95: P3 (National Values) is included in the MA	OBU stores the new MA in the buffer	

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Step	Actions	RBC	OBU	Reference or comment
		This MA is repeated every 10 seconds		
4	TOOL: Shut-down the connection between RBC and OBU			
5	DRIVER: Acknowledge transition to level 2. (*) (Train performs the level transition to L2 based on LT announcement or LTO BG)		OBU sends M136 (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.**	(*) Not applicable for OBU implementing CR#1166
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: Brake the train to standstill before the entry signal.	M11: RBC sends M24 (General Message) with P3 (National Values)	OBU sends ACK related to M24 with P3	Note: If connection is not resumed (step 8) within T_NVCONTACT=60s, the MA will be further shortened to train front.
8	TOOL: Restore the RBC-OBU connection	RBC sends M3 (extended MA) without time limitation	**OBU DMI displays extended MA according to locked route(s).** OBU sends ACK related to M3	

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Step	Actions	RBC	OBU	Reference or comment
9	DRIVER: Start the train and pass the entry signal board.			

3.7.7. TC_BL3_707 – TRANSITION SYSTEM H (ATC) -> E2, USING TRACK AHEAD FREE

Purpose	To test transition from Level NTC to Level 2, where track ahead free is to be confirmed by the train (P9), triggered by P90 programmed in a balise group.
Trackside independency	Yes
Degraded conditions	No
Starting condition	Train starts from ATC area, in level NTC at a border to the ERTMS area. The border must be equipped with a balise group giving Track ahead free information (Packet 90).
Train status before test	Executed Procedure 03

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train towards the system border	Train is registered, in SN mode (visible on the CMI in 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 M136 (Position Report) containing the NID_BG of the LTA BG	
3	(Train reads a BG containing P90 “Track ahead free up to L2/L3 transition”)		OBU sends MA request with P 9 with Q_MARQSTREASON set to ‘TAF up to level2/3 transition location’, indicating the passed BG	Q_MARQSTREASON=16 This BG could be physically the same as LTA.
4		RBC sends FS MA with a section timer defined for the end-section (*) M95: adds P3 (National Values) in same message. This MA is repeated every 10 sec.	OBU stores the new MA (and National Values if received) in the buffer (not visible on OBU DMI)	*) Note: The RBC may wait sending the MA until a later bg (closer to the border) is passed.

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Step	Actions	RBC	OBU	Reference or comment
5	(Train performs the level transition to L2 based on LT announcement or LTO BG)		OBU sends M136 (Position Report) with Mode FS and level 2 **OBU DMI displays Level 2 and FS mode**	Driver ack:s the level transition based on an ack request displayed on the DMI a few sec before (not applicable for OBU implementing CR#1166)
6		M11: RBC sends M24 (General Message) with P3 (National Values)	OBU sends ACK related to M24 with P3	
7		RBC sends M3 (MA without time limitation)	OBU sends ACK related to M3	

3.7.8. TC_BL3_708 – TRANSITION E2 -> SYSTEM M (ATC/TAM), IN FS

Purpose	To test the basic transition scenario from Level 2 to Level NTC, with MA using V_EMA, applicable towards “System M”
Trackside independency	No
Degraded conditions	No
Starting condition	Train with FS MA up to the signal board before the exit route to a system M border
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the exit route to the system M border and clear the exit signal to TAM line (KXV command)	RBC sends M3 (extended MA) with V_EMA defined at the E2/System M border	OBU sends ACK related to M3 **OBU DMI displays the extended MA including the V_EMA speed to be supervised at exit**	
2	DRIVER: Start the train and pass the LTA BG		**OBU DMI displays the text/symbol to the driver informing about level transition**	At this point, the STM starts to read ATC balise information
3	DRIVER: Acknowledge the level transition			
4	(Train performs the level transition to NTC (ATC STM) based on LT announcement or LTO BG)		OBU sends M136 (Position Report) with mode National System 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

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Step	Actions	RBC	OBU	Reference or comment
5			OBU sends M136 (Position Report) with D_LRBG localizing the train completely outside ERTMS area	
6		RBC sends M24 (General Message) including P42 (a Communication Session) with variable: Q_RBC = 0; Q_SLEEPSESSION=0	OBU sends M156 (Termination of a Communication Session)	
7		RBC sends M39 (ACK of Termination of a Communication Session)	**OBU DMI displays the radio connection as OFF.**	

3.7.9. TC_BL3_709 – TRANSITION E2 -> SYSTEM H (ATC), IN FS

Purpose	To test the basic transition scenario from Level 2 to Level NTC, with MA extending into the NTC area, applicable towards "System H"
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS; No route locked in adjacent interlocking (System H)
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	Train with FS MA up to the system H border, but at standstill before the LTA BG.		**OBU DMI displays EoA at the system H border**	
2	DISPATCHER: Set the 1st route in adjacent (*) interlocking (starting at the border) [TOOL: if interlocking not available, simulation methods must be used to force the exit signal to proceed]	RBC sends M3 (extended MA) with EoA beyond the ERTMS border	OBU sends ACK related to M3 **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 may not be accessible in lab environment. The exit signal can usually be manipulated by relay status simulation.
3	DRIVER: Start 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: Acknowledge the level transition			

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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 M136 (Position Report) with mode National System 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 M136 (Position Report) with D_LRBG localizing the train completely outside ERTMS area	
7		RBC sends M24 (General Message) including P42 (Session Management) with variable: Q_RBC = 0 Q_SLEEPSESSION=0	OBU sends M156 (Termination of a Communication Session)	
8		RBC sends M39 (ACK of Termination of a Communication Session)	**OBU DMI displays the radio connection as OFF.**	

3.7.10. TC_BL3_710 – TRANSITION E2 -> SYSTEM H (ATC), from standstill, EXIT SIGNAL "CLEAR"

Purpose	To test a transition scenario from Level 2 to Level NTC where the train starts at the border, implying the LTA information is sent from the RBC instead of a balise group.
Trackside independency	No
Degraded conditions	No
Starting condition	Train running in FS on the last train route towards the border towards system H. No route locked in adjacent interlocking (further beyond the border). Note! The trackside system must be parameterized to produce an MA based on the border signal status.
Train status before test	Executed Procedure 01

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: approach the border and stop the train before the exit signal (but after the LTA bg)			
2	DISPATCHER: release the train route under the train.			This action may also be done while the cab is closed (see step 3).
3	DRIVER: Close the cab and open the same cab again. DRIVER: Perform SoM and press "START".		OBU sends M132 (MA request)	Q_MARQSTREASON=1

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Step	Actions	RBC	OBU	Reference or comment
4	Depending on border type: - Alt.1, adjacent interlocking: DISPATCHER: Set the 1st adjacent (*) route (starting at the border). [TOOL: if interlocking not available, simulation methods must be used to force the exit signal to proceed] - Alt.2, adjacent line: DISPATCHER: Set signal to clear by command LIK (if the line is a TAM line, command KXV must also be given)	Exit signal shows “Clear” RBC sends M3 (extended MA) with EoA beyond the ERTMS border. The MA also includes an LTA (P41)	OBU sends ACK related to M3 and switches to FS mode (**) **OBU DMI displays the extended MA beyond the border, with EoA corresponding to the end of the set route (if alt.1), or with V_EMA>0 (if alt.2).** The STM transitions from CS to HS (Hot Standby) **OBU DMI displays the text/symbol informing about level transition**	*) For alt.1 the route locking requires access to the adjacent interlocking, which might otherwise be achieved by simulated methods. ATC balise telegrams will be read in HS, not in CS. **) If interlocking conditions are missing OS mode will be applied (this does not affect the purpose of the test case)
5	DRIVER: Acknowledge the level transition			
6	DRIVER: Move the train.			
7	(Train performs the level transition to NTC (ATC STM) based on LT announcement or LTO BG)		OBU sends M136 (Position Report) with mode National System 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 in the level transition area since the location where the train was started

3.7.11. TC_BL3_711 – TRANSITION E2 -> SYSTEM H (ATC), IN OS

Purpose	To test a transition scenario from Level 2 to Level NTC, with train in OS mode
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS standing at the end of an FS train route before the last signal board towards the border. The last train route towards the border has a track circuit occupancy ; No route locked in adjacent interlocking (System H)
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train route to the border (containing an occupancy) and confirm running in OS.		**OBU DMI displays a request for acknowledge of OS mode**	
2	DRIVER: Acknowledge the OS		OBU sends M136 (Position Report) with OS mode **OBU DMI displays OS MA** (EoA is extended to the system H border (*))	*) the extension may be observed on the planning area on “toggle request”
3	DRIVER: Start 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: Acknowledge the level transition		While approaching the border: **OBU DMI displays permitted speed reducing towards 0 km/h**	To have the permitted speed indicated in OS mode, a “toggle action for permitted speed” is needed on the DMI

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Step	Actions	RBC	OBU	Reference or comment
5	DISPATCHER: Set the 1st route in adjacent interlocking (starting at the border) [TOOL: if interlocking not available, simulation methods must be used to force the exit signal to proceed]	RBC sends M3 (extended MA) with EoA beyond the ERTMS border	OBU sends ACK related to M3 **OBU DMI displays permitted speed 40 km/h.**	
6	(Train performs the level transition to NTC (ATC STM) based on LT announcement or LTO BG)		OBU sends M136 (Position Report) with mode National System 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 M136 (Position Report) with D_LRBG localizing the train completely outside ERTMS area	
8		RBC sends M24 (General Message) including P42 (Sess. Mgmt) with variable: Q_RBC = 0; Q_SLEEPSESSION=0	OBU sends M156 (Termination of a Communication Session)	
9		RBC sends M39	**OBU DMI displays the radio connection as OFF.**	
10	If the OS train route ending at the border is still locked (*): DISPATCHER: Release the train route	The train route is released.		*) The entire route, or parts of it (typically the end-of-route) may still be locked since the releasing depends on the trains' position reporting, which ceases after level transition.

3.7.12. TC_BL3_712 – TRANSITION E2 -> SYSTEM H (ATC), IN SR

Purpose	To test a transition scenario from Level 2 to Level NTC, with train in SR mode
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS with MA up to the exit border; The border signal should not be indicating proceed (which it may do, depending on the track yard simulator function)
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	Train with FS MA up to the system H border, running towards the first LTA_stm bg.		**OBU DMI displays EoA at the system H border**	
2	DRIVER: Pass the LTA_stm.		**OBU DMI displays the text/symbol informing about level transition**	At this point, the STM starts to read balise information
3	DRIVER: Acknowledge the level transition			The level transition prompt may appear later, depending on the train position relative to the L_ACKLEVELTR distance set in packet 41.
4	DRIVER: Stop the train ahead of the exit signal, which is at stop (ensure the bg related to the exit signal is not passed! DRIVER: Request “OVERRIDE”		OBU sends M136 (Position Report) with mode SR **OBU DMI displays the “override active symbol”**	

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Step	Actions	RBC	OBU	Reference or comment
5	DRIVER: Start the train, and run very slowly until the "override active symbol" is erased from the DMI, then stop immediately.		When the bg is passed**: OBU DMI replaces the "override active symbol" and indicates SR mode.**	Note: An additional override may be necessary to eliminate the 2nd "obstacle" (step 4 handles the "Stop if in SR" and step 6 the EOA).
6	DRIVER: Request "OVERRIDE" (*) DRIVER: Start the train and run towards the ATC area at medium speed (40 km/h).		**OBU DMI displays the "override active symbol"** When passing the LTO bg: OBU performs transition to level NTC and sends M136 (Position Report) with mode National System **Events on the OBU DMI:** **- ATC related info is displayed according to "supervision after passing a stop signal with override"** **- a new level transition prompt is displayed**	*) Only needed if the override active symbol was gone in step 5. Take note whether this 2nd override was needed.
7	DRIVER: Acknowledge the level transition and continue driving into the ATC area		OBU sends M136 (Position Report) with D_LRBG localizing the train completely outside ERTMS area	
8		RBC sends M24 (General Message) including P42 (Session Management).	OBU sends M156 (Termination of a Communication Session)	
9		RBC sends M39 (ACK of Termination of a Communication Session)	**OBU DMI displays the radio connection as OFF.**	

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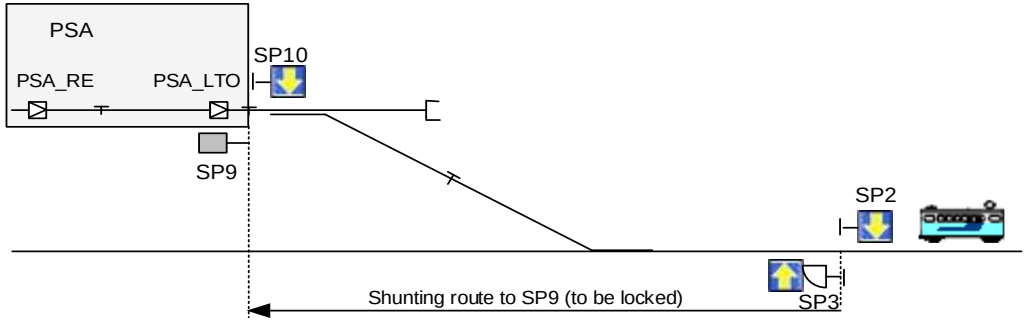
3.7.13. TC_BL3_713 – TRANSITION L2 -> L0, ENDING WITH CLOSING OF CAB

Purpose	To test a transition scenario from Level 2 to Level 0, applicable for a train moving out to a permanent shunting area (PSA) parameterized as a L0 area. Operation ends with closing of cab.
Trackside independency	No
Degraded conditions	No
Starting condition	The track layout could typically be as follows:  Note that the PSA_LTO bg must give P41 for the exit direction to give LTO for Level 0 as 1st priority.
Train status before test	Executed Procedure 01 and TC_BL3_102. Train in FS mode standing in front of a shunting signal, with EoA at the shunting signal.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the shunting route which leads into the PSA	Shunting route is locked		

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Step	Actions	RBC	OBU	Reference or comment
2	DRIVER: Select Shunting Request.		OBU sends M130 (SH request)	The test track could also be engineered to order automatic transition from FS to SH by use of mode profile. In this case the manual shunting request is not necessary.
3		RBC sends M28 (SH authorised)	**OBU switches to SH mode** OBU interacts with RBC according to the normal procedure (*)	For details, see test cases related with shunting
4	DRIVER: Start the train and move into the PSA and stop after the last bg (=PSA_LTO) inside the PSA		(Train reads PSA_LTO bg, but there is no visible event at this point)	
5	DRIVER: Close the cab	RBC sends an order to close the connection (P42)	OBU may establish contact with RBC and send M136 (Position Report) to report change to mode standby and level 0 (*) OBU closes the connection	*) redundant event for Trafikverket
6	DRIVER: Open the cab		**OBU DMI displays Level 0**	
7	DRIVER: Enter train data according to normal procedure and press “START”		**OBU DMI displays mode Unfitted**	

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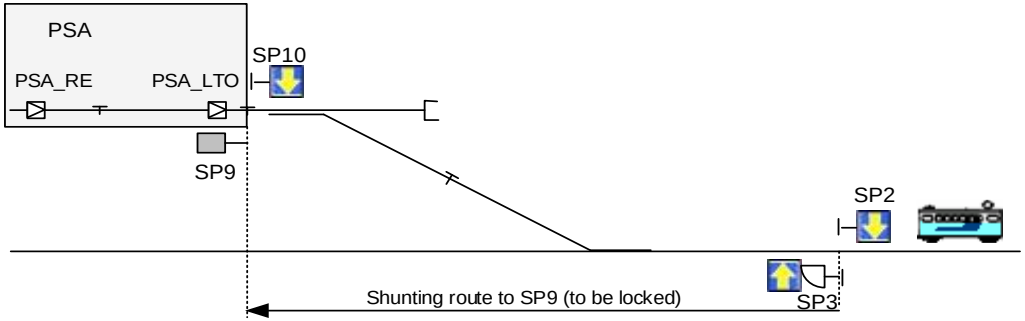
3.7.14. TC_BL3_714 – TRANSITION L2 -> L0, ENDING WITH "EXIT SHUNTING"

Purpose	To test a transition scenario from Level 2 to Level 0, applicable for a train moving out to a PSA parameterized as a L0 area. Operation ends with driver's action "Exit shunting".
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	The track layout could typically be as follows:  Note that the PSA_LTO bg must give P41 for the exit direction to give LTO for Level 0 as 1st priority.
Train status before test	Executed Procedure 01 and TC_BL3_102. Train in FS mode standing in front of a shunting signal, with EoA at the shunting signal.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the shunting route which leads into the PSA	Shunting route is locked		
2	DRIVER: Select Shunting Request.		OBU sends M130 (SH request)	

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Step	Actions	RBC	OBU	Reference or comment
3		RBC sends M28 (SH authorised)	**OBU switches to SH mode** OBU interacts with RBC according to the normal procedure (*)	For details, see test cases related with shunting
4	DRIVER: Start the train and move into the PSA and stop after the last bg (=PSA_LTO) inside the PSA		(Train reads PSA_LTO bg, but there is no visible event at this point)	
5	DRIVER: Select “Exit shunting” and enter Driver’s ID when prompted for it. DRIVER: Confirm change to Level 0	RBC sends an order to close the connection (P42)	**OBU DMI prompts the driver to acknowledge transition to level 0.** OBU may establish contact with RBC and send M136 (Position Report) to report change to mode standby and level 0 (*) **OBU DMI displays Level 0 and mode Standby** OBU closes the connection	*) redundant event for Trafikverket
6	DRIVER: Enter train data according to normal procedure and press “START” DRIVER: Confirm mode change to unfitted		**OBU DMI prompts the driver to acknowledge Unfitted mode** **OBU DMI displays mode Unfitted**	

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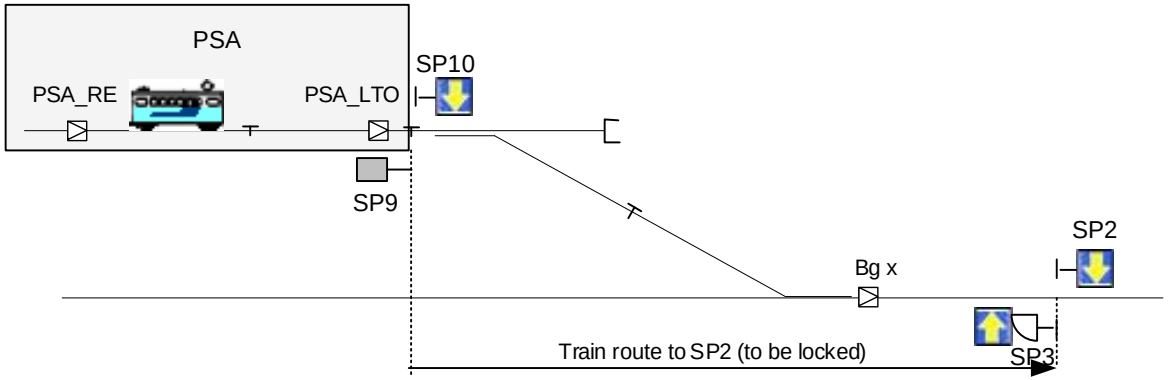
3.7.15. TC_BL3_715 – TRANSITION L0 -> L1 -> L2, SLOW RADIO CONNECTION

Purpose	To test a transition scenario from Level 0 to Level 2 potentially via Level 1, applicable for a train coming from a PSA area. The intermediate Level 1 step is necessary to achieve a fast transition due to short access track. This variant exposes the case of "slow radio connection" implying the Level 1 transition is executed.
Trackside independency	No
Degraded conditions	No
Starting condition	The track layout could typically be as follows:  Note that the PSA_LTO bg must be properly programmed: - P46 *Level Transition Order* for the entry direction, with Level 1 as 1st priority and Level 2 as 2nd priority. - P42 *Session Management* order to contact the RBC (P42) - When route set: An MA for the train route (P5, P12, P21 and P27). The MA packet (P12) shall have an *end section timeout* corresponding to the estimated running time between SP10 and SP2 - When no route set: an MA packet (P12) with direct stop order (V_MAIN=0) - Bg x, if any, shall not force change of level to L2 (via P46), but it could contain L2 as 1st priority and L1 as 2nd priority.

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Train status before test	Executed Procedure 01 and TC_BL3_714. Train in Unfitted mode standing in PSA with train front between PSA_RE and PSA_LTO towards main track (SP10 in figure).

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train route leading from PSA to main track, and extend it with additionally 1-2 train routes	Train route is locked PSA_LTO starts producing the L1 MA telegram (*) corresponding to the train route		*) Depending on lab simulation facility this may need a manually prepared bg telegram, whereas in reality this is achieved through a relay order from the interlocking which is captured by a LEU connected to the PSA_LTO bg
2	DRIVER: Move the train forward at low speed (~30 km/h), approaching the signal signal board (SP10) Note that the train must start beyond the RE (*) !			*) By omitting the RE bg it is ensured that connection with RBC is not established before the border (SP10) is passed.
3	(train passes PSA_LTO)		**OBU switches to Level 1** **OBU DMI displays L1 and FS mode with EoA at the end of the train route (SP2).**	
4	(wait 5-15 s)	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	

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Step	Actions	RBC	OBU	Reference or comment
5	(train moves on)	RBC sends (*) an MA (M3) for the set train routes, including a level transition order (P41) for transition to level 2	**OBU switches to Level 2** **OBU DMI displays L2 and FS mode with EoA at the end of the last set train route.** Verify that there is no brake intervention!	*) The train may have ambiguous position (if it has passed a facing point after the LRBG), in which case it needs to confirm its position by passing a new bg before the RBC can send the MA.

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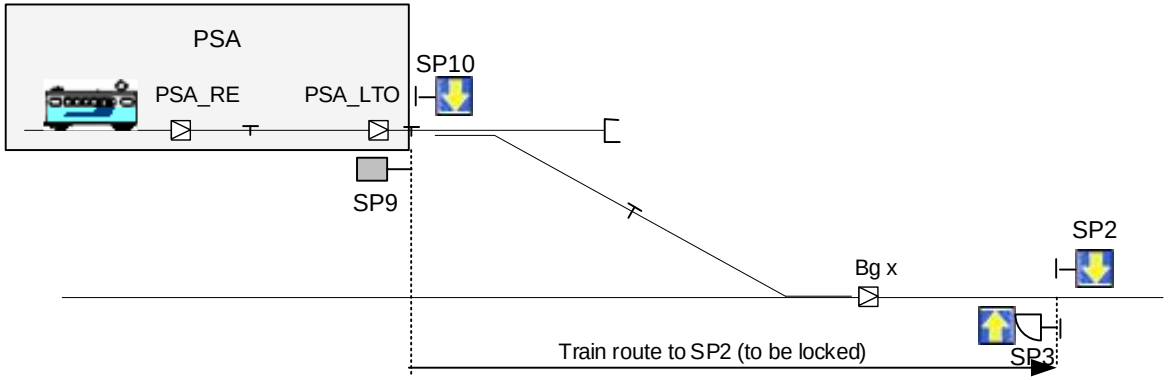
3.7.16. TC_BL3_716 – TRANSITION L0 -> L1 -> L2, FAST RADIO CONNECTION

Purpose	To test a transition scenario from Level 0 to Level 2 potentially via Level 1, applicable for a train coming from a PSA area. This variant exposes the case of "fast radio connection" implying the Level 1 transition is not executed.
Trackside independency	No
Degraded conditions	No
Starting condition	The track layout could typically be as follows:  Note that the PSA_LTO bg must be properly programmed: - P46 *Level Transition Order* for the entry direction, with Level 1 as 1st priority and Level 2 as 2nd priority. - P42 *Session Management* order to contact the RBC (P42) - When route set: An MA for the train route (P5, P12, P21 and P27). The MA packet (P12) shall have an *end section timeout* corresponding to the estimated running time between SP10 and SP2 - When no route set: an MA packet (P12) with direct stop order (V_MAIN=0) - Bg x, if any, shall not force change of level to L2 (via P46), but it could contain L2 as 1st priority and L1 as 2nd priority.
Train status before test	Executed Procedure 01 and TC_BL3_714. Train in Unfitted mode standing in PSA with train front before PSA_RE, towards main track (SP10 in figure).

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Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train route leading from PSA to main track, and extend it with additionally 1-2 train routes	Train route is locked PSA_LTO starts producing the L1 MA telegram corresponding to the train route		
2	DRIVER: Move the train forward at low speed (~30 km/h), passing the PSA_RE bg			
3	DRIVER: Continue moving towards PSA_LTO, but slow down and do not yet pass the bg (*)	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	*) The train may have to stop to await the radio establishment
4	(train enters berth related to SP10, if not already inside)	RBC sends an MA (M3) for the set train routes, including a level transition order (P41) for transition to level 2.	**OBU switches to Level 2** **OBU DMI displays L2 and OS mode (*) with EoA at the end of the last set train route.**	*) OS profile is applied to the PSA border, with possibility to TAF confirmation.
5	(train passes PSA_LTO)		**OBU stays in Level 2** No visible event occurs	

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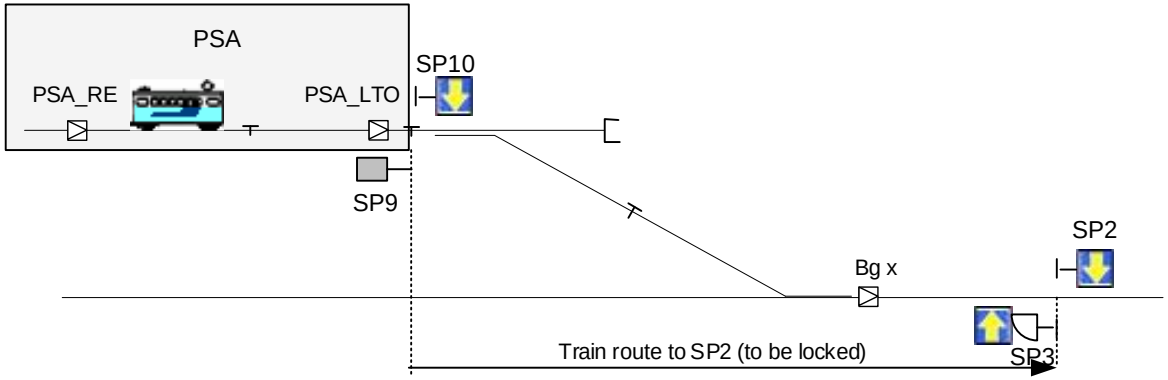
3.7.17. TC_BL3_717 – TRANSITION L0 -> L1 -> L2, FAILED RADIO CONNECTION

Purpose	To test a transition scenario from Level 0 to Level 2 potentially via Level 1, applicable for a train coming from a PSA area. This variant exposes the case of failed radio connection, causing MA end section timeout in OBU.
Trackside independency	No
Degraded conditions	Yes
Starting condition	The track layout could typically be as follows:  Note that the PSA_LTO bg must be properly programmed: - P46 *Level Transition Order* for the entry direction, with Level 1 as 1st priority and Level 2 as 2nd priority. - P42 *Session Management* order to contact the RBC (P42) - When route set: An MA for the train route (P5, P12, P21 and P27). The MA packet (P12) shall have an *end section timeout* corresponding to the estimated running time between SP10 and SP2 - When no route set: an MA packet (P12) with direct stop order (V_MAIN=0) - Bg x, if any, shall not force change of level to L2 (via P46), but it could contain L2 as 1st priority and L1 as 2nd priority.
Train status before test	Executed Procedure 01 and TC_BL3_714. Train in Unfitted mode standing in PSA with train front between PSA_RE and PSA_LTO, towards main track (SP10 in figure).

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Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train route leading from PSA to main track, and extend it with additionally 1-2 train routes	Train route is locked PSA_LTO starts producing the L1 MA telegram corresponding to the train route		
2	TOOL: Disable the ability for the OBU to establish radio connection with RBC (*)			*) E.g. remove antenna cable, switch off modem, shutdown the ISDN server
3	DRIVER: Move the train forward at low speed (~30 km/h), approaching the signal signal board (SP10)			
4	When train passes PSA_LTO: TOOL: Start a timer!		**OBU switches to Level 1** **OBU DMI displays L1 and FS mode with EoA at the end of the train route (SP2).**	
5	DRIVER: Continue moving the train, passing next balise group (Bg x in figure).		(OBU does not switch to Level 2)	
6	DRIVER: Brake the train to standstill approx. 100m before EoA (ensure the train has an unambig-uous position when stopping!)		After the end section timeout contained in P12 has elapsed: **OBU DMI displays the MA as shortened to train front.**	
7	TOOL: Enable the item which is inhibiting radio connection (wait 5-15 s)	(train registration is visible in the CMI train list)	**OBU DMI displays radio connection established**	

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Step	Actions	RBC	OBU	Reference or comment
8		RBC sends an MA (M3) for the set train routes, including a level transition order (P41) for transition to level 2.	**OBU switches to Level 2** **OBU DMI displays L2 and FS mode, and MA is extended to the end of the last set train route.**	

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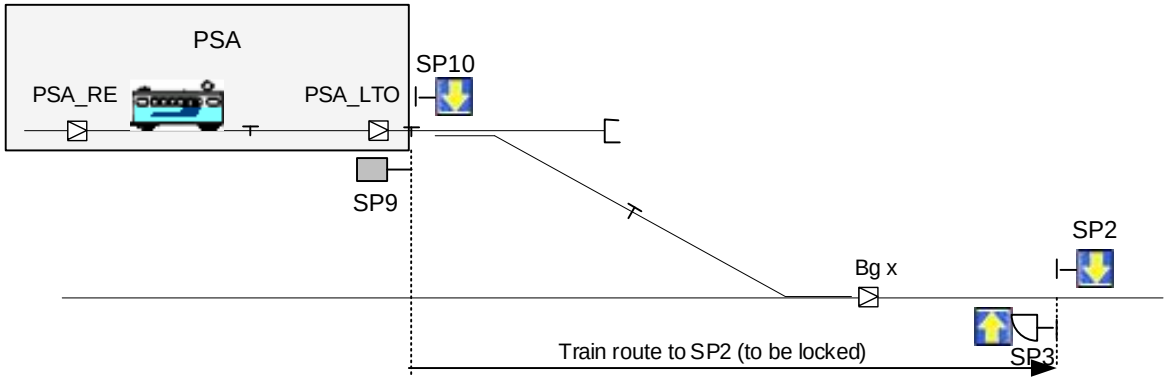
3.7.18. TC_BL3_718 – TRANSITION L0 -> L1 -> L2, PASSING OF A STOP SIGNAL

Purpose	To test a transition scenario from Level 0 to Level 2 potentially via Level 1, applicable for a train coming from a PSA area. This variant exposes the case of a train exiting the PSA without train route being locked, thus causing a brake intervention caused by a "signal in stop (V_MAIN=0).
Trackside independency	No
Degraded conditions	No
Starting condition	The track layout could typically be as follows:  Note that the PSA_LTO bg must be properly programmed: - P46 *Level Transition Order* for the entry direction, with Level 1 as 1st priority and Level 2 as 2nd priority. - P42 *Session Management* order to contact the RBC (P42) - When route set: An MA for the train route (P5, P12, P21 and P27). The MA packet (P12) shall have an *end section timeout* corresponding to the estimated running time between SP10 and SP2 - When no route set: an MA packet (P12) with direct stop order (V_MAIN=0) - Bg x, if any, shall not force change of level to L2 (via P46), but it could contain L2 as 1st priority and L1 as 2nd priority.

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Train status before test	Executed Procedure 01 and TC_BL3_714. Train in Unfitted mode standing in PSA with train front between PSA_RE and PSA_LTO, towards main track (SP10 in figure).

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route from next signal board on main track (SP2 in figure), but not from PSA to main track.	Train route form SP2 is locked (PSA_LTO produces the stop order (V_MAIN=0))		
2	DRIVER: Move the train forward at low speed (~30 km/h), approaching the signal board (SP10)			
3	(train passes PSA_LTO)		**OBU switches to Level 1** **OBU switches to TRIP mode and applies the emergency brake**	
4	When train at standstill: DRIVER: Acknowledge the trip		**OBU switches to POST TRIP mode and releases the emergency brake**.	

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Step	Actions	RBC	OBU	Reference or comment
5	(wait a few seconds)	(train registration is visible in the CMI train list) A level transition order (P41) is sent	**OBU DMI displays radio connection established** **OBU switches to Level 2**	Depending on timing this may occur earlier Note: The train must have an unambiguous position from RBC perspective otherwise the order will not be executed. If train has stopped beyond a point without reading a pos. bg: proceed to step 6+7 and move the train across the next bg then stop and verify step 5.
6	DRIVER: select OVERRIDE	SR mode is indicated in the status information for this train.	**OBU switches to SR mode**	
7	DRIVER: Start the train and approach next signal board (SP2)	When train enters berth of SP2: RBC sends an MA (M3) for the train route(s), starting at SP2.	**OBU DMI displays L2 and FS mode, and MA is given to the end of the last set train route.**	Note: “Start” may need to be pressed

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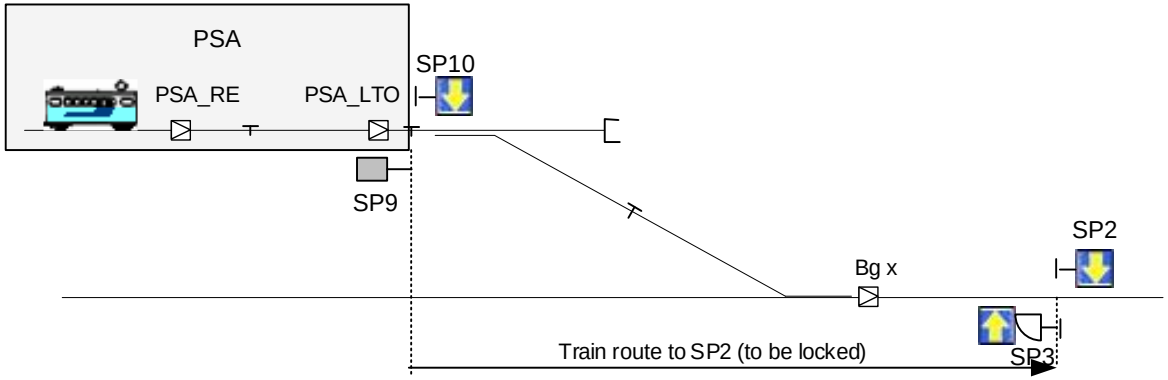
3.7.19. TC_BL3_719 – TRANSITION L0 -> L1 -> L2, ENTRY IN SHUNTING

Purpose	To test a transition scenario from Level 0 to Level 2 potentially via Level 1, applicable for a train coming from a PSA area. This variant exposes the case of a train exiting the PSA in shunting (by mistake).
Trackside independency	No
Degraded conditions	No
Starting condition	The track layout could typically be as follows:  Note that the PSA_LTO bg must be properly programmed: - P46 *Level Transition Order* for the entry direction, with Level 1 as 1st priority and Level 2 as 2nd priority. - P42 *Session Management* order to contact the RBC (P42) - When route set: An MA for the train route (P5, P12, P21 and P27). The MA packet (P12) shall have an *end section timeout* corresponding to the estimated running time between SP10 and SP2 - When no route set: an MA packet (P12) with direct stop order (V_MAIN=0) - Bg x, if any, shall not force change of level to L2 (via P46), but it could contain L2 as 1st priority and L1 as 2nd priority.
Train status before test	Executed Procedure 01 and TC_BL3_714. Train in Unfitted mode standing in PSA with train front before PSA_RE, towards main track (SP10 in figure).

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Step	Actions	RBC/track	OBU	Reference or comment
1	DISPATCHER: Set the train route leading from PSA to main track, and extend it with additionally 1-2 train routes	Train route is locked PSA_LTO starts producing the L1 MA telegram corresponding to the train route		
2	DRIVER: Select "Shunting request"		**OBU DMI displays Lo and SH mode**	
3	DRIVER: Move the train forward at low speed (~30 km/h), approaching the signal board (SP10)			
4	(the train passes PSA_RE and then PSA_LTO)	Bg PSA_RE produces P42 ("Order to contact RBC") Bg PSA_LTO prouces P46 ("Conditional level transition order")	(no visible event)	
5	DRIVER: After a 100-200m, stop the train (ensure the train stops at a location where its position is not ambiguous) DRIVER: Press "Exit shunting"		**OBU DMI displays L1 (*) and SB mode**	*) OBU should have memorized the level transition order from bg PSA_LTO. Some OBU applications *may* require a manual action, see next step.

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Step	Actions	RBC/track	OBU	Reference or comment
6	(wait for registration and level transition to occur (*)) If no level transition was performed automatically in step 5: DRIVER: select Level 2. DRIVER: Enter train data according to normal procedure	Train is registered in RBC (*) RBC sends a transition order to L2.	**OBU switches to Level 2** **OBU DMI displays L2 and SB mode.**	*) OBU should have memorized the right telephone number from bg PSA_RE. Note: This may take place through two separate sessions, first as a position report about the level change, and then as an ordinary SoM Note: Driver's ID may have to be entered before SoM!
7	DRIVER: Press "START"	RBC sends an MA (M3) for the train route sequence, starting at SP10, and with an OS profile for the train route under the train.	**OBU DMI displays OS mode.**	
8	DRIVER: Continue forward, passing the next signal board		**OBU DMI displays FS mode**	

3.7.20. TC_BL3_720 – MANUAL LEVEL CHANGE TO LEVEL NTC (ATC STM)

Purpose	To test that OBU correctly manages the conditional level transition order programmed in all balise groups in level 2 areas.
Trackside independency	No
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: Power-on the OBU and open a cab desk			
2	DRIVER: Enter driver ID			
3	DRIVER: Select Level Change DRIVER: Select Level ATC-2 DRIVER: Acknowledge Level ATC-2		**OBU DMI displays level ATC STM** **OBU DMI displays radio connection OFF**	
4	DRIVER: Enter train data (see procedure 3)			

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Step	Actions	RBC	OBU	Reference or comment
5	DRIVER: Start and let the train pass an ordinary position balise group.		P42 and P46 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. OBU sends M155 (Initiation of communication session)	
6	(communication is being established)	RBC sends M32 “RBC System Version”	OBU sends M146 (related to M32) OBU sends M159 (Communication session established) **OBU DMI displays radio connection ON.**	
7		RBC sends M8 (ack of train data)	OBU sends M129 (Validated train data) including P11 (train data).	
8	DRIVER: Acknowledge transition to level 2 (*) DRIVER: Acknowledge the trip	The train is registered in the RBC	**OBU DMI displays level 2 and Post Trip mode**.	*) Driver’s ack is not applicable for OBU implementing CR#1166
9		RBC sends M24 “General message” with P57 “Movement authority request parameters”, P58 “Position report parameters” with acknowledgment request	OBU sends M146 (related to M24)	

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Step	Actions	RBC	OBU	Reference or comment
10	DRIVER: Press “START”	RBC sends SR Authorization with 60m	**OBU DMI displays SR mode**	

3.7.21. TC_BL3_721 – LEVEL TRANSITION, IN SLEEPING MODE

Purpose	To test that a traction unit in sleeping mode executes a level transition correctly
Trackside independency	No
Degraded conditions	No
Starting condition	Note: OBU must be configured with a sleeping status input. In a **field test context** a multi-coupled train is needed, whereas in a **lab test context** it is enough to have access to manipulating the Sleeping input signal. The test case is primarily written from a field test context perspective. Train starts from ATC area, in level NTC (either in a System M or System H area)
Train status before test	Executed Procedure 03;

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Activate the front cab of the multi-coupled train and do Start-of-Mission. *In a lab test context:* *TOOL: Activate the sleeping status input (*)*			(*) See test case TC_BL3_210 for more information.
2	DRIVER: Run the train towards and across the E2 border (*)	The RBC interacts with the train (front OBU) according to normal procedure for level transition.	The train (front OBU) interacts with the RBC according to normal procedure for level transition.	(*) With a real train configuration the front OBU approaches the border in SN mode and the rear OBU in SL mode. The RBC and OBU interactions are only relevant in a real train configuration!

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Step	Actions	RBC	OBU	Reference or comment
			The rear OBU remains in SL mode! (may need to be evaluated through log analysis)	
3	DRIVER: Stop the train and close the cab. In a lab test context: *TOOL: Inactivate the sleeping status input (**)*	RBC sends an order to close the connection (P42). Check that the connection is closed in the RBC (Train is not registered)	The rear OBU establishes a connection with the RBC and sends a position report (P0) with mode SB. (*) OBU closes the connection	*) redundant event for Trafikverket **) See test case TC_BL3_210 for more information.
4	DRIVER: Open the other cab (which was under supervision of the rear OBU in SL mode)	Train is registered. Train is displayed in the expected position on the CMI (check Train data window!)	OBU establishes a connection with the RBC and initiates the ordinary Start-of-Mission procedure. **Level 2 and SB mode is displayed on the DMI.** The OBU reports LRBG corresponding to the last passed balise group.	

3.7.22. TC_BL3_722 – TRANSITION SYSTEM H (ATC) -> E2, IN NL-MODE

Purpose	To test the basic transition scenario from Level NTC to Level 2, train in NL mode.
Trackside independency	No
Degraded conditions	No
Starting condition	Train starts from ATC area, in level NTC.
Train status before test	SB mode, in level NTC with entered Driver ID. Note: Train data should not be entered. Train configuration that allows the use of Non-Leading mode

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Activate non-leading input signal on driver desk		**OBU DMI displays "Non-Leading" button as enabled**	
2	DRIVER: Press "Non-Leading" button (press button for 3s)		**OBU switches to NL mode**	
3	DISPATCHER: Set a train route in front of the train across the border			
4	DRIVER: Run the train at medium speed, e.g. 100km/h, in NL mode towards the E2 border and pass the "RE" BG	(train registration is visible in the CMI train location list)	**OBU DMI displays radio connection established**	OBU performs the initiation of communication according to normal procedure

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Step	Actions	RBC	OBU	Reference or comment
5	(Train reads the LTA BG)		OBU sends M136 (Position Report) containing the NID_BG of the LTA BG **OBU DMI displays announcement of level transition.**	
6	(Train performs the level transition to L2 based on LT announcement or LTO BG)	(no train number is visible on the CMI)	OBU sends M136 (Position Report) with Mode NL and level 2. **OBU DMI displays Level 2 and NL mode.**	Note: When running in NL mode the train number is not accessible as normally on the CMI. Check the “train location list” and request train data display by command “TDA 0x0nnn”, where ‘nnn’ is the automatically assigned train number
7	DRIVER: Stop the train			
8	DRIVER: Disable the non-leading input signal on driver desk	Train is deregistered (visible on the DMI through the train data window; otherwise check logs for verification)	**OBU switches to SB mode** OBU performs End-of-mission according to normal procedure	
9	Driver: Close the desk			

3.7.23. TC_BL3_723 – TRANSITION E2 -> SYSTEM H (ATC), IN NL-MODE

Purpose	To test the basic transition scenario from Level 2 to Level NTC, in NL mode
Trackside independency	No
Degraded conditions	No
Starting condition	Train in SB.
Train status before test	SB mode, in level 2 with entered Driver ID and radio connection established. Note: Train data should be entered. Train configuration that allows the use of Non-Leading mode

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Activate non-leading input signal on driver desk		**OBU DMI displays "Non-Leading" button as enabled**	
2	DRIVER: Press "Non-Leading" button (press button for 3s)	(train registration is visible in the CMI train location list)	**OBU switches to NL mode**	
3	DISPATCHER: Set a train route in front of the train over the border			
4	DRIVER: Run the train at medium speed, e.g. 100km/h, in NL mode towards the system H border and pass LTA BG		**OBU DMI displays the symbol informing about level transition**	See test case TC_BL3_722 for how to display train data on CMI.

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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 M136 (Position Report) with Mode NL and level NTC. **OBU DMI displays Level NTC and NL mode.**	
6		(train is deregistered)	OBU sends M136 (Position Report) with D_LRBG localizing the train completely outside ERTMS area	
7		RBC sends M24 (General Message) including P42 (Session Management) with variable: Q_RBC = 0 Q_SLEEPSESSION=0	OBU sends M156 (Termination of a Communication Session)	
8		RBC sends M39 (ACK of Termination of a Communication Session)	**OBU DMI displays the radio connection as OFF.**	
9	DRIVER: Stop the train			
10	DRIVER: Disable the non-leading input signal on driver desk		**OBU switches to SB mode**	
11	Driver: Close the desk			

3.8. MANAGEMENT OF LEVEL CROSSINGS (LX)

3.8.1. TC_BL3_801 – LX – NOMINAL CASE

Purpose	To test the normal scenario of passing a level crossing, using P88.
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS with MA extending at least 2000 m to the end of a train route
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train route over the LX	Alt 1 (M11): RBC sends M24 (General Message) with P88. RBC sends M3 (MA) with: - EoA at the end of the train route - P57 “MA request parameters” is sent to control T_MAR=39s Alt 2 (M95): RBC sends M3 (MA) with: - EoA at the LX start location - P57 “MA request parameters” is sent to control T_MAR=39s	OBU sends ACK related to the messages **OBU DMI displays EoA at LX**	Variables in P88: NID_LX=x L_LX=LX area length D_LX=distance to LX area Q_LXSTATUS=1 V_LX=4 (=20 km/h) Q_STOPLX=0

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Step	Actions	RBC	OBU	Reference or comment
2	DRIVER: Run the train according to permitted speed and approach the LX		OBU sends M132 (MA request)	Q_MARQSTREASON=2, based on T_MAR=39 s
3		Alt 2 (M95): RBC sends M3 (MA) with EoA beyond the LX and with P88 (LX information) attached.	OBU sends ACK related to the message MA	
4		LX is activated	**Once the indication curve towards the LX is reached, LX status "not protected" is displayed on the DMI (*)** Note for OBU compliant with SS-026 v3.6: The LX, being the supervised EOA, will only show up when and if the OBU reaches the related indication curve. Normally the LX will become protected before this happens, implying the "not protected" status will not be displayed at all (**)	Variables in P88: See step 1 *) if the LX is located close to the start of the train route the indication may have popped up already in step 1 for alt 1. **) In this case: check the logs and verify that P88 with "not protected" and later "protected" has been sent by RBC and acknowledged by OBU
5	(LX closes)	RBC sends M24 (General message) with P88 (LX info) indicating LX protected. Variables of interest: NID_LX=x Q_LXSTATUS=0	OBU sends ACK related to M24 **The LX status indication is removed from the DMI**	

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Step	Actions	RBC	OBU	Reference or comment
6	(Train passes the level crossing)		No brake intervention obtained. OBU did never “enter” target indication curve.	
7	(Train leaves the track section where the LX is located)	RBC orders LX barriers to open		

3.8.2. TC_BL3_802 – LX – STATUS LOST AFTER "PROTECTED"

Purpose	To test approaching of a level crossing that becomes out of control when barriers are already down; the event causing a CES/P88 event.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS with MA extending at least 2000 m to the end of a train route
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train route over the LX	See nominal case step 1.	See nominal case step 1	See nominal case step 1
2	DRIVER: Run the train according to permitted speed and approach the LX	See nominal case step 2	See nominal case step 2	See nominal case step 2
3		See nominal case step 3	See nominal case step 3	
4		See nominal case step 4	See nominal case step 4	
5	(LX closes)	See nominal case step 5	See nominal case step 5	

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Step	Actions	RBC	OBU	Reference or comment
6	When train is at least 500m before the LX: TOOL: Simulate LX to status [out of control]	Alt 1: RBC sends M24 (General Message) with P88 (LX info), variable of interest: Q_LXSTATUS=1	OBU sends ACK related to M24 **OBU DMI displays LX status "not protected", with permitted speed =20 km/h.** Note: the dynamic behavior (depending on speed/distance) will be that the LX is initially indicated as target, and when approaching the target, while gradually decreasing the speed down to 20 km/h, the MA will be indicated as extended beyond the LX.	Depending on position and speed, OBU might apply brakes and/or enter Trip mode
7	*(see step 6)*	*Alt 2 (*): The RBC sends msg 15 (CES) to the OBU, where the stop location is the beginning of the LX*	*OBU sends M147 (ACK to CES) with Q_EMERGENCYSTOP=0 (CES accepted).* ***OBU DMI displays the new EoA at the LX start location***	**) This alternative may be used in certain cases by M95*
8	*If alt 2 is applied:* *DRIVER: Reduce the speed until an MA extension is visible on the DMI*	*Alt 2: RBC sends CES revocation and M3 (MA) with P88 (LX info), variable of interest: Q_LXSTATUS=1*	*OBU sends M146 (ACK) related to the received messages* ***OBU DMI displays an extended MA.*** ***OBU DMI displays LX status "not protected", with permitted speed =20 km/h***	
9	DRIVER: Pass the level crossing at permitted speed 20 km/h		When the train front end passes the area covered by L_LX, then the **speed limitation of 20 km/h is removed**	

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Step	Actions	RBC	OBU	Reference or comment
10	(Train leaves the track section where the LX is located)	RBC orders LX barriers to open		

3.8.3. TC_BL3_803 – LX OUT OF CONTROL – MA EXTENSION AT PASSAGE

Purpose	To test approaching of a level crossing which does never become protected. Moreover to have the MA extended and verify that the LX status “not protected” is not “forgotten” by the train.
Trackside independency	Yes
Degraded conditions	Yes
Starting condition	Train in FS with MA extending at least 2000 m to the end of a train route
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Simulate LX to status [not good condition]			
2	DISPATCHER: Set the train route over the LX	See nominal case step 1.	See nominal case step 1	See nominal case step 1
3	DRIVER: Run the train according to permitted speed and approach the LX	See nominal case step 2 (but activation will fail)	See nominal case step 2	See nominal case step 2
4		See nominal case step 3-5	See nominal case step 3-5	See nominal case step 3-5
5	Just after the train front has passed the LX start location: DISPATCHER: Extend the current route	RBC sends M3 (extended MA)	OBU sends ACK related to the MA **OBU continues supervising the LX (permitted speed =20 km/h) until the train front has passed the entire LX area length.**	
6	(Train leaves LX track section)		Normal line speed is resumed (when train front is beyond LX area)	

3.8.4. TC_BL3_804 – LX - MANAGEMENT OF CONSECUTIVE LEVEL CROSSINGS

Purpose	To test multiple level crossings communicated to the train closely enough to have their barriers closing partly at the same time, i.e. to verify that the OBU is able to supervise more than one LX object at a time.
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS with MA extending at least 2000 m to the end of a train route The test track chosen should have two LX located so that the 1st LX does not become protected before the 2nd LX is activated (this implies the 2nd LX is *coupled by timer* to the 1st LX from RBC perspective). Ensure that there are no other influencing speed limitations (due to e.g. SSP, TSR, Axle load) between the LX:s, since this may obstruct the test result evaluation!
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train route over the two LX	Alt 1 (M11): RBC sends M24 (General Message) with P88 for the 1st LX. RBC sends M3 (MA) with: - EoA at the end of the train route - P57 “MA request parameters” is sent to control T_MAR=39s Alt 2 (M95): RBC sends M3 (MA) with: - EoA at the 1st LX start location - P57 “MA request parameters” is sent to control T_MAR=39s	OBU sends ACK related to the messages **OBU DMI displays EoA at LX**	

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Step	Actions	RBC	OBU	Reference or comment
2	DRIVER: Run the train according to permitted speed and approach the LX		OBU sends M132 (MA request)	
3		Alt 2 (M95): RBC sends M3 (MA) with EoA at the 2nd LX and with P88 (LX info) related to the 1st LX.	OBU sends ACK related to the MA message	
4		1st LX is activated	**Once the indication curve towards the LX is reached, LX status "not protected" is displayed on the DMI (*).** Note for OBU compliant with SS-026 v3.6: The LX, being the supervised EOA, will only show up when and if the OBU reaches the related indication curve. Normally the LX will become protected before this happens, implying the "not protected" status will not be displayed at all (**)	*) if the LX is located close to the start of the train route the indication may have popped up already in step 1 for alt 1. **) In this case: check the logs and verify that P88 with "not protected" and later "protected" has been sent by RBC and acknowledged by OBU
5	(timer expires)	Alt 1 (M11): RBC sends M24 (General Message) with P88 (LX info) related to the 2nd LX. Alt 2 (M95): RBC sends M3 (MA) with EoA beyond the 2nd LX and with P88 related to the 2nd LX.	OBU sends ACK related to the message	

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Step	Actions	RBC	OBU	Reference or comment
6	(1st LX closes)	RBC sends M24 (General message) with P88 (LX info) indicating LX protected for the 1st LX.	OBU sends ACK related to M24 **The status indication related to 1st LX is removed from the DMI** **The status indication related to 2nd LX is displayed on the DMI (*)** Note for OBU compliant with SS-026 v3.6: See comment in step 4	*) Depending on distances between the LX:s the gap between the removal and the new display may be very short (even not conceivable), or last for a few seconds.
7	(2nd LX closes)	RBC sends M24 (General message) with P88 (LX info) indicating LX protected.	OBU sends ACK related to M24 **The status indication related to 2nd LX is removed from the DMI** Note for OBU compliant with SS-026 v3.6: See comment in step 4	
8	(Train passes the 1st level crossing)		No brake intervention obtained.	
9	(Train passes the 2nd level crossing)		No brake intervention obtained.	

3.8.5. TC_BL3_805 – LX CLOSELY AHEAD OF A TRAIN DOING START-OF-MISSION

Purpose	To test the scenario of the train starting up in front of a level crossing, e.g. located inside the berth section of a train route. Focus is on appearance of LX symbol on the DMI.
Trackside independency	Yes
Degraded conditions	No
Starting condition	Train in SR inside berth section of a train route, just ahead of the level crossing
Train status before test	Executed Procedure 01

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set the train route in front of the train			
2	DRIVER: Press ”START”		OBU sends M132 (MA request)	Q_MARQSTREASON=1
3		M11: RBC sends M24 (General Message) with P88 (LX information)	OBU sends ACK related to the M24	Variables in P88: NID_LX=x L_LX=LX area length D_LX=distance to LX area Q_LXSTATUS=1 V_LX=4 (=20 km/h) Q_STOPLX=0
4		M95: RBC sends M3 (MA) with EoA beyond the LX and with P88 (LX information) attached.		Variables in P88: See step 4

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Step	Actions	RBC	OBU	Reference or comment
5		M11: RBC sends M3 (MA) with EoA beyond the LX		
6			**OBU switches to FS mode** **OBU DMI displays LX status "not protected"** **OBU DMI indicates permitted speed 20 km/h over the LX area** OBU sends ACK related to the MA	
7	(LX closes)	RBC sends M24 (General message) with P88 (LX info). Variables of interest: NID_LX=x Q_LXSTATUS=0	OBU sends ACK related to M24 **The LX status indication is removed from the DMI**	The P88 could be delayed a few seconds after the LX is closed to achieve the required closing time before train passage
8	DRIVER: Start the train and pass the level crossing			
9	(Train leaves the track section where the LX is located)	RBC orders to open the LX barriers		

3.8.6. TC_BL3_806 – LX TYPE *PREPARED* – NOMINAL CASE

Purpose	To test the normal scenario of passing a level crossing of type *Prepared*, using time limited MA.
Trackside independency	No
Degraded conditions	No
Starting condition	Train in FS mode with long MA
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a 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	DRIVER: Move the train towards the LX (which is equal to the EoA)		OBU sends M132 (MA Request)	Q_MARQSTREASON=2
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 becomes protected)	RBC sends a new MA to the train, without sections and without timers	(no visible change on the DMI)	
5	DRIVER: Run the train and pass the level crossing		The train can pass the level crossing at full speed	

3.8.7. TC_BL3_807 – LX TYPE *PREPARED* – PROTECTED STATUS IS LOST

Purpose	To test approaching of a level crossing of type *prepared* that becomes out of control when barriers are already down (status change: good condition -> bad condition); the event causing a CES/P88 event.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS mode with long MA
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a 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	DRIVER: Move the train towards the LX (which is equal to the EoA)		OBU sends M132 (MA Request)	Q_MARQSTREASON=2
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 becomes protected)	RBC sends a new MA to the train, now without sections and without timers	(no visible change on the DMI)	
5	TOOL: Simulate that the protected status for the LX is lost	M11: The RBC sends M24 (General Message) with P88 (LX info) for the LX. Variables of interest in P88: Q_LXSTATUS=1 ; V_LX= 20 km/h	**OBU DMI displays LX status “not protected and permitted speed 20 km/h**	Depending on position and speed, OBU might apply brakes

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Step	Actions	RBC	OBU	Reference or comment
6		M95: The RBC sends msg 15 (CES) to the OBU, where the stop location is the beginning of the LX (alternatively, instead of M15, RBC may send P88 with status not protected already at this point, see step 7 for details)	OBU sends M147 (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
7		After acknowledgement from OBU, the CES is revoked. M95: When the train has come to standstill, the RBC sends a new M3 (MA) with P88 (LX info) for the LX. Variables of interest in P88: Q_LXSTATUS=1 ; V_LX= 20 km/h	**OBU DMI displays LX status “not protected” and permitted speed 20 km/h**	

3.8.8. TC_BL3_808 – LX TYPE *PREPARED* – PROTECTED STATUS NOT OBTAINED

Purpose	To test approaching of a level crossing of type *prepared* that is continuously out of control, provoking an MA section timeout in OBU.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS mode with long MA
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a sequence of train routes 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	DRIVER: Move the train towards the LX (which is equal to the EoA)		OBU sends M132 (MA Request)	Q_MARQSTREASON=2
3		RBC extends the MA beyond the LX, to the end of the last locked 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**	

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Step	Actions	RBC	OBU	Reference or comment
4	DRIVER: slow down the speed to ensure the train is able to stop before the LX in case of a brake intervention TOOL: Manipulate the Level crossing simulation so that it cannot achieve protected status when activated	(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		RBC sends a fixed text message “Level crossing not protected”, P76 with Q_TEXT=0.	**OBU DMI displays the predefined text message** “Level crossing not protected”	
6		RBC extends the MA: M3 is sent with EoA beyond the LX, including P88 (LX info) for the LX. Variables of interest in P88: Q_LXSTATUS=1; V_LX= 20 km/h	**OBU DMI displays LX status “not protected”**	
7		Additional function, if engineered in the test track (*): RBC sends a “sound horn” command: P68 with M_TRACKCOND=2 and Q_TRACKINIT=0.	**OBU DMI displays the “sound horn” symbol**	*) The “sound horn” function is also addressed in a separate test case.

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Step	Actions	RBC	OBU	Reference or comment
8	DRIVER: Approach the LX and stop before the LX	When at standstill (*): RBC sends a revocation of the track condition “sound horn”, P68 with D_TRACKINIT=x and Q_TRACKINIT=1	**OBU DMI still displays LX status “not protected” and permitted speed gradually decreases to 20 km/h.** **OBU DMI removes the displayed “sound horn” symbol**	*) Redundant event for Trafikverket
9	TOOL: Restore the simulated state of the LX to “protected”	A new P88 is sent with status protected. Variables of interest: Q_LXSTATUS=0	**The LX status indication is removed from the DMI and permitted speed resumes to the normal SSP.**	

3.8.9. TC_BL3_809 – LX FOR PLATFORM BARRIERS – NOMINAL CASE

Purpose	To test the nominal scenario of passage of an LX configured as a PBLX (Platform Barrier LX). This implies inter-action with RBC using text message acknowledgements for delaying and/or closing the barriers.
Trackside independency	Yes
Degraded conditions	No
Starting condition	The PBLX should be configured to have the "PBLX approach function" by which the activation can be delayed. If this is not the case step 2 will generate no events and step 3 can be omitted. Train in FS mode heading towards a PBLX. The train must be far enough from the PBLX so that line speed can be reached before the MA request is sent relative to the PBLX.
Train status before test	Executed Procedure 01 and TC_BL3_102.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a sequence of train routes in front of the train and across a level crossing type *PBLX*	RBC sends an MA to the train, covering the route to the start location of the LX (or earlier, depending on distance)	**OBU DMI displays EoA at LX**	

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Step	Actions	RBC	OBU	Reference or comment
2	DRIVER: Move the train towards the LX (which is currently equal to the EoA)	RBC sends M24 (General Message) including a text message (P72). Variables of interest: X_TEXT coded as the used text Q_TEXTCONFIRM = 1 Q_TEXTREPORT =1 NID_TEXTMESSAGE = x RBC extends the MA beyond the LX, to the end of the last locked 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 sends MA request relative to the PBLX (*) **OBU DMI displays the message for the driver to acknowledge:** **"**Uppehåll vid driftplats: [*name of the station; abbreviated as needed*]**"** **Extended MA is displayed on the DMI**	*) The MA request is sent based on the specific T_MAR given to the train when the MA was initially produced. The T_MAR contains an added time slot for the driver's reaction.
3	DRIVER: Acknowledge the text (*)	As a response to M158, RBC sends a new MA with an LX restriction (P88) over the PBLX.	OBU sends M158 (Text Message Acknowledged by Driver) with NID_TEXTMESSAGE=x (see step 2) **Shortened MA is displayed on the DMI with EoA at the PBLX**	*) Action applied when train is supposed to stop at platform

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Step	Actions	RBC	OBU	Reference or comment
4	DRIVER: Continue approaching the PBLX	After a while (when the calculated detain time has elapsed) the RBC/IL orders the Platform barriers to go down.	(Depending on the timing, the DMI may gradually start decreasing the permitted speed while approaching EoA.) When barriers are detected down: **Extended MA is displayed on the DMI**	
5	DRIVER: Approach the PBLX and stop within the configured stopping area, e.g. 80m before the crossing.	When standstill is detected: RBC requests shortening of MA (M9/CoSMA) with a target a certain distance ahead of the crossing.	OBU grants the shortening request (M137) **Shortened MA is displayed on the DMI with EoA ahead of the PBLX**	
6	(wait)	RBC/IL orders the Platform barriers to go up. RBC sends M24 (General Message) including a text message (P72). Variables of interest: X_TEXT coded as the used text Q_TEXTCONFIRM = 1 Q_TEXTREPORT =1 NID_TEXTMESSAGE = x	**OBU DMI displays the message for the driver to acknowledge:** **“**Bekräfta för att fälla plattformsbommar”.	

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Step	Actions	RBC	OBU	Reference or comment
7	DRIVER: Wait for the departure control timer to elapse (*), then acknowledge the text message	As a response to M158 RBC/IL orders the Platform barriers to go down.	OBU sends M158 (Text Message Acknowledged by Driver) with NID_TEXTMESSAGE=x (see step 5)	*) Typically > 10s. Note: if the text is acknowledged too early this will be ignored and a new text message will be sent.
8	(wait)	When barriers are detected down: RBC/IL extends the MA across the PBLX (without restriction.)	**Extended MA is displayed on the DMI**	
9	DRIVER: Start the train and move across the crossing.	When the train has left the PBLX the barriers are ordered up.	OBU supervises the MA according to normal function.	

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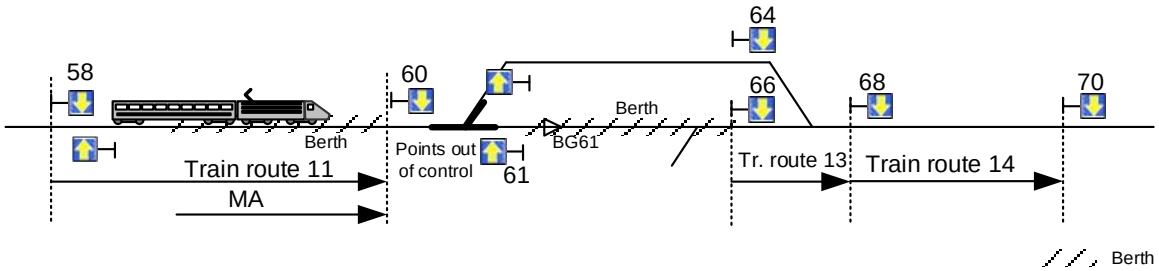
3.9. OTHER DEGRADED SITUATIONS

3.9.1. TC_BL3_901 – SR AUTHORISATION, TRAIN ENTERS INTENDED TRACK

Purpose	To test a basic scenario using SR Authorization with balise list. The scenario applied is a train that enters a track which is locked by the dispatcher as an SR train route.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train at standstill approx. 50m from EOA, with KNOWN position, located inside berth section. Train in FS mode with an MA to signal point 60. Train routes are locked for the train from signal point 66 to 70. The local point before signal point 66 is locked with train route 13 (as a condition for the berth section). Point out of control is correctly positioned (right). Note that this track layout is only an example layout to help clarifying the intended test case scenario: 
Train status before test	Executed Procedure 01 and TC_BL3_101

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Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set an SR train route between train route 11 and train route 13 to enable passing of point out of control			
2	DISPATCHER: Set signal 66 to stop (command SIS)	**Signal 66 is indicated in stop (filled red) on CMI**		
3	DRIVER: Select OVERRIDE		**OBU switches to SR mode**	
4		RBC sends an SR authorization (M2) with distance D_SR set to the end of the SR train route, and with a list of balise groups covered by the SR authorization.		
5	DRIVER: Move the train into the station area.			Note: Si 60 has to be passed within max 90s from the action in step 3, since the EOA stop condition will otherwise be re-activated.
6	DRIVER: Move the train as far as possible to the end of the SR train route (entering the intended track)		**OBU target supervises the brake curve to signal point 66. OBU forces (brakes) train to stop before signal point.**	
7	DISPATCHER: Remove stop status in signal 66 (command SIK)	**Signal 66 is indicated in proceed (filled green) on CMI**	**MA is sent to the OBU, which switches to OS mode**	
8	DRIVER: Continue driving the train beyond signal 66		**OBU switches to FS mode when passing signal 66**	

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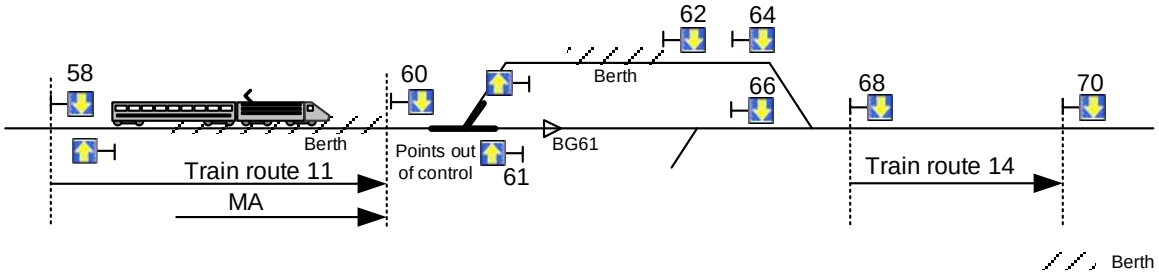
3.9.2. TC_BL3_902 – SR AUTHORISATION, TRAIN ENTERS WRONG TRACK

Purpose	To test a scenario using SR Authorization with balise list, provoking the train to enter the wrong track, thus causing a brake intervention due to balise supervision. Moreover, to see that an SR authorisation can be renewed.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	Yes
Starting condition	Train at standstill approx. 50m from EOA, with KNOWN position, located inside berth section. Train in FS mode with an MA to signal point 60. Train routes are locked for the train from signal point 64 to 70. The local point before signal point 64 is locked with train route 13 (as a condition for the berth section). **Point out of control is incorrectly positioned (left).** Note that this track layout is only an example layout to help clarifying the intended test case scenario: 
Train status before test	Executed Procedure 01 and TC_BL3_101

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Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set an SR train route from Si 60 to Si 66 to enable passing of point out of control			
2	DRIVER: Select OVERRIDE		**OBU switches to SR mode**	
3		RBC sends an SR authorization (M2) with distance D_SR set to the end of the SR train route, including a corresponding list of balise groups.		
4	DRIVER: Move the train into the station area.		The point out of control is positioned in the wrong direction forcing the train to the wrong track.	Note: Si 60 has to be passed within max 90s from the action in step 3, since the EOA stop condition will otherwise be re-activated.
5	DRIVER: Continue passing the first balise group beyond the point (i.e. in the wrong leg)		**OBU switches to TRIP mode and applies the emergency brake**	
6	DISPATCHER: Set two consecutive SR train routes from the side track onto the line (62-64-68 in figure)			
7	DRIVER: Select OVERRIDE and move the train into the berth section of signal 62, then stop and press “Start”.	RBC sends an SR authorization (M2) with distance D_SR set to the end of the 1st SR train route (Si 64), including a corresponding list of balise groups.	**OBU DMI displays target distance corresponding to signal 64**	

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Step	Actions	RBC	OBU	Reference or comment
8	DRIVER: Move the train as close as possible to the target and stop	RBC sends an SR authorization (M2) with distance D_SR set to the end of the 2nd SR train route (Si 68), including a corresponding list of balise groups.	**OBU DMI displays target distance corresponding to signal 68**	

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3.9.3. TC_BL3_903 – LOSS OF RADIO → RECONNECTION BEFORE T_NVCONTACT EXPIRES

Purpose	To test loss of connection for a time shorter than T_NVCONTACT (“no action” expected).
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS with long MA
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train at medium speed			
2	A few seconds (2-4s) before the train is about to pass a signal point: TOOL: Simulate loss of RBC-OBU connection (*)	After 20 seconds since the last radio messages, RBC sends an alarm to CTC		T_NVCONTACT = 60s *) Note that the error detection capability in OBU depends on where the connection is broken. The 45s timer event (see step 4b) will only occur if the connection is broken on the OBU side, thus directly detectable by OBU.
3	After approx. 30s since radio connection was disabled: TOOL: Restore RBC-OBU connection			

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Step	Actions	RBC	OBU	Reference or comment
4a	(wait a few seconds)	The alarm on the CTC is revoked RBC sends M3 (MA)	OBU sends ACK related to the MA **If error message has already been displayed on DMI (step 4b), this is now erased.**	Other message than M3 might also be sent from the RBC. Note: Step 4b may occur before 4a, see below
4b	(After 45 seconds since loss off radio link AND if connection not yet re-established)		**OBU DMI displays the "safe radio connection" with status lost**	Note: Step 4a may occur after step 4b, depending on timing. See also comment to step 2
5	(wait until more than 60s has elapsed since connection was disabled)		**OBU does not apply brakes!**	

3.9.4. TC_BL3_904 – LOSS OF RADIO → RECONNECTION AFTER T_NVCONTACT EXPIRES

Purpose	To test loss of connection for a time longer than T_NVCONTACT (brake intervention expected). Subsequently, at re-connection it must be possible to resume normal communication.
Trackside independency	No
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_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train at low speed			
2	A few seconds (2-4s) before the train is about to pass a signal point: TOOL: Simulate loss of RBC-OBU connection (*)	After 20 seconds since the last radio messages, RBC sends an alarm to CTC		*) Note that the error detection capability in OBU depends on where the connection is broken. The 45s timer event in step 3 will only occur if the connection is broken on the OBU side, thus directly detectable by OBU.
3	(After 45 seconds since loss off radio link)		**OBU DMI displays the "safety status connection" with status lost**	See comment to step 2
4			**When T_NVCONTACT has expired, service brakes are applied.** **OBU DMI displays a "connection lost" text message**	T_NVCONTACT = 60s

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Step	Actions	RBC	OBU	Reference or comment
5	(The train stops)		**OBU withdraws the MA to train front end**	
6	TOOL: Restore the RBC-OBU connection before the communication session is lost (i.e. within 5 minutes)		OBU reconnects with RBC **OBU DMI displays the "safety status connection" as UP** OBU sends M132 (MA request) with Q_MARQSTREASON set to 'Track description deleted' (*)	Q_MARQSTREASON=8 *) Note: OBU may have tried to send this value while connection was broken, thus not visible in logs
7		The alarm on the CTC is revoked RBC sends M3 (MA)	OBU sends M146 (ACK) related to the MA **OBU DMI displays MA extended to same EoA as before loss of connection**	

3.9.5. TC_BL3_905 – LOSS OF COMMUNICATION SESSION → NEW COMM. SESSION

Purpose	To test loss of connection for a time longer than 5 min (connection is expected to be closed). Subsequently it must be possible to establish a new connection.
Trackside independency	No
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_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DRIVER: Run the train at low speed			
2	TOOL: Simulate loss of RBC-OBU connection	After 20 seconds since the last radio messages, RBC sends an alarm to CTC		
3	(After 45 seconds since loss off radio link)		See previous test case, step 3	
4			See previous test case, step 4	
5	(The train stops)		See previous test case, step 5 OBU tries to reconnect with RBC for a period of 5 minutes	
6	(After 5 minutes)		**OBU DMI comm. symbol displays “No communication session” (*)**	*) redundant event for Trafikverket

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Step	Actions	RBC	OBU	Reference or comment
7	TOOL: Restore the RBC-OBU connection	Train is registered (data is assigned to the existing train number)	OBU establishes a new connection with the RBC	The messages exchanged for communication establishment and train registration are not described in detail.
8	DRIVER: If “Start button” is enabled: Press “Start”, otherwise select “OVERRIDE”	(if “Start” was pressed, see actions in step 11)	(if “Start” was pressed, see actions in step 11), otherwise: **OBU switches to SR mode.**	
9	DRIVER: Move the train in SR mode (*)			*) Only applicable if MA has not been received
10	(The train reads a new BG containing P42)	(no visible action)	(no visible action,*)	*) Normally the communication is already established, see step 7, but if this has not happened for any reason, the OBU is supposed to do a new call due to P42.
11	(if MA has not yet been received, press “start”)	RBC sends M3 (MA)	OBU sends ACK related to the MA **OBU DMI displays MA extended to same EoA as before loss of connection**	

3.9.6. TC_BL3_906 – CHANGE OF TRAIN DATA WHILE RADIO CONNECTION LOST

Purpose	To test the OBU behavior in case train data is changed while there is a loss of connection with RBC (repetition of train data message is expected).
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	Yes
Starting condition	Train in FS with long MA, covering at least one additional train route ahead of train front. Window for display of current train data for the train is presented on the CMI
Train status before test	Executed Procedure 01 and TC_BL3_102; Train at standstill

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Simulate loss of RBC-OBU connection (start a timer!)			
2	DRIVER: Change the train data with regard to train length	(message from OBU not received)	(OBU DMI does not change the display of the MA) OBU sends M129 (Validated Train Data) with P11 containing the modified train data	Should be done directly, so that T_NVCONTACT does not expire!
3	(wait)		(OBU application is expected to repeat the sending of M129+P11 due to lack of acknowledgment from RBC)	Note: Repetition is not possible to observe in logs due to broken radio contact.
4	TOOL: After approx. 40 s from timer start in (1), restore the connection.	RBC sends M8 (ACK to validated train data). **The changed train data can be seen on the CMI.**	Another repetition of M129+P11 is issued.	

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Step	Actions	RBC	OBU	Reference or comment
5	(After additional few seconds since loss off radio link)		If the connection is not re-established in due time the OBU DMI may display the “safety status connection” with status lost	Successful re-establishment may be delayed due to communication protocol issues.
6	DISPATCHER: Set next signal point in front of the train to stop (command SIS)		**OBU DMI displays a shortened MA to the position of the relevant signal.**	

3.9.7. TC_BL3_907 – LOSS OF ONE BALISE IN A BG WITH DUPLICATED BALISES

Purpose	To test the OBU behavior at loss of one single balise in a bg with duplicated balises. The OBU is expected to execute the data read from the duplicated balise if linking is established.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	Yes
Starting condition	Train in FS with long MA; Balises need to be manipulated, preferably according to the following: 1) Select a system border E2->H and identify the last two train routes in sequence towards the border. 2) In the 1st train route, manipulate one of its "normal bg", by disabling one of its balises 3) In the 2nd train route, manipulate the LTA_stm bg, by disabling one of its balises (if there are several LTA_stm, you must select the 1st bg to be passed by the train!).
Train status before test	Executed Procedure 01 and TC_BL3_102 (train in FS mode in a train route)

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a train route in front of the train, covering the manipulated "normal bg", (extending the current route authorized to the train)	MA is extended, corresponding to the set train route.	**OBU DMI displays MA extension.**	

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Step	Actions	RBC	OBU	Reference or comment
2	DRIVER: Run the train into the new train route and pass the manipulated bg. Continue running, passing next balise group(s).	RBC displays an alarm on the D&M as a result of the received P4	(train reads only one of the balises) **OBU does not apply brakes.** OBU sends M136 (Position Report) with P4 containing M_ERROR=1	Take a note whether OBU DMI displays an error message for the missing balise
3	DISPATCHER: Set the train route covering the manipulated “LTA_stm” bg. (extending the current route authorized to the train)	MA is extended, corresponding to the set train route.	**OBU DMI displays MA extension.**	
4	DRIVER: Run the train into the new train route and pass the manipulated bg.		(train reads only one of the balises) **OBU does not apply brakes.** **OBU DMI displays a message announcing a level transition ahead.** OBU sends M136 (Position Report) with P4 containing M_ERROR=1 **Verify that the LTA_stm bg is adopted by the train as LRBG!**	Take a note whether OBU DMI displays an error message for the missing balise
5	DRIVER: Stop the train and change cab for operation in the other direction			

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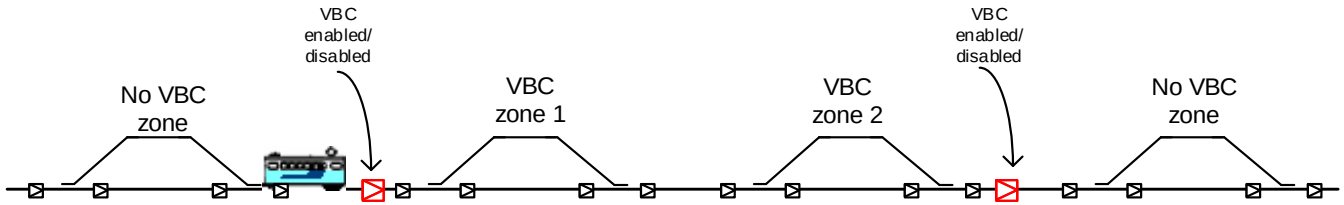
Step	Actions	RBC	OBU	Reference or comment
6	DRIVER: Activate the cab and do SoM according to normal procedure, including train data entry.	Train is registered according to normal procedure		
7	DRIVER: Select SR by Override			
8	(Ensure the override procedure will end* before the train is about to pass the balise!) DRIVER: Move the train in SR across the manipulated "LTA_stm" bg (now in the other direction)	RBC displays an alarm on the D&M as a result of the received P4	**OBU applies service brakes (**)** OBU sends M136 (Position Report) with P4 containing M_ERROR=1 **OBU DMI displays an error message for the missing balise**	*) T_NVOVTRP=90s **) bg contains directional data, hence the brake application
9	DRIVER: Start the train and continue moving in SR mode towards and across the manipulated "normal bg"	RBC displays an alarm on the D&M as a result of the received P4	(train reads only one of the balises) **OBU does not apply brakes (*)** OBU sends M136 (Position Report) with P4 containing M_ERROR=1	*) bg does not contain directional data, hence no brake application Take a note whether OBU DMI displays an error message for the missing balise

3.9.8. TC_BL3_908 – SYSTEM FAILURE IN OBU

Purpose	To test the OBU behavior when an onboard technical failure occurs leading to System Failure mode (SF). It is verified that the data produced by OBU does not cause the train to be "decoupled" from the train route, which could make it releasable unconditionally.
Trackside independency	No
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_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Provoke a technical failure in the OBU, leading to a system failure		OBU enters system failure mode. A position report (P0) 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). Whether the mode change is reported at all depends on the OBU design philosophy. The event is redundant for Trafikverket.
2	DISPATCHER: While train still running, try to release the train route under the train.	Train route is not released		
3	DISPATCHER: Wait 3 minutes, then try to release the train route	Train route is released (*)		*) The RBC/IL implementation may be more strict: The train route may not be allowed to be released unless the train is manually de-registered. Use command ART, to achieve de-registration!

3.9.9. TC_BL3_909 – VBC – NOMINAL CASE

Purpose	To test the basic VBC function. The train is supposed to ignore the information provided by bg:s in the active VBC zone.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	All balises used in the test case must be programmed according to Trafikverket standard with regard to P42 and P46. The test track shall be split into "VBC zones" . Proposal: consider a sequence of 4 stations: 1st Station: no VBC configuration, just normal balises 2nd Station: VBC zone 1, realized by loading of Packet 0 with NID_VBCMK=1 in all balise groups (at least along the main through track) 3rd Station: As station 2, but with NID_VBCMK=2 4th Station: no VBC configuration, just normal balises Prepare unlinked VBC balises (Packet 6) which can be enabled/disabled in the test track according to the test case. The VBC shall "*SET* cover" (Q_VBCO=1) either for zone 1 or zone 2 in direction "IN" and "*REMOVE* cover" (Q_VBCO=0) in direction "OUT". The VBC time (T_VBC) shall be 1 day. 
Train status before test	The train has an active cab, with OBU in level NTC, oriented towards zone 1 (from left in figure)

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Step	Actions	TRACK	OBU	Reference or comment
1	TOOL: Enable a VBC for zone 1 before the 1st bg of zone 1	VBC bg produces NID_VBCMK=1 in direction to zone 1		
2	DRIVER: Move the train forward passing the VBC and further into zone 1.		(there is no level change executed by OBU when passing balise groups within zone 1) **OBU DMI continues displaying level NTC**	
3	DRIVER: Continue driving into zone 2		P42 and P46 is read from the balise. The OBU is ordered to change to Level 2, then tripped due to unauthorized movement. **OBU DMI displays level 2**	For details about message exchange and further events see test case TC_BL3_46

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3.9.10. TC_BL3_910 – VBC – MEMORISATION

Purpose	To test the VBC function with regard to memorization of the VBC data in OBU.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	See previous test case
Train status before test	The train has an active cab, with OBU in level NTC, oriented towards zone 2 (from right in figure)

Step	Actions	TRACK	OBU	Reference or comment
1	TOOL: Enable a VBC for zone 2 before the 1st bg of zone 2	VBC bg produces NID_VBCMK=2 in direction to zone 2		
2	DRIVER: Move the train forward passing the VBC and further into zone 2.		(there is no level change executed by OBU when passing balise groups within zone 2) **OBU DMI continues displaying level NTC**	
3	DRIVER: Stop the train within zone 2, and change the cab			
4	DRIVER: Perform start-of-mission in level NTC and move the train within zone 2		(there is no level change executed by OBU when passing balise groups within zone 2) **OBU DMI continues displaying level NTC**	

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Step	Actions	TRACK	OBU	Reference or comment
5	DRIVER: Stop the train within zone 2, and do a power-off / power-on of the OBU. Activate the same cab as before			Ensure the train is reporting “Invalid position” at start-up which may not be the case if the OBU is equipped with an acting CMD, see description of Procedure 2 for more information.
6	DRIVER: Perform start-of-mission in level NTC and continue moving the train within zone 2		(there is no level change executed by OBU when passing balise groups within zone 2) **OBU DMI continues displaying level NTC**	
7	DRIVER: Continue moving the train out of zone 2 (passing the VBC in opposite direction), and further across next bg (which is not in zone 2)		P42 and P46 is read from the balise. The OBU is ordered to change to Level 2, then tripped due to unauthorized movement. **OBU DMI displays level 2**	For details about message exchange and further events see test case TC_BL3_46

3.9.11. TC_BL3_911 – VBC – VALIDITY PERIOD

Purpose	To test the VBC function with regard to the validity period of the received VBC data.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	See previous test case
Train status before test	The train has an active cab, with OBU in level NTC, oriented towards zone 1 (from left in figure)

Step	Actions	TRACK	OBU	Reference or comment
1	TOOL: Enable a VBC for zone 1 before the 1st bg of zone 1	VBC bg produces NID_VBCMK=1 in direction to zone 1		
2	DRIVER: Move the train forward passing the VBC and further into zone 1.		(there is no level change executed by OBU when passing balise groups within zone 1) **OBU DMI continues displaying level NTC**	
3	(wait approx. 23 hours, ensure T<24h since the VBC was passed, see step 2)			Note: Other test cases can be run in the meantime, as long as the current part of the test track is not used!
4	DRIVER: Continue moving inside zone 1		(there is no level change executed by OBU when passing balise groups within zone 1) **OBU DMI continues displaying level NTC**	
5	(wait approx. 1 hour, so that T>24h since the VBC was passed, see step 2)			

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Step	Actions	TRACK	OBU	Reference or comment
6	DRIVER: Continue moving inside zone 1		P42 and P46 is read from the balise. The OBU is ordered to change to Level 2, then tripped due to unauthorized movement. **OBU DMI displays level 2**	For details about message exchange and further events see test case TC_BL3_46

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3.9.12. TC_BL3_912 – VBC – ENTRY OF VBC CODE FROM DMI

Purpose	To test whether a VBC code can be entered from the DMI and managed equally as if read from a VBC bg.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	No
Starting condition	See test case TC_BL3_909. The cab should be closed.
Train status before test	The train has an active cab, with OBU in level NTC, standing inside zone 2

Step	Actions	TRACK	OBU	Reference or comment
1	DRIVER: Open the cab and perform the Start-of-Mission procedure. Before entering the train data, goto the VBC data entry on the DMI and enter the VBC code for zone 2 (*).			Select the “test tool” symbol on the DMI *) The code is a binary concatenation of T_VBC, NID_C and NID_VBCMK. Example for 1 day’s cover, NID_C=530 and code 5: 1 1000010010 000101 = 99461
2	DRIVER: Move the train, passing balise groups inside zone 2.		(there is no level change executed by OBU when passing balise groups within zone 1) **OBU DMI continues displaying level NTC**	

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Step	Actions	TRACK	OBU	Reference or comment
3	DRIVER: Close and re-open the cab and perform the Start-of-Mission procedure. Before entering the train data, goto the VBC data entry on the DMI and select command for removal of VBC code for zone 2 (*)			*) The removal code is a binary concatenation of NID_VBCMK and NID_C. Example for code 5 and NID_C=530: 101 1000010010 = 5650
4	DRIVER: Continue moving inside zone 2		P42 and P46 is read from the balise. The OBU is ordered to change to Level 2, then tripped due to unauthorized movement. **OBU DMI displays level 2**	For details about message exchange and further events see test case TC_BL3_46

3.9.13. TC_BL3_913 – MULTIPLE ACKNOWLEDGE REQUESTS, case 1

Purpose	To test how the OBU handles timing regarding multiple acknowledge requests. Specifically this tests aims to verify if the timer for brake application at transition to OS mode can be inhibited by other pending acknowledge requests.
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	Yes
Starting condition	Train at standstill in FS mode, having run on a locked train route, which has then been released (MA shortened to train front). Ensure the train is stopped approx. 100m before EOA.
Train status before test	The train shall have a text displayed on the DMI prompting for acknowledgement. This could be achieved if stopping with a short train at a location where rear-end-free logic is applied, a situation obtained if running TC_BL3_207, except last step. (As an alternative, a text message prompting for acknowledge may be produced by any other means, if possible through the CMI)

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: occupy the track section beyond the signal board in front of the train, to force a continued OS situation		**(OBU DMI continuously prompts for text message ack., due to the starting condition)**	Note that a train route under the train should not be locked, otherwise the train will be tripped!
2	DISPATCHER: Set a train route from the signal board in front of the train	Train route is locked, but start-of-route is indicated in stop due to the occupation.		

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Step	Actions	RBC	OBU	Reference or comment
3	DISPATCHER: Confirm the route for OS (command KOS)	The route is indicated for OS on the CMI. RBC sends M3 (MA) including P80 (Mode Profile)	**(OBU DMI still prompts for text message ack.)** **The OS ack. Request is either displayed in parallel or hidden behind the text message ack prompt**	Note: None of the prompting messages should be acknowledged by the driver! Note: When the MA is received by OBU, start directly a time measurement!
4	DRIVER: Directly after the MA is received by OBU, start the train and drive slowly (without acknowledging!)		Brake application is expected within 5s after the timer was started, i.e. when the max time for OS mode acknowledgement has elapsed (regardless if the prompt is visible and accessible or not) Note: For improved verification, the logs could be checked by calculating the time from when the OS MA was sent to the train (step 3) until speed reduction due to brake application can be observed.	It is advised to capture the DMI behavior by recording a short movie. Note that the ERTMS standard is not precise with regard to the brake intervention condition. Any deviation to expected result will have to be assessed.

3.9.14. TC_BL3_914 – MULTIPLE ACKNOWLEDGE REQUESTS, case 2

Purpose	See BL3_913
Trackside independency	Yes: Test of onboard function without possible variation due to trackside supplier
Degraded conditions	Yes
Starting condition	Train at standstill in FS mode, having run on a locked train route which ends at a system border towards a TAM line (system M). The train route has been released (MA shortened to train front). Ensure the train is stopped approx. 100m before EOA.
Train status before test	See starting condition.

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: release the train route under the train.		MA is shortened to train front.	
2	TOOL: occupy the track section beyond the signal in front of the train, to force a continued OS situation. Remove the occupation.			
3	DRIVER: Enter SR mode by pressing the Override button (*)			*) In order to get the LTA erased from the OBU memory
4	DISPATCHER: Set the signal in front of the train to proceed (command LIK). Confirm for TAM mission (command KXV)	The exit signal shows proceed aspect.		

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Step	Actions	RBC	OBU	Reference or comment
5	DRIVER: press “Start” Note: None of the prompting messages should be acknowledged!	RBC sends M3 (MA) with P41 announcing a level transition.	The DMI design may vary: Alt 1: Simultaneous display on OBU DMI: - OS ack. Request and - level transition ack. request. Alt 2: The DMI may only allow for one ack request at a time, meaning that only the level transition ack. Request is visible, while the OS ack request is queued.	Note: Alt 1: When the OS ack. prompt is visible on the DMI, start directly a time measurement! Alt 2: time measurement not needed
6	DRIVER: Directly after OS ack request is shown, start the train and drive slowly (without acknowledging!) (If the OS ack request is not visible, start the train anyway) *[Alternatively, if difficult to synchronize propulsion and time measurement, the brake application can be observed on the DMI]*	(have the train data window displayed on the CMI and observe the current mode and level of the train! Take note!)	Alt 1: Brake application is expected within 5s after the OS ack request was displayed on the DMI Alt 2: Brake application is expected. Take note of any delay! [*if propulsion could not be given, the brake application can be verified also at standstill, by check of the brake symbol on the DMI]*	It is advised to capture the DMI behavior by recording a short movie. Note that the ERTMS standard is not precise with regard to the brake intervention condition. Any deviation to expected result will have to be assessed.

3.9.15. TC_BL3_915 – ROUTE RELEASING UNDER A TRAIN IN SR ON AN SR TRAIN ROUTE

Purpose	To test that a shortened SR Authorisation is accepted and executed by the train.
Trackside independency	Yes
Degraded conditions	Yes
Starting condition	Train standing in front of a signal board, in FS mode
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set an SR train route from the signal point in front of the train.			
2	DRIVER: Select OVERRIDE		**OBU switches to SR mode**	
3		RBC sends an SR authorization (M2) with distance D_SR set to the end of the SR train route, and with a list of balise groups covered by the SR authorization.		
4	DRIVER: Move the train into the SR train route			
5	DISPATCHER: Release the SR train route (while the train is running).	RBC sends an SR authorization (M2) with distance D_SR=0	**OBU switches to TRIP mode and applies the emergency brake**	

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Step	Actions	RBC	OBU	Reference or comment
6	When train at standstill: DRIVER: Acknowledge the trip		**OBU switches to POST TRIP mode and releases the emergency brake.** OBU sends M136 (Position Report) with M_MODE=8 (POST TRIP)	
7		RBC sends M6 (Recognition of exit from TRIP mode) with ACK request	OBU sends ACK related to M6	

3.9.16. TC_BL3_916 – LINKING FAILURE (LOSS OF ENTIRE BG)

Purpose	To test the OBU behavior at loss of entire balise group(s). The OBU reaction is verified, including error reporting to RBC
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS with long MA
Train status before test	Executed Procedure 01 and TC_BL3_102 (train in FS mode in a train route)

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a sequence of train routes in front of the train	MA is extended, corresponding to the set train route.	**OBU DMI displays MA extension.**	
2	DRIVER: Run the train into the new train route and reduce the speed while approaching the next bg.			
3	TOOL: Simulate a loss of balise group (*) DRIVER: Continue running, passing the position where the bg is expected by the OBU linking supervision	RBC displays an alarm on the D&M as a result of the received P4	**OBU does not apply brakes.** OBU sends M136 (Position Report) with P4 containing M_ERROR=0	*) Could be done either by jumping the current train front across the balise group so that it is not injected to OBU, or by disabling the bg itself (choose the best method depending on the test environment capability) Note: If the “jump option” is chosen, make sure to jump back the train with the same distance after passage, so that the odometry counting is not disturbed relative to the linking supervision for the continued train mission!

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Step	Actions	RBC	OBU	Reference or comment
4	DRIVER: Continue running and let the train pass the next bg		(no visible event) Check in logs that the LRBG has been updated.	
5	DRIVER: Continue running and reduce the speed while approaching the next bg.			
6	TOOL: Simulate a loss of balise group (*) DRIVER: Continue running, passing the position where the bg is expected by the OBU linking supervision	RBC displays an alarm on the D&M as a result of the received P4	**OBU does not apply brakes.** OBU sends M136 (Position Report) with P4 containing M_ERROR=0	*) See step 3
7	DRIVER: Continue running and reduce the speed while approaching the next bg.			
8	TOOL: Simulate a loss of balise group (*) DRIVER: Continue running, passing the position where the bg is expected by the OBU linking supervision	RBC displays an alarm on the D&M as a result of the received P4	**OBU applies service brakes.** OBU sends M136 (Position Report) with P4 containing M_ERROR=7	*) See step 3
9	(wait until train has stopped)		When the train comes to standstill the MA is shortened to train front.	
10	(wait until the MA is extended)	A new MA is sent to the OBU	OBU sends an MA request OBU DMI displays MA extension.	

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Step	Actions	RBC	OBU	Reference or comment
11	DRIVER: Start the train and continue running, passing the next bg.		(no visible event) Check in logs that the LRBG has been updated.	

3.9.17. TC_BL3_917 – RBC/RBC HANDOVER WITH LOST RADIO CONTACT TO RBC HOV, 1 MODEM

Purpose	To test how OBU interacts with trackside RBC:s when loosing contact with RBC HOV, and the OBU has only one modem working. This is regarded a safety critical event and it needs to be verified how the situation develops.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS mode heading towards an RBC/RBC border, located before the configured distance in the test track for sending of packet 131 to the train.
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a sequence of train routes in front of the train, across the RBC-RBC border	HOV (Handing Over) RBC sends an MA, stretching to and across the RBC-RBC border	**OBU DMI displays MA correspondingly**	Communication between the HOV RBC and ACC RBC is established and the handing-over procedure is initiated.
2	TOOL: Disable the inactive modem		**There might be a failure indication on the DMI (*)**	*) Depends on individual OBU design
3	DRIVER: Run the train slowly, passing the location configured for sending of P131	HOV RBC orders the train to contact ACC RBC (P131)	OBU does not establish a new communication session due to the modem failure	
4	DRIVER: Accelerate the train to medium speed (80- 100 km/h) towards the border			

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Step	Actions	RBC	OBU	Reference or comment
5	A few seconds (5-10s) before the train is about to pass the border: TOOL: Simulate loss of RBC_HOV - OBU connection (and start a timer!)	After 20s HOV RBC indicates contact loss towards the train		
6	(let the train run across the RBC/RBC border and continue without further action)	RBC ACC: no registration is observed	When T_NVCONTACT times out (relative to the moment of loss of connection in step 5), brakes are applied and train brakes to standstill. (OBU tries to re-establish contact with RBC HOV)	T_NVCONTACT =60s Note: It is safety critical that the T_NVCONTACT timer is not reset by OBU due to the change of RBC, since this could double the time before a radio hole is detected and acted upon!
7	TOOL: Restore the connection between RBC_HOV and OBU within less than 2 minutes since the connection was broken in step 5.	RBC HOV (*): Train is re-connected, but immediately RBC HOV orders disconnection RBC ACC: train is registered and an MA is sent to the train for the remaining part of the locked train routes	OBU re-connects to RBC HOV (*) OBU disconnects from RBC HOV and calls RBC ACC (*). An MA is visible on the DMI	*) If the train has run long enough into the RBC ACC area the result may deviate: • OBU may call RBC ACC directly in which case no inter-action with RBC HOV will take place. • If OBU calls RBC HOV it may directly respond with an error message “Out of RBC area” to the train after which it will call RBC ACC.

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3.9.18. TC_BL3_918 – RBC/RBC HANDOVER WITH LOST RADIO CONTACT TO BOTH RBC:s, 2 MODEMS

Purpose	To test how OBU interacts with trackside RBC:s when loosing contact with RBC ACC, after having established a session with RBC ACC. The focus is on the handling of T_NVCONTACT.
Trackside independency	No
Degraded conditions	Yes
Starting condition	Train in FS mode heading towards an RBC/RBC border, located before the configured distance in the test track for sending of packet 131 to the train.
Train status before test	Executed Procedure 01 and TC_BL3_102

Step	Actions	RBC	OBU	Reference or comment
1	DISPATCHER: Set a sequence of train routes in front of the train, across the RBC-RBC border	HOV (Handing Over) RBC sends an MA, stretching to and across the RBC-RBC border	**OBU DMI displays MA correspondingly**	Communication between the HOV RBC and ACC RBC is established and the handing-over procedure is initiated.
2	DRIVER: Run the train at medium speed (e.g. 70 km/h), passing the location configured for sending of P131	HOV RBC orders the train to contact ACC RBC (P131)	OBU establishes a communication session with RBC ACC	
3	A few sec. after events in step 2: TOOL: Disable the RBC_ACC – OBU connection		**There might be a failure indication on the DMI (*)**	*) Depends on individual OBU design

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Step	Actions	RBC	OBU	Reference or comment
4	A few seconds (5-10s) before the train is about to pass the border: TOOL: Simulate a loss of RBC_HOV - OBU connection (and start a timer!)	After 20s HOV RBC indicates “contact loss” towards the train		
5	(let the train run across the RBC/RBC border and continue without further action)	RBC ACC: no registration is observed	When T_NVCONTACT times out (relative to the moment of loss of connection in step 4), brakes are applied and train brakes to standstill.	T_NVCONTACT =60s
6	TOOL: Restore both RBC-OBU connections within less than 3 minutes since the connection was broken in step 3. DRIVER: After session is restored: if no MA is sent automatically from RBC press “Start” (if possible).	RBC HOV (*): Train is re-connected, but immediately RBC HOV orders disconnection RBC ACC: train is registered and an MA is sent to the train for the remaining part of the locked train routes	OBU re-connects to RBC HOV (*) OBU disconnects from RBC HOV and calls RBC ACC (*). An MA is visible on the DMI	*) If the train has run long enough into the RBC ACC area the result may deviate: • OBU may call RBC ACC directly in which case no inter-action with RBC HOV will take place. • If OBU calls RBC HOV it may directly respond with an error message “Out of RBC area” to the train after which it will call RBC ACC.

3.9.19. TC_BL3_919 – RBC SUPERVISION OF OBU REPORTED CONFIDENCE INTERVAL

Purpose	To test the inter-action between OBU and RBC when the RBC detects abnormal odometry data as reported by OBU, and the effect of the safety barriers applied as a consequence of this.
Trackside independency	No
Degraded conditions	Yes
Starting condition	The test case presumes that the triggering distance for the RBC supervision is set as follows: D_LRBG=3000 m; L_DOUBTOVER=500 m; L_DOUBTUNDER=300 m. Should the current site have other values set, these must be applied instead when running the test and evaluating the test result. The test case presumes that the balise groups are located approximately each 1000 m. This is not mandatory for the test, but the tester must be prepared to mute more (or less) balise groups if the presumption is wrong
Train status before test	Executed Procedure 01 and TC_BL3_102, which implies: Train in FS mode, running on a locked sequence of train routes. It is recommended to run the test on a line in order to minimize the number of balise groups to manipulate.

Step	Actions	RBC	OBU	Reference or comment
1	TOOL: Remove next balise group in front of the train (*) DRIVER: Continue driving across the muted bg		Check (in the produced position reports) that the variable D_LRBG (**) is not reset but continues increasing while running. [presumption: current D_LRBG > 1000 m]	*) The best method depends on the test environment at hand. E.g. it may be achieved by direct “balise muting”, or, if having access to the SS-111 interface, the method *BALISE.removeBalise* can be applied from the TCL. **) D_LRBG reflects the distance to the last adopted balise group which is currently applied as reference location by OBU)

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Step	Actions	RBC	OBU	Reference or comment
2	TOOL: Remove next balise group in front of the train	After train stop, the RBC sends a new MA to the train.	A short distance after passing the location of the muted balise group the train will brake itself to stop and shorten the MA (*). [presumption: current D_LRBG > 2000m]	*) Generic fault reaction after two consecutive missed linked balise groups
3	TOOL: Remove next balise group in front of the train DRIVER: Start the train and continue running.	When a position report is obtained containing D_LRBG > 3000 the following events will occur: - A text message is sent to the OBU - A new MA is sent, containing modified link information (P5) enforcing service brake at link failure.	A text message is shown on the DMI: "Odometrifel: Vid nästa balislänkfel bromsas tåget till stopp. Fortsatt körning sker På sikt" The texts prompts for confirmation. No other visible reaction occurs, i.e. train movement is allowed to continue.	The RBC will now consider the train having "compromised odometry"
4	DRIVER: Confirm the text message (within approx. 5s) (*)			*) After 15 sec the OBU will apply service brakes unless the text is confirmed

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Step	Actions	RBC	OBU	Reference or comment
5	DRIVER: Continue running the train across the next balise group (which is not supposed to be muted!)		When next balise group is passed the LRBG is updated and the confidence interval is collapsed as usual. (brakes are not applied)	
6	TOOL: Remove next balise group in front of the train DRIVER: Continue running the train across the next (muted) balise group		**OBU detects balise linking failure and applies the link reaction "service brake to stop"**	
7		When train comes to standstill, a new MA is sent with an OS profile covering the entire MA, with release speed =0. The link reaction is restored to the original value, i.e. "no reaction"	**OBU switches to OS mode**	The RBC will now consider the train in state "restricted authorisation"
8	DRIVER: When OS ack is prompted: Confirm OS mode on the DMI and start the train		**The OBU supervises any further train movement in OS mode.**	

3.10. PACKET SWITCHED DATA COMMUNICATION (OVER GPRS)

The following table applies for all test cases listed in this main chapter.

Purpose	To test that the OBU is able to correctly perform track-to-train communication using the packet switched data communication protocol. A number of “ordinary” test cases are selected which altogether are considered to prove compliance to the communication protocol. Note that this is not claiming to be a deep verification of all the communication properties but rather a validation on an overall level.
General conditions	The radio communication system should be configured to support PS data communication. This includes proper SIM-card in OBU that support GPRS and also a working ETCS-DNS in the GSM-R network. It is advised to co-ordinate with the IT/GSM-R responsible part within Trafikverket to ensure that all pre-conditions are in place before executing the tests in this section.

3.10.1. TC_BL3_1001 – NORMAL START-UP SCENARIO [TC_BL3_101]

Purpose	To test that the OBU is able to perform a normal start-up scenario, using PS data communication.
Trackside independency	No
Degraded conditions	No
Starting condition	General conditions, plus specific conditions stated in BL3_101.
Train status before test	See BL3_101

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_101	See BL3_101	See BL3_101	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.2. TC_BL3_1002 – NOMINAL RUNNING SCENARIO [TC_BL3_201]

Purpose	To test that the OBU is able to perform a nominal run, using PS data communication.
Trackside independency	No
Degraded conditions	No
Starting condition	General conditions, plus specific conditions stated in BL3_201.
Train status before test	See BL3_201

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_201	See BL3_201	See BL3_201	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.3. TC_BL3_1003 – RBC/RBC HANDOVER – NORMAL SCENARIO [TC_BL3_701]

Purpose	To test that the OBU is able to pass an RBC/RBC border, using PS data communication.
Trackside independency	No
Degraded conditions	No
Starting condition	General conditions, plus specific conditions stated in BL3_701.
Train status before test	See BL3_701

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_701	See BL3_701	See BL3_701	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.4. TC_BL3_1004 – RBC-RBC HANDOVER – MODEM FAILURE [TC_BL3_702]

Purpose	To test that the OBU is able to pass an RBC/RBC border with a single modem, using PS data communication.
Trackside independency	No
Degraded conditions	Yes
Starting condition	General conditions, plus specific conditions stated in BL3_702.
Train status before test	See BL3_702

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_702	See BL3_702	See BL3_702	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.5. TC_BL3_1005 – LEVEL TRANSITION – ENTRY TO LEVEL 2 [TC_BL3_703]

Purpose	To test that the OBU is able to establish a connection with RBC based on an order from a balise while entering an L2 area, using PS data communication.
Trackside independency	No
Degraded conditions	No
Starting condition	General conditions, plus specific conditions stated in BL3_703.
Train status before test	See BL3_703

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_703	See BL3_703	See BL3_703	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.6. TC_BL3_1006 – LEVEL TRANSITION – ENTRY TO LEVEL 2 WITH COMM.FAILURE [TC_BL3_706]

Purpose	To test that the OBU is able to re-establish a connection with RBC after a communication error while entering an L2 area, using PS data communication.
Trackside independency	No
Degraded conditions	No
Starting condition	General conditions, plus specific conditions stated in BL3_706.
Train status before test	See BL3_706

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_706	See BL3_706	See BL3_706	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.7. TC_BL3_1007 – LEVEL TRANSITION – EXIT FROM LEVEL 2 [TC_BL3_709]

Purpose	To test that the OBU is able to close communication with RBC while exiting an L2 area, using PS data communication.
Trackside independency	No
Degraded conditions	No
Starting condition	General conditions, plus specific conditions stated in BL3_709.
Train status before test	See BL3_709

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_709	See BL3_709	See BL3_709	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.8. TC_BL3_1008 – ”FORCED” COMM. ESTABLISHMENT DUE TO P46 [TC_BL3_720]

Purpose	To test that the OBU is able to establish RBC communication at a “forced level transition to L2” due to a P46 order in a balise, using PS data communication.
Trackside independency	No
Degraded conditions	Yes
Starting condition	General conditions, plus specific conditions stated in BL3_720.
Train status before test	See BL3_720

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_720	See BL3_720	See BL3_720	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.9. TC_BL3_1009 – COMM. MANAGEMENT AFTER T_NVCONTACT EXPIRES [TC_BL3_904]

Purpose	To test that the OBU is able to resume normal communication after a temporary loss of communication, using PS data communication.
Trackside independency	No
Degraded conditions	Yes
Starting condition	General conditions, plus specific conditions stated in BL3_904.
Train status before test	See BL3_904

Step	Actions	RBC	OBU	Reference or comment
1-N	See BL3_904	See BL3_904	See BL3_904	The addressed test case is to be executed as is, but applying PS comm. protocol.

3.10.10. TC_BL3_1010 – CONNECTION SET-UP TOWARDS A MALFUNCTIONING DNS

Purpose	To test various cases of OBU not getting all needed information from the ETCS-DNS when connecting to an RBC that offers PS connection (GPRS). In this case the OBU is supposed to set up a CS connection to the RBC. The various failure modes in the connection establishment scenario are listed below under “Degraded conditions”
Trackside independency	No
Prerequisites	RBC needs to be enabled for using CS-connections. A DNS-server must be configured and in operation. A sim-card must be prepared to call the DNS. The OBU is supposed to get the relevant RBC ETCS-ID/phone number from balise or use Transmission mode table (cached) information at power-up. OBU is presumed to do a “GPRS-attach” and according to the APN/PDP context, ask for the IP address of the ETCS-DNS.
Degraded conditions	Failure conditions in DNS: 1. Not in service (OBU not able to connect to DNS) 2. No information about RBC:s ETCS-ID (no IP address to RBC in DNS answer) 3. No IP address and a TXT field indication CS Mode 4. DNS gives wrong/non-existing IP address to RBC
Starting condition	OBU is powered-off or are about to pass a Radio Establishment (RE) bg.

Note: the test case shall be run 4 times, where each iteration should be prepared to inducing one of the listed degraded conditions in the DNS.

Author (Name, org)	Date	Document ID	Version
PRer	2023-06-12	ERTMS19-0593	3.0

Step	Actions	OBU	RBC	DNS	Reference or comment
1	TOOL: for each iteration (1-4) of the test case, manipulate the DNS as follows: 1. No answer from DNS. 2. Empty answer from DNS. 3. Answer with no IP address and TXT-field containing txm=cs. 4. Answer with irrelevant IP address (*)				*) “irrelevant” should be understood as an address which does not address any RBC
2	DRIVER: Alt 1: Power ON the OBU Alt 2: Let the train pass an RE bg, while in NTC level, i.e. without connection established (start a manual timer at this moment; to be stopped at step 5)	Receives P42 and P45			See OBU-log for information.
3	-	Connects to GPRS network. Sends an RBC FQDN query to the DNS.		Receives the FQDN query, and acts according to current failure condition 1-4	See OBU-log or GEM for information.

Author (Name, org)	Date	Document ID	Version
PRer	2023-06-12	ERTMS19-0593	3.0

Step	Actions	OBU	RBC	DNS	Reference or comment
4	-	Expected action depending on the current failure condition: 1. Try CS-mode 2. Try CS-mode 3. Try CS-mode 4. Try PS-mode			See OBU-log or GEM for information.
5	(wait a few seconds until connection is established, then stop the manual timer; see step 2)	OBU connects to RBC in CS-mode.	Receives a call setup, session is established.		See OBU-log or GEM for information. For each iteration: take note of the time used for connection establishment!
6	DRIVER: Continue driving the train	ETCS performs relevant supervision	Train data is visible on CMI (based on position reporting)		See OBU-log or GEM for information.

4. MESSAGES AND PACKET COVERAGE

This chapter lists the covered messages related to the interface between track and train, according to [A1] and [A2].

4.1. Messages from Track to OBU

Message ID	Message name	Covered/Not used by Trafikverket
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	RBC/RIU System Version	Covered
33	MA with Shifted Location Reference	Covered
34	Track Ahead Free Request	Covered
37	In-fill MA	Not used by Trafikverket
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 Trafikverket
45	Assignment of coordinate system	Not explicitly specified by Trafikverket

Table 4.1 - Messages sent from track to train

4.2. Packets from Track to OBU

Packet ID	Packet name	Covered/Not used by Trafikverket
0	Virtual Balise Cover marker	Covered, sent from balise only
2	System Version order	Not used by Trafikverket
3	National Values	Covered
5	Linking	Covered
6	Virtual Balise Cover order	Covered, sent from balise only
12	Level 1 Movement Authority	Covered, sent from balise only
13	Staff Responsible distance information from loop	Not used by Trafikverket
15	Level 2/3 Movement Authority	Covered
16	Repositioning Information	Not used by Trafikverket
21	Gradient Profile	Covered
27	International Static Speed Profile	Covered
39	Track Condition Change of traction power	Covered

Packet ID	Packet name	Covered/Not used by Trafikverket
40	Track Condition Change of allowed current consumption	Covered
41	Level Transition Order	Covered
42	Session Management	Covered
44	Data used by applications outside the ERTMS/ETCS system.	Not used by Trafikverket
45	Radio Network registration	Covered, sent from balise only
46	Conditional Level Transition Order	Covered, sent from balise only
49	List of balises for SH Area	Covered
51	Axle load Speed Profile	Covered
52	Permitted Braking Distance Information	Not used by Trafikverket
57	Movement Authority Request Parameters	Covered
58	Position Report Parameters	Covered
63	List of Balises in SR Authority	Covered
64	Inhibition of revocable TSRs from balises in L2/3	Not used by Trafikverket
65	Temporary Speed Restriction	Covered
66	Temporary Speed Restriction Revocation	Covered
67	Track Condition Big Metal Masses	Covered
68	Track Condition	Covered
69	Track Condition Station Platforms	Not used by Trafikverket
70	Route Suitability Data	Covered
71	Adhesion Factor	Not used by Trafikverket
72	Packet for sending plain text messages	Covered
76	Packet for sending fixed text messages	Covered
79	Geographical Position Information	Covered, sent from balise only
80	Mode profile	Covered
88	Level crossing information	Covered
90	Track Ahead Free up to level 2/3 transition location	Covered, sent from balise only
131	RBC transition order	Covered
132	Danger for Shunting information	Covered, sent from balise only
133	Radio in-fill area information	Not used by Trafikverket
134	EOLM Packet	Not used by Trafikverket
135	Stop Shunting on desk opening	Covered, sent from balise only
136	Infill location reference	Not used by Trafikverket
137	Stop if in Staff Responsible	Covered, sent from balise only
138	Reversing area information	Covered
139	Reversing supervision information	Covered
140	Train running number from RBC	Covered
141	Default Gradient for Temporary Speed Restriction	Not used by Trafikverket
143	Session Management with neighbouring Radio Infill unit	Not used by Trafikverket
145	Inhibition of balise group message consistency reaction	Not used by Trafikverket
180	LSSMA display toggle order	Not used by Trafikverket
181	Generic LS function marker	Not used by Trafikverket
254	Default balise loop or RIU information	Not used by Trafikverket

Packet ID	Packet name	Covered/Not used by Trafikverket
255	End of Information	

Table 4.2 – Packets sent from track to train

4.3. Messages from OBU to RBC

Message ID	Message name	Covered/Not used by Trafikverket
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 Trafikverket
154	No compatible version supported	Not covered in this specification
155	Initiation of a communication session	Covered
156	Termination of a communication session	Covered
157	SoM Position Report	Covered
158	Text Message Acknowledged by Driver	Covered
159	Session Established	Covered

Table 4.3 – Messages sent from train to track

4.4. Packets from OBU to RBC

Packet ID	Packet name	Covered/Not used by Trafikverket
0	Position Report	Covered
1	Position Report based on two balise groups	Not explicitly specified by Trafikverket
2	Onboard supported system versions	Covered (only through the start-up procedures 1-3)
4	Error Reporting	Covered
5	Train running number	Covered
9	Level 2/3 transition information	Covered
11	Validated train data	Covered
44	Data used by applications outside the ERTMS/ETCS system.	Not used by Trafikverket

Table 4.4 - Packets sent from train to track

5. APPENDIX A – TEST RECORD

During the test campaign the test leader assigned by Trafikverket's ERTMS project normally ensures that all relevant test results are recorded, as observed from trackside point of view. For this purpose it is recommended to use the dedicated template: *Test record template IOP*, which step by step reflects the test cases in this test specification. The template is managed by Trafikverket and can be supplied on request.

6. APPENDIX B – CROSS REFERENCE OF TEST CASE IDENTITIES

Main subject	Test case number (new)	Test case number (old)	Comment	No.
Start-up Scenarios	TC_BL3_101	TC_COMP_01		1
=	TC_BL3_102	TC_COMP_02		2
=	TC_BL3_103	TC_COMP_03		3
=	TC_BL3_104	TC_COMP_04		4
=	TC_BL3_105	New		5
=	TC_BL3_106	TC_COMP_05		6
=	TC_BL3_107	TC_COMP_06		7
=	TC_BL3_108	TC_COMP_07		8
=	TC_BL3_109	TC_COMP_08		9
=	TC_BL3_110	New		10
=	TC_BL3_111	New		11
	TC_BL3_112	New		12
Normal train operation	TC_BL3_201	TC_COMP_56		13
=	TC_BL3_202	TC_COMP_13		14
=	TC_BL3_203	TC_COMP_17		15
=	TC_BL3_204	New		16
=	TC_BL3_205	TC_COMP_26		17
=	TC_BL3_206	New		18
=	TC_BL3_207	New		19
=	TC_BL3_208	New		20
=	TC_BL3_209	New		21
=	TC_BL3_210	TC_COMP_68		22
=	TC_BL3_211	New		23
Management of TSR	TC_BL3_301	TC_COMP_09		24
=	TC_BL3_302	TC_COMP_10		25
=	TC_BL3_303	TC_COMP_11		26
=	TC_BL3_304	TC_COMP_12		27
=	TC_BL3_305	New		28
=	TC_BL3_306	New		29
Track description and mode profiles	TC_BL3_401	TC_COMP_52		30
=	TC_BL3_402	New		31
=	TC_BL3_403	TC_COMP_18		32
=	TC_BL3_404	Deleted		N/A
=	TC_BL3_405	New		33
=	TC_BL3_406	New		34

=	TC_BL3_407	TC_COMP_55		35
=	TC_BL3_408	TC_COMP_59		36
=	TC_BL3_409	TC_COMP_27		37
=	TC_BL3_410	New		38
=	TC_BL3_411	New		39
Emergency stop and MA shortening	TC_BL3_501	TC_COMP_14		40
=	TC_BL3_502	TC_COMP_15		41
=	TC_BL3_503	TC_COMP_16		42
=	TC_BL3_504	TC_COMP_19		43
=	TC_BL3_505	TC_COMP_28		44
=	TC_BL3_506	TC_COMP_21		45
=	TC_BL3_507	TC_COMP_22		46
=	TC_BL3_508	TC_COMP_54		47
=	TC_BL3_509	TC_COMP_63		48
Shunting	TC_BL3_601	TC_COMP_24		49
=	TC_BL3_602	New		50
=	TC_BL3_603	TC_COMP_57		51
=	TC_BL3_604	New		52
=	TC_BL3_605	New		53
=	TC_BL3_606	New		54
=	TC_BL3_607	New		55
=	TC_BL3_608	New		56
RBC/RBC and Level transitions	TC_BL3_701	TC_COMP_65		57
=	TC_BL3_702	TC_COMP_66		58
=	TC_BL3_703	TC_COMP_29		59
=	TC_BL3_704	TC_COMP_30		60
=	TC_BL3_705	TC_COMP_31		61
=	TC_BL3_706	TC_COMP_32		62
=	TC_BL3_707	TC_COMP_64		63
=	TC_BL3_708	TC_COMP_33		64
=	TC_BL3_709	TC_COMP_34		65
=	TC_BL3_710	TC_COMP_34B		66
=	TC_BL3_711	TC_COMP_35		67
=	TC_BL3_712	TC_COMP_36		68
=	TC_BL3_713	New		69
=	TC_BL3_714	New		70
=	TC_BL3_715	New		71
=	TC_BL3_716	New		72

=	TC_BL3_717	New		73
=	TC_BL3_718	New		74
=	TC_BL3_719	New		75
=	TC_BL3_720	TC_COMP_46		76
=	TC_BL3_721	New		77
=	TC_BL3_722	New		78
=	TC_BL3_723	New		79
Level crossings	TC_BL3_801	TC_COMP_37		80
=	TC_BL3_802	TC_COMP_40		81
=	TC_BL3_803	TC_COMP_43		82
=	TC_BL3_804	TC_COMP_44		83
=	TC_BL3_805	TC_COMP_25		84
=	TC_BL3_806	TC_COMP_60		85
=	TC_BL3_807	TC_COMP_61		86
=	TC_BL3_808	TC_COMP_62		87
=	TC_BL3_809	New		88
Other degraded situations	TC_BL3_901	New		89
=	TC_BL3_902	New		90
=	TC_BL3_903	TC_COMP_47		91
=	TC_BL3_904	TC_COMP_48		92
=	TC_BL3_905	TC_COMP_49		93
=	TC_BL3_906	New		94
=	TC_BL3_907	TC_COMP_50		95
=	TC_BL3_908	TC_COMP_67		96
=	TC_BL3_909	New		97
=	TC_BL3_910	New		98
=	TC_BL3_911	New		99
=	TC_BL3_912	New		100
=	TC_BL3_913	New		101
=	TC_BL3_914	New		102
=	TC_BL3_915	New		103
=	TC_BL3_916	New		104
=	TC_BL3_917	New		105
=	TC_BL3_918	New		106
=	TC_BL3_919	New		107
Packet switched data communication	TC_BL3_1001	New		108
=	TC_BL3_1002	New		109
=	TC_BL3_1003	New		110

=	TC_BL3_1004	New		111
=	TC_BL3_1005	New		112
=	TC_BL3_1006	New		113
=	TC_BL3_1007	New		114
=	TC_BL3_1008	New		115
=	TC_BL3_1009	New		116
=	TC_BL3_1010	New		117

The following old test cases has been deleted:

TC_COMP_20, TC_COMP_23, TC_COMP_38, TC_COMP_45, TC_COMP_51

7. APPENDIX C – CROSS REFERENCE BETWEEN TEST CASES AND RELEASES OF FUNCTIONAL PRODUCT

Main subject	Test case number (new)	BL2 (*) see below	5.2.1	5.2.1+	5.4	Comment	No.
Start-up Scenarios	TC_BL3_101	X	X	X	X		1
=	TC_BL3_102	X	X	X	X		2
=	TC_BL3_103	X	X	X	X		3
=	TC_BL3_104	X	X	X	X		4
=	TC_BL3_105	*	X	X	X	*) P137 not used in BL2.	5
=	TC_BL3_106	X*	X	X	X	*) Excluding step 1-5.	6
=	TC_BL3_107	X	X	X	X		7
=	TC_BL3_108	X	X	X	X		8
=	TC_BL3_109	X*	X	X	X	*) Excluding step 5-6.	9
=	TC_BL3_110	X	X	X	X		10
=	TC_BL3_111	X	X	X	X		11
=	TC_BL3_112	X	X	X			12
Normal train operation	TC_BL3_201	X	X	X	X		13
=	TC_BL3_202	X	X	X	X		14
=	TC_BL3_203	X	X	X	X		15
=	TC_BL3_204	*	X	X	X	*) P140 not supported in BL2.	16
=	TC_BL3_205	X	X	X	X		17
=	TC_BL3_206		X	X	X		18
=	TC_BL3_207		X	X	X		19
=	TC_BL3_208	*	X	X	X	*) P158 not supported in BL2.	20
=	TC_BL3_209	X	X	X	X		21
=	TC_BL3_210	X	X	X	X		22
=	TC_BL3_211	X	X	X	X		23
Management of TSR	TC_BL3_301	X	X	X	X		24
=	TC_BL3_302	X	X	X	X		25
=	TC_BL3_303	X	X	X	X		26
=	TC_BL3_304	X	X	X	X		27
=	TC_BL3_305	X	X	X	X		28
=	TC_BL3_306				X		29
Track description	TC_BL3_401	X*	X	X	X	*) Changed set of values representing axel load.	30

and mode profiles							
=	TC_BL3_402	X*	X	X	X	*) Changed set of values representing axel load.	31
=	TC_BL3_403	X	X	X	X		32
=	TC_BL3_404	N/A	N/A	N/A	N/A	Removed.	N/A
=	TC_BL3_405	*	X	X	X	*) P39 not used.	33
=	TC_BL3_406	*	X	X	X	*) P40 not supported.	34
=	TC_BL3_407	X	X	X	X		35
=	TC_BL3_408	*	X	X	X	*) Reversing area not used.	36
=	TC_BL3_409	X	X	X	X		37
=	TC_BL3_410	*	X	X	X	*) P67 not used.	38
=	TC_BL3_411	X	X	X	X		39
Emergency stop and MA shortening	TC_BL3_501	X	X	X	X		40
=	TC_BL3_502	X	X	X	X		41
=	TC_BL3_503	X*	X**	X	X	*) Release speed = 0. **) Requires CR478 for OK results.	42
=	TC_BL3_504	X	X	X	X		43
=	TC_BL3_505	X	X	X	X		44
=	TC_BL3_506	X	X	X	X		45
=	TC_BL3_507	X	X	X	X		46
=	TC_BL3_508	X	X	X	X		47
=	TC_BL3_509	X	X	X	X		48
Shunting	TC_BL3_601	X*	X	X	X	*) Step 2 d_validnv = 0 (Instead of now).	49
=	TC_BL3_602	*	X	X	X	*) P132 not used.	50
=	TC_BL3_603	X	X	X	X		51
=	TC_BL3_604	*	X	X	X	*) Shunting balise list not used.	52
=	TC_BL3_605	*	X	X	X	*) PS mode not used.	53
=	TC_BL3_606	X*	X	X	X	*) Step 9 d_validnv = 0 (Instead of now).	53
=	TC_BL3_607	*	X	X	X	*) Shunting balise list not used.	54
=	TC_BL3_608	*	X	X	X	*) PS mode not used.	55
RBC/RBC and Level transitions	TC_BL3_701	*	X	X	X	*) RBC/RBC border does not exist.	56
=	TC_BL3_702	*	X	X	X	*) RBC/RBC border does not exist.	57
=	TC_BL3_703	X	X	X	X		58
=	TC_BL3_704	X	X	X	X		59

=	TC_BL3_705	X	X	X	X		60
=	TC_BL3_706	X	X	X	X		61
=	TC_BL3_707	*	X	X	X	*) P90 not used.	62
=	TC_BL3_708	*	X	X	X	*) System M does not exist.	63
=	TC_BL3_709	X	X	X	X		64
=	TC_BL3_710	X	X	X	X		65
=	TC_BL3_711	X	X	X	X		66
=	TC_BL3_712	X	X	X	X		67
=	TC_BL3_713	*	X	X	X	*) Level 0 not used.	68
=	TC_BL3_714	*	X	X	X	*) Level 0 not used.	69
=	TC_BL3_715	*	X	X	X	*) Level 0 not used.	70
=	TC_BL3_716	*	X	X	X	*) Level 0 not used.	71
=	TC_BL3_717	*	X	X	X	*) Level 0 not used.	72
=	TC_BL3_718	*	X	X	X	*) Level 0 not used.	73
=	TC_BL3_719	*	X	X	X	*) Level 0 not used.	74
=	TC_BL3_720	X*	X	X	X	*) Registration not concluded due to missing train data ack.	75
=	TC_BL3_721	X	X	X	X		76
=	TC_BL3_722	X	X	X	X		77
=	TC_BL3_723	X	X	X	X		78
Level crossings	TC_BL3_801	X*	X	X	X	*) TSR instead of LX restriction.	79
=	TC_BL3_802	X*	X	X	X	*) TSR instead of LX restriction.	80
=	TC_BL3_803	X*	X	X	X	*) TSR instead of LX restriction.	81
=	TC_BL3_804		X	X	X		82
=	TC_BL3_805	X	X	X	X		83
=	TC_BL3_806	*	X	X	X	*) LX prepared does not exist.	84
=	TC_BL3_807	*	X	X	X	*) LX prepared does not exist.	85
=	TC_BL3_808	*	X	X	X	*) LX prepared does not exist.	86
=	TC_BL3_809	*			X	*) PBLX not used.	87
Other degraded situations	TC_BL3_901	X	X	X	X		88
=	TC_BL3_902	X	X	X	X		89
=	TC_BL3_903	X*	X	X	X	*) T_NVCONTACT = 100 s.	90
=	TC_BL3_904	X*	X	X	X	*) T_NVCONTACT = 100 s.	91
=	TC_BL3_905	X	X	X	X		92
=	TC_BL3_906	X	X	X	X		93
=	TC_BL3_907	X	X	X	X		94
=	TC_BL3_908	X	X	X	X		95

=	TC_BL3_909	*	X	X	X	*) VBC not used.	96
=	TC_BL3_910	*	X	X	X	*) VBC not used.	97
=	TC_BL3_911	*	X	X	X	*) VBC not used.	98
=	TC_BL3_912	*	X	X	X	*) VBC not used.	99
=	TC_BL3_913	*	X	X	X	*) Text combination not possible to achieve.	100
=	TC_BL3_914	X	X	X	X		101
=	TC_BL3_915	X	X	X	X		102
=	TC_BL3_916	X*	X	X	X	*) M_ERROR = 7 does not exist.	103
=	TC_BL3_917	*	X	X	X	*) RBC/RBC border does not exist.	104
=	TC_BL3_918	*	X	X	X	*) RBC/RBC border does not exist.	105
=	TC_BL3_919	*	X**	X	X	*) Function not supported in BL2. **) Step 6-8: N/A, instead, MA not further extended.	106
Packet switched data communication	TC_BL3_1001	*	X	X	X	*) GPRS not used.	107
=	TC_BL3_1002	*	X	X	X	*) GPRS not used.	108
=	TC_BL3_1003	*	X	X	X	*) GPRS not used.	109
=	TC_BL3_1004	*	X	X	X	*) GPRS not used.	110
=	TC_BL3_1005	*	X	X	X	*) GPRS not used.	111
=	TC_BL3_1006	*	X	X	X	*) GPRS not used.	112
=	TC_BL3_1007	*	X	X	X	*) GPRS not used.	113
=	TC_BL3_1008	*	X	X	X	*) GPRS not used.	114
=	TC_BL3_1009	*	X	X	X	*) GPRS not used.	115
=	TC_BL3_1010	*	X	X	X	*) GPRS not used.	116

*) Regarding table header “BL2”: This column concerns explicitly the test scope related to the last release of the remaining ERTMS line commissioned for Baseline 2 in Sweden, which is Haparandabanan.