



## ERTMS/ETCS

### FFFIS STM Test Cases of Functional identity 006

#### DATA AVAILABLE FUNCTIONALITY

**Total: 12 Test cases**

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Company	Technical Approval	Management approval
ALSTOM		
AZD		
CAF		
HITACHI RAIL STS		
MERMEC		
SIEMENS		
THALES		

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## Modification History

Issue Number Date	Section Number	Modification / Description	Author
0.0.1 01/07/2004	All	First version/review issued after WG meeting on the 16/06/2004 based on individual test case.	Ansaldo FB
0.0.2 01/09/2004	All	All test cases completed.	Ansaldo FB
0.0.3 06/09/2004	ALL	Update during UNISIG STM WG meeting in Madrid	Ansaldo FB
0.0.4 24/09/2004	ALL	Complete the review started during the STM WG meeting in Madrid	Ansaldo FB
0.0.5 22/10/2004	ALL	Add the packet STM_161 in test case 6.1.2.3.0.0.0 Add the packets STM_35 and STM_46 in test case 6.3.0.0.0.0.0.0 Update in Brussels meeting.	Ansaldo FB
0.0.11 30/11/2004	ALL	Update following Brussels meeting	Ansaldo FB
0.0.12 26/01/2005	ALL	Take into account traceability issue : (5.2.10.1.0 DMI); ;10.7.3.5.0 STM Indicator, button & sound + add test case for 10.7.3.5.0 STM Track data&track condition, override + slippery.	Ansaldo FB
0.1.0 27/01/2005		Editorial changes for delivery	F. Bernaudin (Ansaldo)
0.1.1 13/10/2005	6.5, 6.7 & 6.10	Take into account input and output to BIU and TIU.	F. Bernaudin (Ansaldo)
1.0.0 13/10/2005		Update version number for official release.	F. Bernaudin (Ansaldo)
1.0.1 11/04/2007		Updated due to comments received	R. Ramos
1.0.2 04/10/07		Updated due to the update of the specifications	R. Ramos
2.9.1 30/01/2013	All	Updated to be in line with Subset 35 issue 3.0.0 date 2010-02-29, SRS issue 3.3.0 date 2012-03-07 and ETCS DMI specification issue 3.3.0 date 2012-03-01	Invensys Rail Manuel Lorenzo

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2.9.2 30/08/2013	All	Updated according to 2 <sup>nd</sup> review process, see revision marks	Manuel Lorenzo
2.9.3 31/10/2013	Diagram 6g Test Case 6h.1 Test Case 6g.1	Updated according to CR 1158 (considering impact from CR 1148 and CR 1173 and STMWG comments)	Manuel Lorenzo
2.9.4 28/02/2014	Test Case 6h.1	Added "Step 3" (Train Running Number is changed)	Manuel Lorenzo
2.9.5 2014-04-24	Front page	Baseline 3 1 <sup>st</sup> Maintenance pre-release version	Thomas Mandry (Alstom)
3.0.0 2014-05-09	-	Baseline 3 1 <sup>st</sup> Maintenance release version	Philippe Prieels
3.0.1 2015-08-17	Diagram 6b Diagram 6c Test Case 6b.1 Test Case 6c.1 Test Case 6f.1 Test Case 6f.2	CR 1278: impact from CRs 1094 & 1242 and from STMWP review: Changes due to CR1242: Changes in requirement 11.1.1.1a applied to Diagrams 6b and 6c Review Results: Functionality related corrections in Test Cases 6b.1, 6c.1, 6f.1 and 6f.2, and other general minor corrections.	Amaia Uranga (CAF)
3.0.2 2015-10-19	No change to this part of the Subset	CR 1278: Updated according to SUBSET-074v301ERAreview	Thomas Mandry (Alstom)
3.1.0 2015-12-16	-	Baseline 3 2 <sup>nd</sup> release version	Thomas Mandry (Alstom)
Version 3.1.1 2022-09-29	Front page Diagram 6f Diagram 6i Test cases 6i.1 & 6i.2	Update of company list CR1307: "backwards" changed to "backward" CR1338: "airgap" changed to "trackside"	Thomas Mandry (Alstom)
Version 3.9.1 25/11/22	-	Formal update for the 2 <sup>nd</sup> consolidation review for Baseline 4 1 <sup>st</sup> release version	Sven Adomeit (Siemens)
Version 3.9.2 2023-02-16	-	Formal update for the 3 <sup>rd</sup> consolidation review for Baseline 4 1 <sup>st</sup> release version	Thomas Mandry (Alstom)
Version 3.9.4 2023-06-20	-	Formal update for the 4 <sup>th</sup> consolidation review for Baseline 4 1 <sup>st</sup> release version	Thomas Mandry (Alstom)
Version 4.0.0 05/07/2023	-	Baseline 4 1 <sup>st</sup> release version	Thomas Mandry (Alstom)

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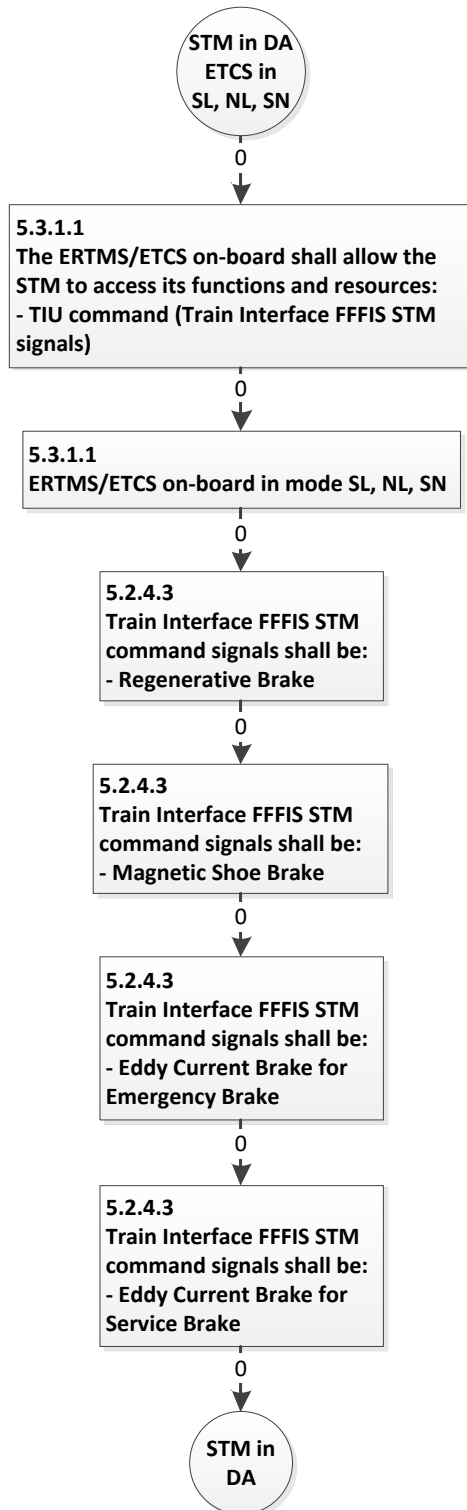


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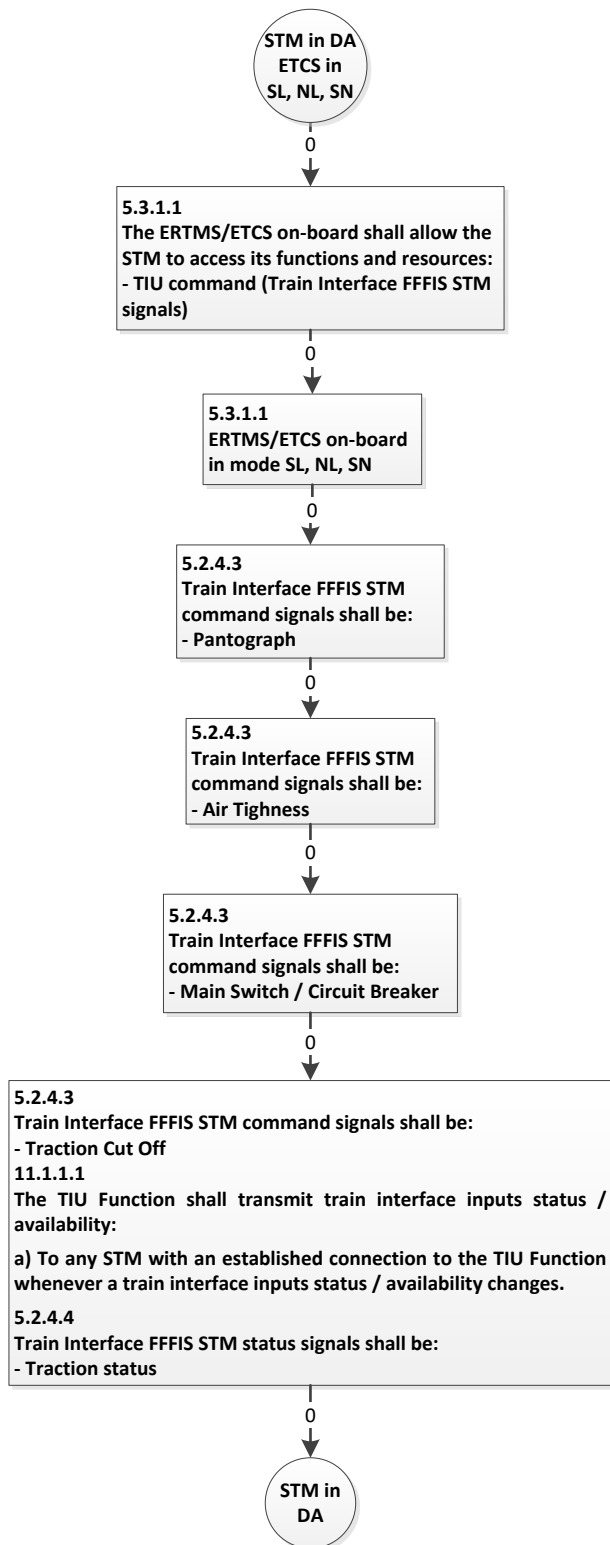
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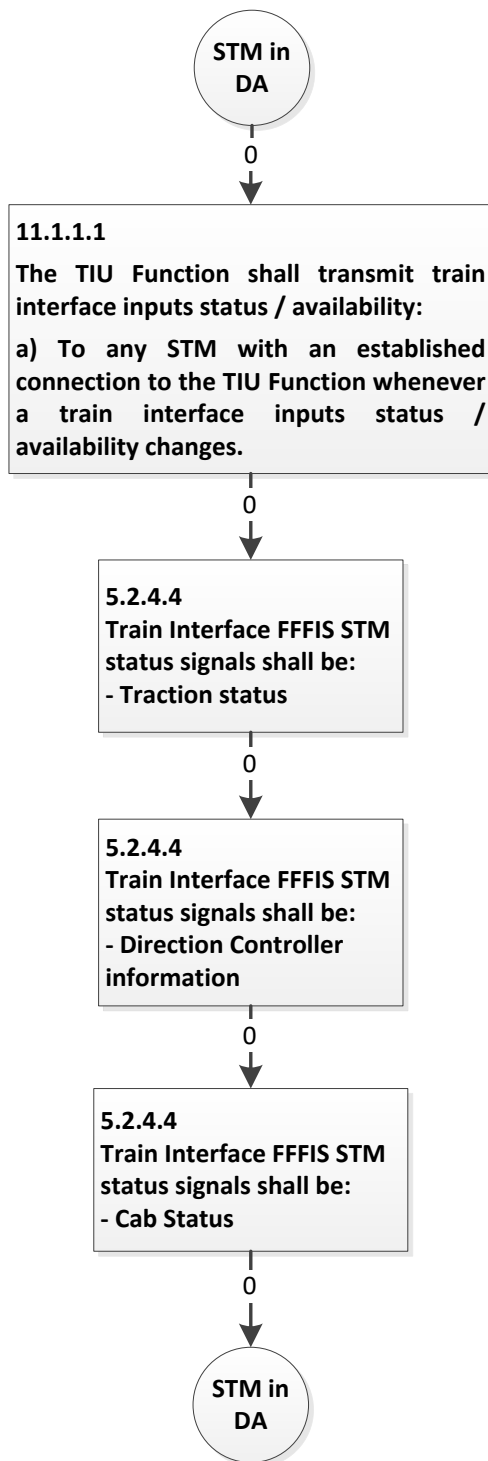
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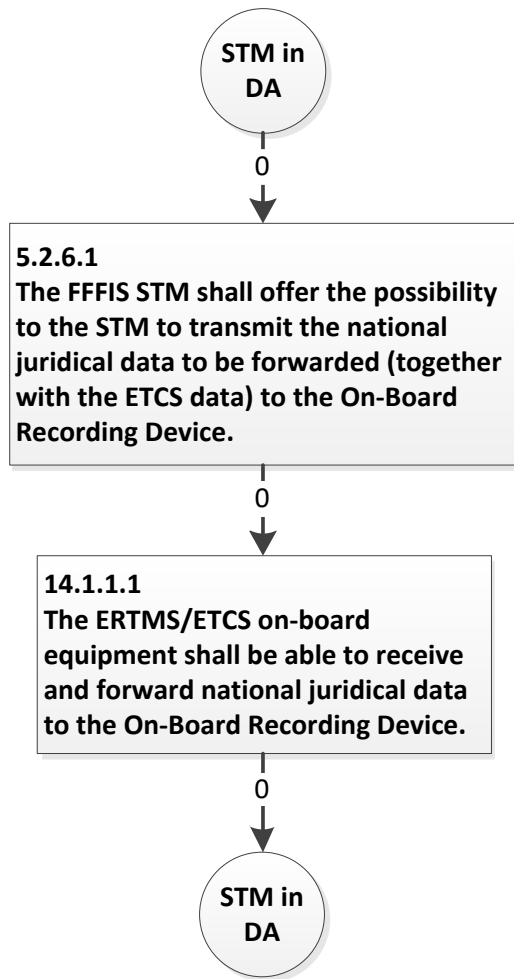
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6c

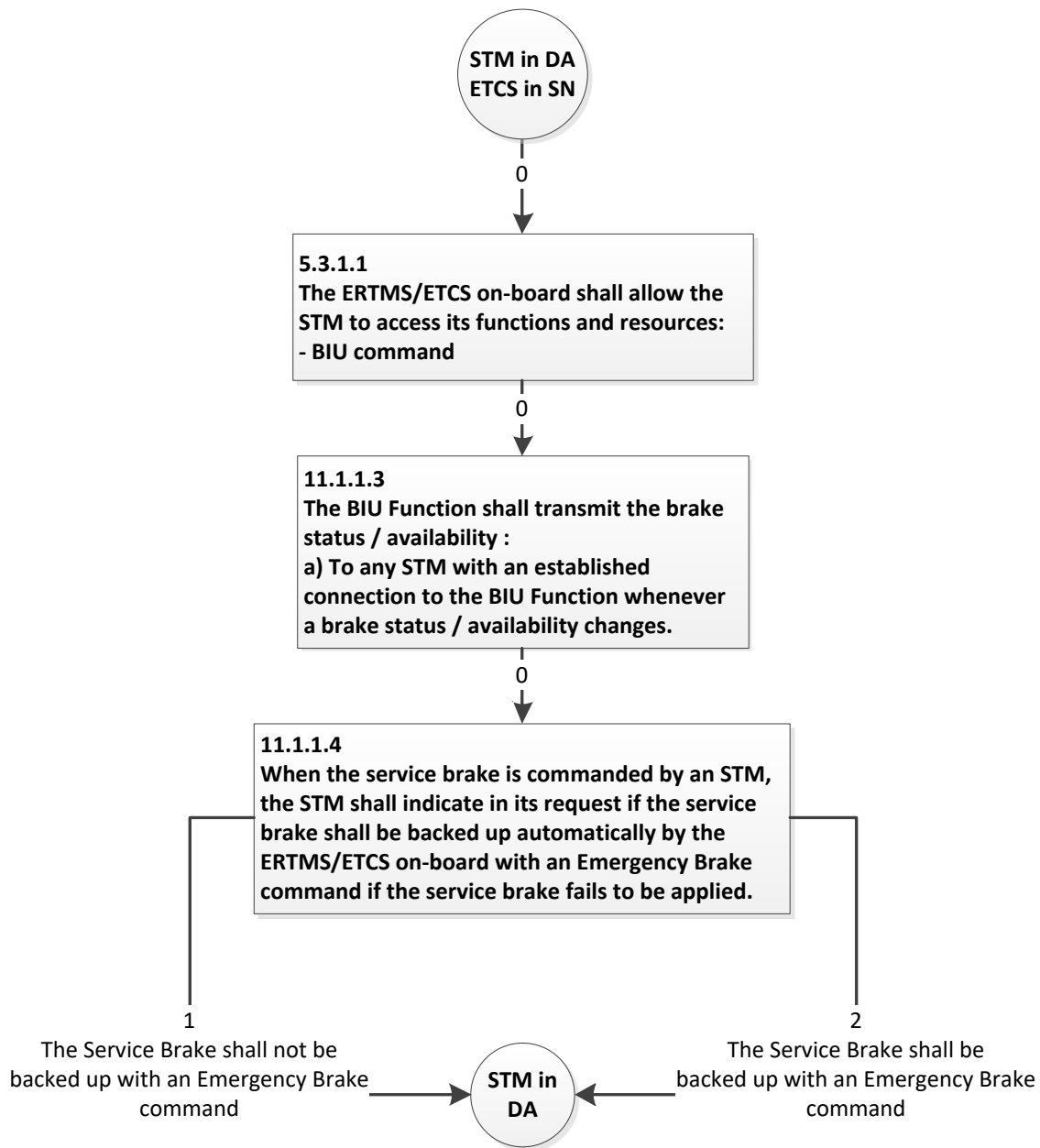


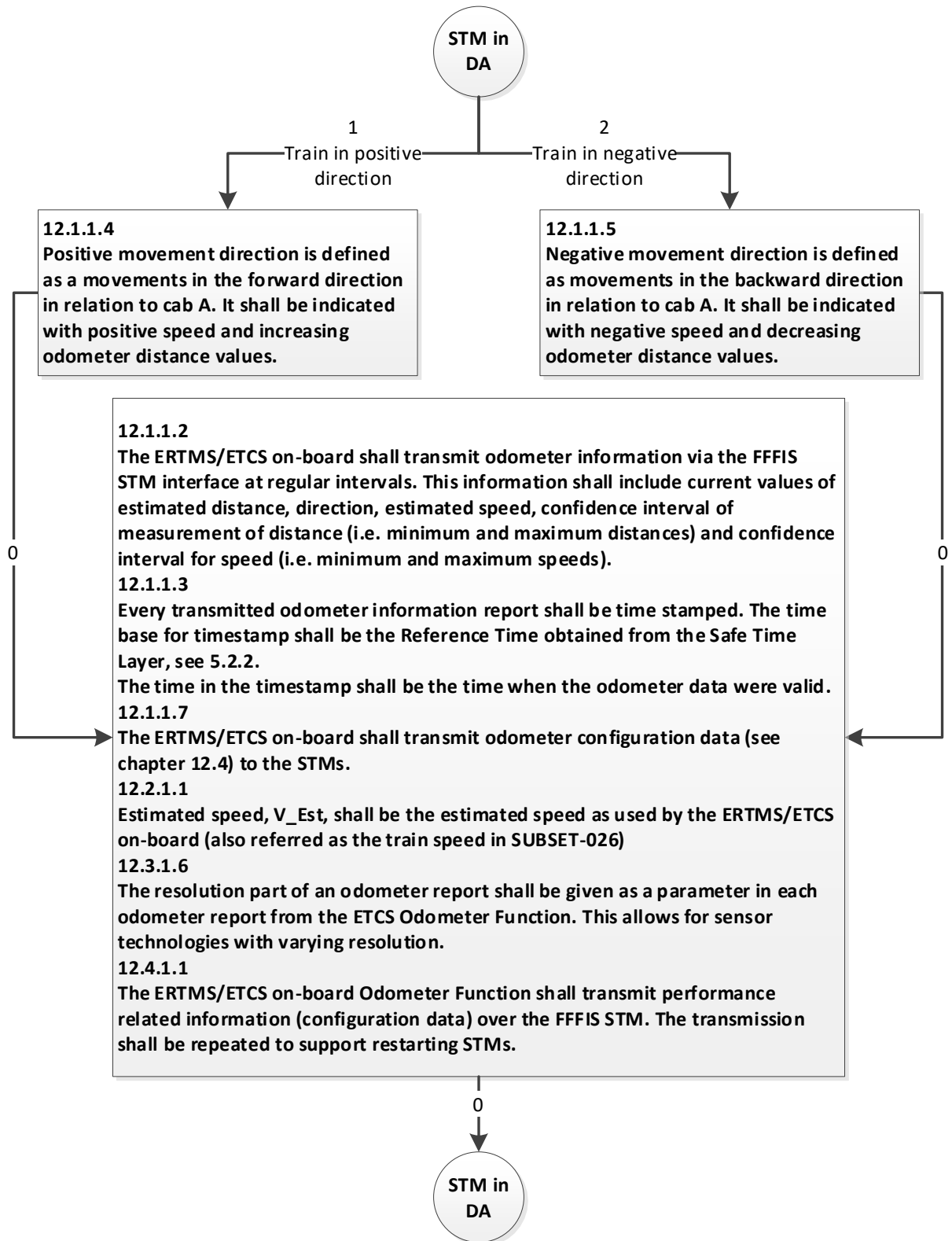
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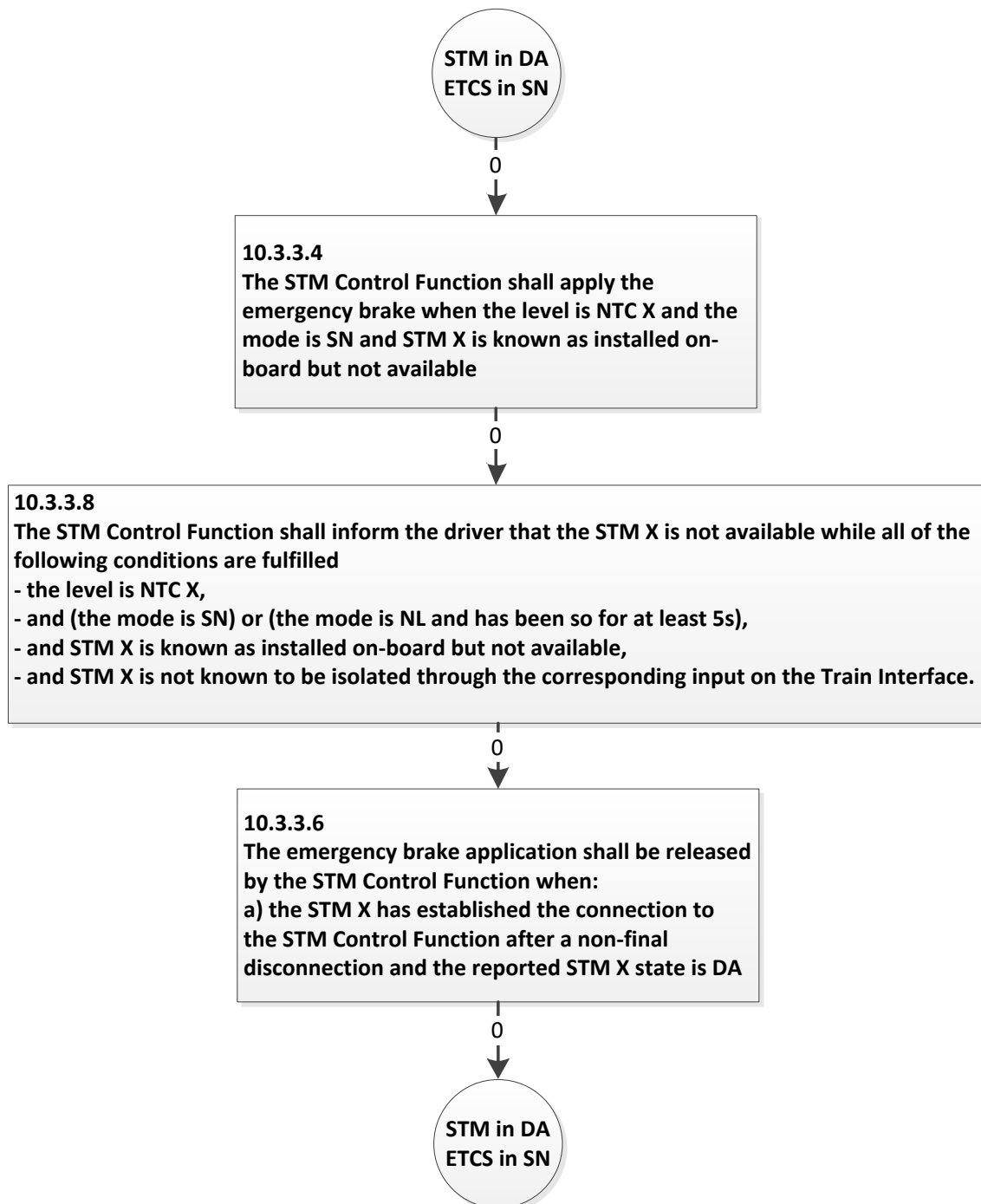


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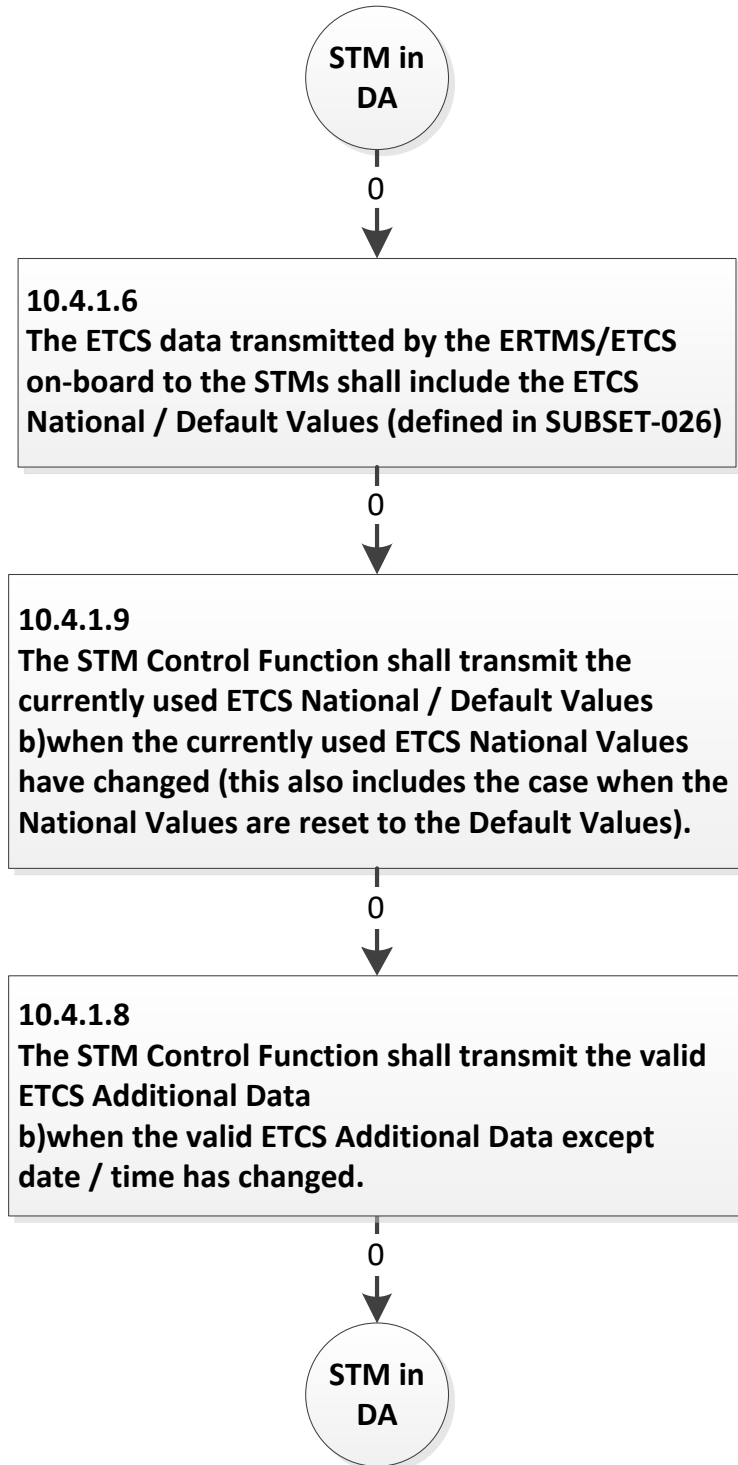




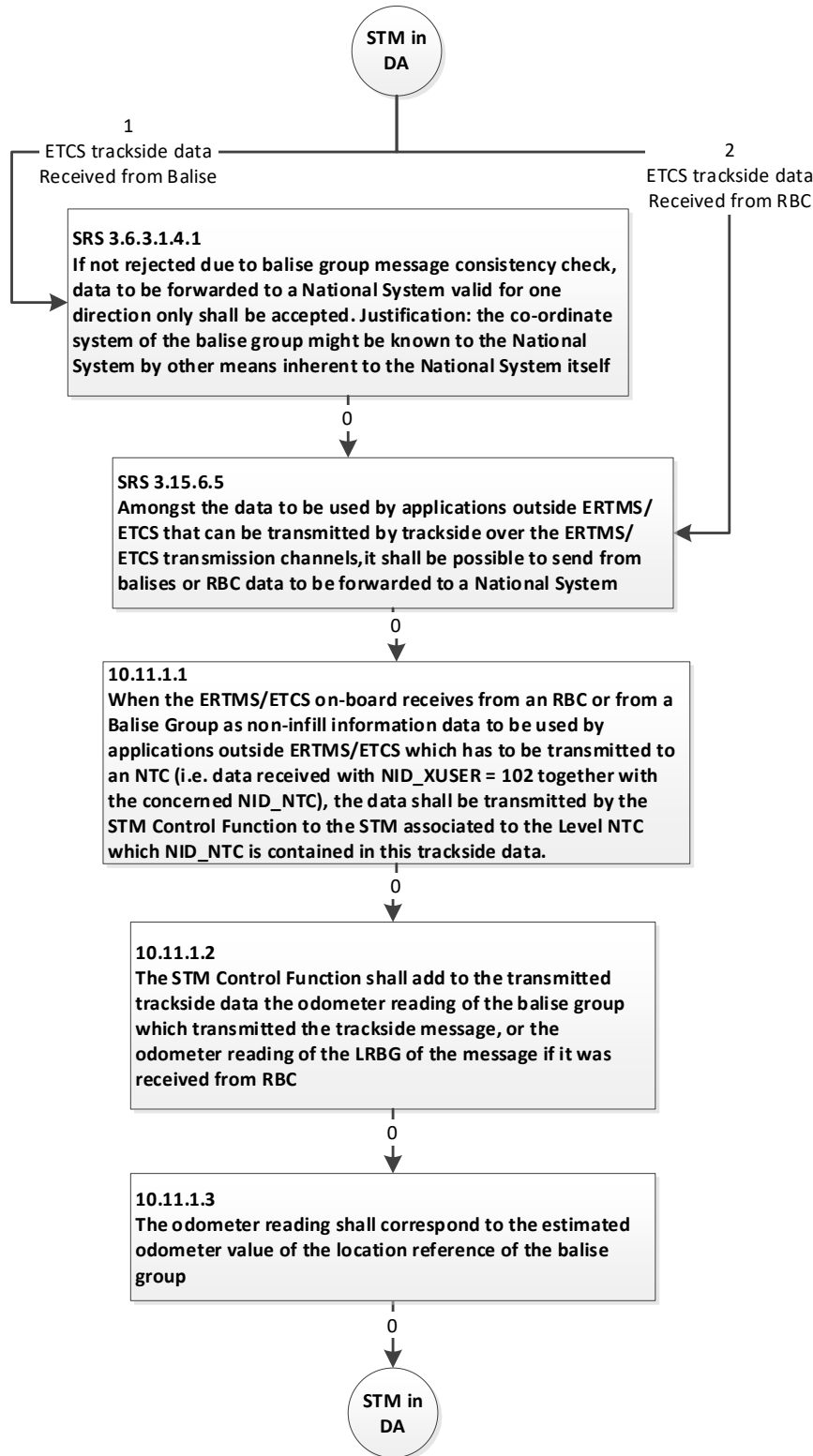
6g



6h



6i





## Supplier-specific delays table

#	Supplier of	Start time	End time
Ts1	ETCS	Timestamp of message including STM-130 "Traction Cut Off"	Timestamp of message including STM-139 "Traction status"
Ts2	ETCS	Timestamp of message including STM-161	Reference time at which the message to the On-Board Recording Device is sent
Ts3	ETCS	Timestamp of message including STM-128 "Apply SB"	Reference time at which the Service Brake braking is displayed
Ts4	ETCS	Reference time at which Service Brake failure occurs while commanded	Timestamp of message including STM-136 "SB not available"
Ts5	ETCS	Timestamp of message including STM-128 "Release SB"	Reference time at which the Service Brake braking is removed
Ts6	ETCS	Timestamp of message including STM-128 "Apply EB"	Reference time at which the Emergency Brake braking is displayed
Ts7	ETCS	Reference time at which Service Brake failure occurs while commanded	Reference time at which the Emergency Brake is applied
Ts8	ETCS	Reference time at which Service Brake failure occurs while commanded	Reference time at which the Emergency Brake braking is displayed
Ts9	ETCS	Reference time at which ETCS is powered on	Timestamp of message including STM-8
Ts10	ETCS	Reference time at which ETCS is powered on	Timestamp of message including STM-9
Ts11	ETCS	Reference time at which ETCS (with "sleeping" input signal activated) is powered on	Reference time at which the train is in Sleeping mode
Ts12	ETCS	Reference time at which Connection between STM and STM Control Function is cut	Reference time at which the Emergency Brake is applied
Ts13	ETCS	Reference time at which Connection between STM and STM Control Function is cut	Reference time at which the message "NTC X is not available" is displayed
Ts14	ETCS	Timestamp of message including STM-1	Reference time at which the Emergency Brake is released

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Ts15	ETCS	Timestamp of message including STM-1	Reference time at which the message “NTC X is not available” is removed
Ts16	ETCS	Reference time at which is received a message including "National Values" immediately applicable	Timestamp of message including STM-178
Ts17	ETCS	Reference time at which a balise group is received	Reference time at which a “Position Report” message is sent



## TEST CASE 6a.1

### TEST CASE HEADER

<b>Test Case Identification</b>	Data Available functionality
	6a.0.0.0.0.0.0.0
	Train interface command signals (STM specific brake control command)
<b>ERTMS/ETCS on-board Requirements Tested</b>	Subset-035 : 5.2.4.3 (special brakes), 5.3.1.1 (TIU command)
<b>STM Requirements Tested</b>	Subset-035: None
<b>Packets Transmitted via FFFIS STM</b>	STM-15, STM-129
<b>ERTMS/ETCS on-board Configuration</b>	
<b>Comments and constraints</b>	





Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SL, NL, SN	All of these modes (several test executions)
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Established	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Allow	
TIU Magnetic Shoes Brake Command	Allow	
TIU Eddy Current Brake Command for Emergency Brake	Allow	
TIU Eddy Current Brake Command for Service Brake	Allow	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	SL: No cab active NL/SN: Cab A or Cab B active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	

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#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM issues inhibition command signals for all brakes	PROF	T0	Message-1 (Packet STM-15; Packet STM-129)	TIU		Commands from STM forwarded to the train interface
2	The STM issues an allow command signal for "Regenerative Brake"	PROF	T0 + 5s	Message-2 (Packet STM-15; Packet STM-129)	TIU		Commands from STM forwarded to the train interface
3	The STM issues an allow command signal for "Magnetic shoes"	PROF	T0 + 10s	Message-3 (Packet STM-15; Packet STM-129)	TIU		Commands from STM forwarded to the train interface
4	The STM issues an allow command signal for "Eddy Current Brake for Emergency Brake"	PROF	T0 + 15s	Message-4 (Packet STM-15; Packet STM-129)	TIU		Commands from STM forwarded to the train interface
5	The STM issues an allow command signal for "Eddy Current Brake for Service Brake"	PROF	T0 + 20s	Message-5 (Packet STM-15; Packet STM-129)	TIU		Commands from STM forwarded to the train interface

#### STM Test Case

Not applicable



Message 1 (Packet STM-129) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	129	Packet identifier (STM-129)
L_PACKET	13	COMPUTED	Packet length
M_TIRB_CMD	2	10b	Suppress regenerative brake (off)
M_TIMSH_CMD	2	10b	Suppress MB (off)
M_TIEDCBEB_CMD	2	10b	Suppress eddy current brake for Emergency Brake command (off)
M_TIEDCBSB_CMD	2	10b	Suppress eddy current brake for Service Brake command (off)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 2 (Packet STM-129) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	129	Packet identifier (STM-129)
L_PACKET	13	COMPUTED	Packet length
M_TIRB_CMD	2	01b	Allow regenerative brake (on)
M_TIMSH_CMD	2	11b	No command from STM → Keep current output status
M_TIEDCBEB_CMD	2	11b	No command from STM → Keep current output status
M_TIEDCBSB_CMD	2	11b	No command from STM → Keep current output status
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 3 (Packet STM-129) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	129	Packet identifier (STM-129)
L_PACKET	13	COMPUTED	Packet length
M_TIRB_CMD	2	11b	No command from STM → Keep current output status
M_TIMSH_CMD	2	01b	Allow MB (on)
M_TIEDCBEB_CMD	2	11b	No command from STM → Keep current output status
M_TIEDCBSB_CMD	2	11b	No command from STM → Keep current output status
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 4 (Packet STM-129) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	129	Packet identifier (STM-129)
L_PACKET	13	COMPUTED	Packet length
M_TIRB_CMD	2	11b	No command from STM → Keep current output status
M_TIMSH_CMD	2	11b	No command from STM → Keep current output status
M_TIEDCBEB_CMD	2	01b	Allow eddy current brake for Emergency Brake command (on)
M_TIEDCBSB_CMD	2	11b	No command from STM → Keep current output status
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 5 (Packet STM-129) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	129	Packet identifier (STM-129)
L_PACKET	13	COMPUTED	Packet length
M_TIRB_CMD	2	11b	No command from STM → Keep current output status
M_TIMSH_CMD	2	11b	No command from STM → Keep current output status
M_TIEDCBEB_CMD	2	11b	No command from STM → Keep current output status
M_TIEDCBSB_CMD	2	01b	Allow eddy current brake for Service Brake command (on)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Unchanged	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Unchanged	
TIU Magnetic Shoes Brake Command	Unchanged	
TIU Eddy Current Brake Command for Emergency Brake	Unchanged	
TIU Eddy Current Brake Command for Service Brake	Unchanged	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	





## TEST CASE 6b.1

TEST CASE HEADER	
Test Case Identification	Data Available functionality
	6b.0.0.0.0.0.0.0
	Train interface command signals (STM commands to train interface)
ERTMS/ETCS on-board Requirements Tested	Subset-035 : 5.2.4.3, 5.2.4.4, 5.3.1.1 (TIU command), 11.1.1.1 a)
STM Requirements Tested	Subset-035: None
Packets Transmitted via FFFIS STM	STM-15, STM-130, STM-139
ERTMS/ETCS on-board Configuration	ERTMS/ETCS on-board must be configured for the complete set of train interface signals.
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SL, NL, SN	All of these modes (several test executions)
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Established	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Cut	
TIU Traction Status	On	
TIU Direction Controller Position Status	Neutral	
TIU Cab Status	SL: No cab active NL/SN: Cab A active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	

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#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM issues command signals for all TIU commands but brakes inhibition	PROF	T0	Message-1 (Packet STM-15; Packet STM-130)	TIU		Commands from STM forwarded to the train interface
2	The STM issues a "Pantograph" command signal	PROF	T0 + 5s	Message-2 (Packet STM-15; Packet STM-130)	TIU		Commands from STM forwarded to the train interface
3	The STM issues a "Air Tightness" command signal	PROF	T0 + 10s	Message-3 (Packet STM-15; Packet STM-130)	TIU		Commands from STM forwarded to the train interface
4	The STM issues an "Main Switch / Circuit Breaker" command signal	PROF	T0 + 15s	Message-4 (Packet STM-15; Packet STM-130)	TIU		Commands from STM forwarded to the train interface
5	The STM issues a "Traction Cut Off" command signal	PROF	T0 + 20s	Message-5 (Packet STM-15; Packet STM-130)	TIU		Commands from STM forwarded to the train interface
					PROF	Ts1	Message-6 (Packet STM-139) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.

#### STM Test Case

Not applicable



Message 1 (Packet STM-130) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	130	Packet identifier (STM-130)
L_PACKET	13	COMPUTED	Packet length
M_TIPANTO_CMD	2	10b	Pantograph lower
M_TIFLAP_CMD	2	10b	Flap close (air conditioning off)
M_TIMS_CMD	2	10b	Main switch open (off)
M_TITR_C_CMD	2	10b	No traction cut off
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

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Message 2 (Packet STM-130) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	130	Packet identifier (STM-130)
L_PACKET	13	COMPUTED	Packet length
M_TIPANTO_CMD	2	01b	Pantograph lift
M_TIFLAP_CMD	2	11b	No command from STM → Keep current output status
M_TIMS_CMD	2	11b	No command from STM → Keep current output status
M_TITR_C_CMD	2	11b	No command from STM → Keep current output status
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 3 (Packet STM-130) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	130	Packet identifier (STM-130)
L_PACKET	13	COMPUTED	Packet length
M_TIPANTO_CMD	2	11b	No command from STM → Keep current output status
M_TIFLAP_CMD	2	01b	Flap open (air conditioning on)
M_TIMS_CMD	2	11b	No command from STM → Keep current output status
M_TITR_C_CMD	2	11b	No command from STM → Keep current output status
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 4 (Packet STM-130) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	130	Packet identifier (STM-130)
L_PACKET	13	COMPUTED	Packet length
M_TIPANTO_CMD	2	11b	No command from STM → Keep current output status
M_TIFLAP_CMD	2	11b	No command from STM → Keep current output status
M_TIMS_CMD	2	01b	Main switch close (on)
M_TITR_C_CMD	2	11b	No command from STM → Keep current output status
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 5 (Packet STM-130) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	130	Packet identifier (STM-130)
L_PACKET	13	COMPUTED	Packet length
M_TIPANTO_CMD	2	11b	No command from STM → Keep current output status
M_TIFLAP_CMD	2	11b	No command from STM → Keep current output status
M_TIMS_CMD	2	11b	No command from STM → Keep current output status
M_TITR_C_CMD	2	01b	Traction cut off
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked





Message 6 (Packet STM-139) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	139	Packet identifier (STM-139)
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	01b	Traction off
M_TIDIR_STATUS	3	010b	Neutral
M_TICAB_STATUS	2	11b	SL: No Cab active
		01b	NL/SN: Cab A active
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Unchanged	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Lift	
TIU Air Tightness Command	Open	
TIU Main Switch / Circuit Breaker Command	Closed	
TIU Traction Cut Off Command	Cut	
TIU Traction Status	Off	
TIU Direction Controller Position Status	Unchanged	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## TEST CASE 6c.1

### TEST CASE HEADER

<b>Test Case Identification</b>	Data Available functionality
	6c.0.0.0.0.0
	Train interface command and status signals
<b>ERTMS/ETCS on-board Requirements Tested</b>	Subset-035 : 5.2.4.4, 11.1.1.1 a)
<b>STM Requirements Tested</b>	Subset-035: None
<b>Packets Transmitted via FFFIS STM</b>	STM-15, STM-130, STM-139
<b>ERTMS/ETCS on-board Configuration</b>	
<b>Comments and constraints</b>	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Standstill	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Established	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	On	
TIU Direction Controller Position Status	Forward	
TIU Cab Status	Cab A active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



# ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM issues command signals for all TIU commands (but brakes) inhibition	PROF	T0	Message-1 (Packet STM-15; Packet STM-130)	TIU		Commands from STM forwarded to the train interface
2	The STM issues a "Traction Cut Off" command signal	PROF	T0 + 5s	Message-2 (Packet STM-15; Packet STM-130)	TIU		Commands from STM forwarded to the train interface
					PROF	Ts1	Message-3 (Packet STM-139) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.
3	Direction controller change from Forward to Neutral	TIU	T0 + 10s	Direction controller change from Forward to Neutral	PROF		Message-4 (Packet STM-139) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.
4	Direction controller change from Neutral to Backward	TIU	T0 + 15s	Direction controller change from Neutral to Backward	PROF		Message-5 (Packet STM-139) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.
5	Direction controller change from Backward to Neutral	TIU	T0 + 20s	Direction controller change from Backward to Neutral	PROF		Message 4 (Packet STM-139) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.
6	Direction controller change from Neutral to Forward	TIU	T0 + 25s	Direction controller change from Neutral to Forward	PROF		Message 3 (Packet STM-139) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.
7	Cab A closed	TIU	T0 + 30s	Cab A closed	PROF		Message 6 (Packet STM-139) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.
8	Cab B active	TIU	T0 + 35s	Cab B active	PROF		Message 7 (Packet STM-139) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.

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STM Test Case

Not applicable

Message 1 (Packet STM-130) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	130	Packet identifier (STM-130)
L_PACKET	13	COMPUTED	Packet length
M_TIPANTO_CMD	2	10b	Pantograph lower
M_TIFLAP_CMD	2	10b	Flap close (air conditioning off)
M_TIMS_CMD	2	10b	Main switch open (off)
M_TITR_C_CMD	2	10b	No traction cut off
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

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Message 2 (Packet STM-130) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	130	Packet identifier (STM-130)
L_PACKET	13	COMPUTED	Packet length
M_TIPANTO_CMD	2	11b	No command from STM → Keep current output status
M_TIFLAP_CMD	2	11b	No command from STM → Keep current output status
M_TIMS_CMD	2	11b	No command from STM → Keep current output status
M_TITR_C_CMD	2	01b	Traction cut off
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

Message 3 (Packet STM-139) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	139	Packet identifier (STM-139)
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	01b	Traction off
M_TIDIR_STATUS	3	001b	Forward
M_TICAB_STATUS	2	01b	Cab A active
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

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Message 4 (Packet STM-139) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	139	Packet identifier (STM-139)
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	01b	Traction off
M_TIDIR_STATUS	3	010b	Neutral
M_TICAB_STATUS	2	01b	Cab A active
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

Message 5 (Packet STM-139) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	139	Packet identifier (STM-139)
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	01b	Traction off
M_TIDIR_STATUS	3	100b	Backward
M_TICAB_STATUS	2	01b	Cab A active
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked





Message 6 (Packet STM-139) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	139	Packet identifier (STM-139)
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	01b	Traction off
M_TIDIR_STATUS	3	001b	Forward
M_TICAB_STATUS	2	11b	No cab active
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

Message 7 (Packet STM-139) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	139	Packet identifier (STM-139)
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	01b	Traction off
M_TIDIR_STATUS	3	001b	Forward
M_TICAB_STATUS	2	10b	Cab B active
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Unchanged	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Unchanged	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Cut	Traction cut off
TIU Traction Status	Off	
TIU Direction Controller Position Status	Forward	
TIU Cab Status	Cab B active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## TEST CASE 6d.1

### TEST CASE HEADER

<b>Test Case Identification</b>	Data Available functionality
	6d.0.0.0
	STM information to the On-Board Recording Device
<b>ERTMS/ETCS on-board Requirements Tested</b>	Subset-035 : 5.2.6.1, 14.1.1.1
<b>STM Requirements Tested</b>	Subset-035: None
<b>Packets Transmitted via FFFIS STM</b>	STM-15, STM-161
<b>ERTMS/ETCS on-board Configuration</b>	
<b>Comments and constraints</b>	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Established	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM sends juridical data	PROF	T0	Message-1 (Packet STM-15; Packet STM-161)	JD	Ts2	Message-2 (STM INFORMATION)

#### STM Test Case

Not applicable



Message 1 (Packet STM-161) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	161	Packet identifier (STM-161)
L_PACKET	13	COMPUTED	Packet length
T_JD	32	FINITE VALUE	Time Stamp
N_LITER	8	18	Number of iterations of a data set following
M_DATA(1)	8	"S"	
M_DATA(2)	8	"T"	
M_DATA(3)	8	"M"	
M_DATA(4)	8	" "	
M_DATA(5)	8	"J"	
M_DATA(6)	8	"u"	
M_DATA(7)	8	"r"	
M_DATA(8)	8	"i"	
M_DATA(9)	8	"d"	
M_DATA(10)	8	"l"	
M_DATA(11)	8	"c"	
M_DATA(12)	8	"a"	
M_DATA(13)	8	"l"	
M_DATA(14)	8	" "	
M_DATA(15)	8	"D"	
M_DATA(16)	8	"a"	

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Message 1 (Packet STM-161) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
M_DATA(17)	8	"t"	
M_DATA(18)	8	"a"	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 2 : ETCS → On-Board Recording Device			
VARIABLE	Length	VALUE	COMMENTS
NID_MESSAGE	8	14	Message identification number (STM INFORMATION)
L_MESSAGE	11	COMPUTED	Message length
YEAR	7	FINITE VALUE	Official year
MONTH	4	FINITE VALUE	Official month
DAY	5	FINITE VALUE	Official day
HOURL	5	FINITE VALUE	Official hour
MINUTES	6	FINITE VALUE	Official minutes
SECONDS	6	FINITE VALUE	Official seconds
TTS	5	FINITE VALUE	Official hundredth of second
Q_SCALE	2	FINITE VALUE	Qualifier for the distance scale (10cm, 1m, 10m)
NID_LRBG	10 + 14	FINITE VALUE	Identity of last relevant balise group
D_LRBG	15	FINITE VALUE	Distance between the last relevant balise group and the estimated front end of the train (depends on Q_SCALE)
Q_DIRLRBG	2	FINITE VALUE	Orientation of the train in relation to the direction of the LRBG
Q_DLRBG	2	FINITE VALUE	Qualifier telling on which side of the LRBG the estimated front end is
L_DOUBTOVER	15	FINITE VALUE	Over-reading amount plus the Q_LOCACC (accuracy of the balise location) of the LRBG
L_DOUBTUNDER	15	FINITE VALUE	Under-reading amount plus the Q_LOCACC (accuracy of the balise location) of the LRBG
V_TRAIN	10	FINITE VALUE	Current train speed
DRIVER_ID	128	FINITE VALUE	Driver identifier
NID_ENGINE	24	FINITE VALUE	The ETCS identity number is uniquely defined for ERTMS/ETCS purposes
M_VERSION	7	010 0000	Version of the ETCS system (Version 2.0, introduced in SRS 3.3.0)
M_LEVEL	3	1	Current Operating level (Level NTC)

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Message 2 : ETCS → On-Board Recording Device			
VARIABLE	Length	VALUE	COMMENTS
M_MODE	4	13	On-board Operating mode (National System)
NID_STMX	8	FINITE VALUE	STM identification
NID_STMEVENT	2	2	STM Event type (Reception/sending of STM packet)
NID_STMPACKET	8	161	STM packet identification (NTC juridical data from STM)
L_STMPACKET	13	FINITE VALUE	Length of STM packet (L_STMPACKET = L_PACKET of Message 1)
T_JD	32	FINITE VALUE	Time Stamp
N_LITER	8	18	Number of iterations of a data set following
M_DATA(1)	8	"S"	
M_DATA(2)	8	"T"	
M_DATA(3)	8	"M"	
M_DATA(4)	8	" "	
M_DATA(5)	8	"J"	
M_DATA(6)	8	"u"	
M_DATA(7)	8	"r"	
M_DATA(8)	8	"l"	
M_DATA(9)	8	"d"	
M_DATA(10)	8	"i"	
M_DATA(11)	8	"c"	
M_DATA(12)	8	"a"	
M_DATA(13)	8	"l"	
M_DATA(14)	8	" "	
M_DATA(15)	8	"D"	
M_DATA(16)	8	"a"	
M_DATA(17)	8	"t"	
M_DATA(18)	8	"a"	

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Message 2 : ETCS → On-Board Recording Device			
VARIABLE	Length	VALUE	COMMENTS
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Unchanged	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Unchanged	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## TEST CASE 6e.1

### TEST CASE HEADER

<b>Test Case Identification</b>	Data Available functionality
	6e.0.0.0.1
	Brake interface command access. The Service Brake shall not be backed up with an Emergency Brake command
<b>ERTMS/ETCS on-board Requirements Tested</b>	Subset-035 : 5.3.1.1 (BIU command), 11.1.1.3 a), 11.1.1.4
<b>STM Requirements Tested</b>	Subset-035: None
<b>Packets Transmitted via FFFIS STM</b>	STM-15, STM-128, STM-136
<b>ERTMS/ETCS on-board Configuration</b>	
<b>Comments and constraints</b>	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Established	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Release	
BIU Service Brake Command	Release	
BIU Emergency Brake Status	Available	
BIU Service Brake Status	Available	
NTC isolation status	Not isolated	



#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM issues a "Service brake" command to apply the Service Brake	PROF	T0	Message-1 (Packet STM-15; Packet STM-128)	TIU		Commands from STM forwarded to the train interface
					DMI	Ts3	Commands from STM forwarded to the DMI
2	The Service Brake fails (The way to provoke the Service Brake failure is specific to the ERTMS/ETCS on-board supplier)	TIU	T0 + 5s	The Service Brake fails	PROF	Ts4	Message-2 (Packet STM-136) is sent by the ERTMS /ETCS on-board to notify the STM about the change of status.
					TIU		ERTMS/ETCS on-board does not apply the Emergency Brake
3	The STM issues a "Service brake" command to release the Service Brake	PROF	T0 + 10s	Message-3 (Packet STM-15; Packet STM-128)	TIU		Commands from STM forwarded to the train interface
					DMI	Ts5	Commands from STM forwarded to the DMI
4	The STM issues a "Emergency brake" command to apply the Emergency Brake	PROF	T0 + 11s	Message-4 (Packet STM-15; Packet STM-128)	TIU		Commands from STM forwarded to the train interface
					DMI	Ts6	Commands from STM forwarded to the DMI

#### STM Test Case

Not applicable



Message 1 (Packet STM-128) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	128	Packet identifier (STM-128)
L_PACKET	13	COMPUTED	Packet length
M_BIEB_CMD	2	11b	No command from STM → Keep current output status
M_BISB_CMD	2	01b	Apply SB
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

Message 2 (Packet STM-136) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	136	Packet identifier (STM-136)
L_PACKET	13	COMPUTED	Packet length
M_BIEB_STATUS	2	10b	Available
M_BISB_STATUS	2	00b	Fail
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

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Message 3 (Packet STM-128) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	128	Packet identifier (STM-128)
L_PACKET	13	COMPUTED	Packet length
M_BIEB_CMD	2	11b	No command from STM → Keep current output status
M_BISB_CMD	2	10b	Release SB
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

Message 4 (Packet STM-128) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	128	Packet identifier (STM-128)
L_PACKET	13	COMPUTED	Packet length
M_BIEB_CMD	2	01b	Apply EB
M_BISB_CMD	2	11b	No command from STM → Keep current output status
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

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End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	The train could be moving while braking or could have reached standstill
ETCS Train Data	Unchanged	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Unchanged	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Apply	
BIU Service Brake Command	Unchanged	
BIU Emergency Brake Status	Unchanged	
BIU Service Brake Status	Fail status	
NTC isolation status	Unchanged	



## TEST CASE 6e.2

TEST CASE HEADER	
Test Case Identification	Data Available functionality
	6e.0.0.0.2
	Brake interface command access. The Service Brake shall be backed up with an Emergency Brake command
ERTMS/ETCS on-board Requirements Tested	Subset-035 : 5.3.1.1 (BIU command), 11.1.1.3 a), 11.1.1.4
STM Requirements Tested	Subset-035: None
Packets Transmitted via FFFIS STM	STM-15, STM-128
ERTMS/ETCS on-board Configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Established	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Release	
BIU Service Brake Command	Release	
BIU Emergency Brake Status	Available	
BIU Service Brake Status	Available	
NTC isolation status	Not isolated	



#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The STM issues a "Service brake" command to apply the Service Brake	PROF	T0	Message-1 (Packet STM-15; Packet STM-128)	TIU		Commands from STM forwarded to the train interface
					DMI	Ts3	Commands from STM forwarded to the DMI
2	The Service Brake fails (The way to provoke the Service Brake failure is specific to the ERTMS/ETCS on-board supplier)	TIU	T0 + 5s	The Service Brake fails	TIU	Ts7	ETCS/ERTMS on-board applies the Emergency Brake
					DMI	Ts8	The Emergency Brake application is indicated on the DMI

#### STM Test Case

Not applicable



Message 1 (Packet STM-128) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
NID_PACKET	8	128	Packet identifier (STM-128)
L_PACKET	13	COMPUTED	Packet length
M_BIEB_CMD	2	11b	No command from STM → Keep current output status
M_BISB_CMD	2	00b	Apply SB, or EB in case the SB fails to be applied
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Standstill	
ETCS Train Data	Unchanged	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Unchanged	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Apply	
BIU Service Brake Command	Apply with EB fall-back	
BIU Emergency Brake Status	Unchanged	
BIU Service Brake Status	Fail status	
NTC isolation status	Unchanged	



## TEST CASE 6f.1

TEST CASE HEADER	
Test Case Identification	Data Available functionality
	6f.1.0.0
	Odometer information (positive movement)
ERTMS/ETCS on-board Requirements Tested	Subset-035 : 12.1.1.2, 12.1.1.3, 12.1.1.4, 12.1.1.7, 12.2.1.1, 12.3.1.6, 12.4.1.1
STM Requirements Tested	Subset-035: None
Packets Transmitted via FFFIS STM	STM-8, STM-9
ERTMS/ETCS on-board Configuration	
Comments and constraints	The “sleeping” input signal is activated. All desks connected to the ERTMS/ETCS on-board equipment are closed.



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SL	
ETCS Level	NTC	
Train State	Standstill	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	No cab active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not Relevant	





# ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The train is at Standstill	-	T0		PROF	Ts9	Message-1 (Packet STM-8) Odometer multicast
					PROF	Ts10	Message-2 (Packet STM-9)
2	The train begins to move in positive direction with an acceleration of 1 m/s <sup>2</sup>	ODO	T1 = Max (Ts9, Ts10, Ts11)	Movement in positive direction with an acceleration of 1 m/s <sup>2</sup>	PROF		Message-3 (Packet STM-8) Odometer multicast
					PROF	7s	Message-2 (Packet STM-9)
3	Train is accelerating to reach a speed of 20 m/s	ODO	T1+ 7s	Movement in positive direction with an acceleration of 1 m/s <sup>2</sup>	PROF		Message-4 (Packet STM-8) Odometer multicast <ul style="list-style-type: none"> <li>D_MIN ≤ D_EST ≤ D_MAX</li> <li>V_MIN ≤ V_EST ≤ V_MAX</li> <li>V_XXX &gt; 0</li> <li>V_XXX (Message-4) &gt; V_XXX (Message-3)</li> </ul>
					PROF	7s	Message-2 (Packet STM-9)
4	The train reaches a speed of 20 m/s	ODO	T1 + 20s	Movement in positive direction at constant speed	PROF		Message-5 (Packet STM-8) Odometer multicast <ul style="list-style-type: none"> <li>D_MIN ≤ D_EST ≤ D_MAX</li> <li>V_MIN ≤ V_EST ≤ V_MAX</li> <li>V_XXX &gt; 0</li> <li>V_XXX (Message-5) &gt; V_XXX (Message-4)</li> </ul>
					PROF	7s	Message-2 (Packet STM-9)

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Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
5	The train runs at a constant speed of 20 m/s	ODO	T1 + 27s	Movement in positive direction at constant speed	PROF		Message-6 (Packet STM-8) Odometer multicast <ul style="list-style-type: none"> <li>• <math>D\_MIN \leq D\_EST \leq D\_MAX</math></li> <li>• <math>V\_MIN \leq V\_EST \leq V\_MAX</math></li> <li>• <math>V\_XXX &gt; 0</math></li> <li>• <math>V\_XXX \text{ (Message-6)} = V\_XXX \text{ (Message-5)}(*)</math></li> </ul> (*)With a margin of $\pm 1$ Km/h
					PROF	7s	Message-2 (Packet STM-9)
					DMI		Commands from STM forwarded to the DMI The speed displayed must be the same as $V\_EST$ within Packet STM-8 (*) (*) With a margin of $\pm 1$ Km/h

STM Test Case

Not applicable



Message 1 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	0	Standstill
V_EST	16	0	Standstill
V_MIN	16	0	Standstill
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 2 (Packet STM-9) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	9	Packet identifier (STM-9)
L_PACKET	13	COMPUTED	Packet length
T_ODOCYCLE	8	FINITE VALUE	
T_ODOMAXPROD	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 3 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	Positive or null value
V_EST	16	FINITE VALUE	Positive or null value
V_MIN	16	FINITE VALUE	Positive or null value
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 4 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	Positive value
V_EST	16	FINITE VALUE	Positive value
V_MIN	16	FINITE VALUE	Positive value
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 5 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	Positive value
V_EST	16	FINITE VALUE	Positive value
V_MIN	16	FINITE VALUE	Positive value
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 6 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	Positive value
V_EST	16	FINITE VALUE	Positive value
V_MIN	16	FINITE VALUE	Positive value
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked





End Conditions	Value	Comments
STM State	DA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Moving	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not Relevant	



## TEST CASE 6f.2

TEST CASE HEADER	
Test Case Identification	Data Available functionality
	6f.2.0.0
	Odometer information (negative movement)
ERTMS/ETCS on-board Requirements Tested	Subset-035 : 12.1.1.2, 12.1.1.3, 12.1.1.5, 12.1.1.7, 12.2.1.1, 12.3.1.6, 12.4.1.1
STM Requirements Tested	Subset-035: None
Packets Transmitted via FFFIS STM	STM-8, STM-9
ERTMS/ETCS on-board Configuration	
Comments and constraints	<p>The “sleeping” input signal is activated.</p> <p>All desks connected to the ERTMS/ETCS on-board equipment are closed.</p>



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SL	
ETCS Level	NTC	
Train State	Standstill	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	No cab active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not Relevant	



# ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The train is at Standstill	-	T0		PROF	Ts9	Message-1 (Packet STM-8) Odometer multicast
					PROF	Ts10	Message-2 (Packet STM-9)
2	The train begins to move in negative direction with an acceleration of 1 m/s <sup>2</sup>	ODO	T1 = Max (Ts9, Ts10, Ts11)	Movement in negative direction with an acceleration of 1 m/s <sup>2</sup>	PROF		Message-3 (Packet STM-8) Odometer multicast
					PROF	7s	Message-2 (Packet STM-9)
3	Train is accelerating to reach a speed of 20 m/s	ODO	T1 + 7s	Movement in negative direction with an acceleration of 1 m/s <sup>2</sup>	PROF		Message-4 (Packet STM-8) Odometer multicast <ul style="list-style-type: none"> <li>D_MIN ≤ D_EST ≤ D_MAX</li> <li>V_MIN ≤ V_EST ≤ V_MAX</li> <li>V_XXX &lt; 0</li> <li>V_XXX (Message-4) &lt; V_XXX (Message-3)</li> </ul>
					PROF	7s	Message-2 (Packet STM-9)
4	The train reaches a speed of 20 m/s	ODO	T1 + 20s	Movement in negative direction at constant speed	PROF		Message-5 (Packet STM-8) Odometer multicast <ul style="list-style-type: none"> <li>D_MIN ≤ D_EST ≤ D_MAX</li> <li>V_MIN ≤ V_EST ≤ V_MAX</li> <li>V_XXX &lt; 0</li> <li>V_XXX (Message-5) &lt; V_XXX (Message-4)</li> </ul>
					PROF	7s	Message-2 (Packet STM-9)

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Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
5	The train runs at a constant speed of 20 m/s	ODO	T1 + 27s	Movement in negative direction at constant speed	PROF		Message-6 (Packet STM-8) Odometer multicast <ul style="list-style-type: none"> <li>• <math>D\_MIN \leq D\_EST \leq D\_MAX</math></li> <li>• <math>V\_MIN \leq V\_EST \leq V\_MAX</math></li> <li>• <math>V\_XXX &lt; 0</math></li> <li>• <math>V\_XXX \text{ (Message-6)} \leq V\_XXX \text{ (Message-5)}</math></li> </ul>
					PROF	7s	Message-2 (Packet STM-9)
					DMI		Commands from STM forwarded to the DMI The speed displayed must the same as the absolute value of V_EST within Packet STM-8 (*) (*)With a margin of $\pm 1$ Km/h

STM Test Case

Not applicable



Message 1 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	0	Standstill
V_EST	16	0	Standstill
V_MIN	16	0	Standstill
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 2 (Packet STM-9) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	9	Packet identifier (STM-9)
L_PACKET	13	COMPUTED	Packet length
T_ODOCYCLE	8	FINITE VALUE	
T_ODOMAXPROD	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 3 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	Negative or null value
V_EST	16	FINITE VALUE	Negative or null value
V_MIN	16	FINITE VALUE	Negative or null value
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked





Message 4 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	Negative value
V_EST	16	FINITE VALUE	Negative value
V_MIN	16	FINITE VALUE	Negative value
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 5 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	Negative value
V_EST	16	FINITE VALUE	Negative value
V_MIN	16	FINITE VALUE	Negative value
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 6 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	Negative value
V_EST	16	FINITE VALUE	Negative value
V_MIN	16	FINITE VALUE	Negative value
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	DA	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Moving	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not Relevant	



## TEST CASE 6g.1

TEST CASE HEADER	
Test Case Identification	Data Available functionality
	6g.0.0.0
	STM reconnection after non-final disconnection
ERTMS/ETCS on-board Requirements Tested	Subset-035 : 10.3.3.4, 10.3.3.6 a), 10.3.3.8
STM Requirements Tested	Subset-035: None
Packets Transmitted via FFFIS STM	STM-1, STM-15
ERTMS/ETCS on-board Configuration	ERTMS/ETCS on-board configured with STM X installed on-board STM X is associated to Level NTC X
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	Connection between STM and STM Control Function is lost	PROF	T0	Cut communication between STM and STM Control Function	TIU	Ts12	ETCS/ERTMS on-board applies the Emergency Brake
					DMI	Ts13	The message "NTC X is not available" is displayed
2	Connection between STM and STM Control Function is re-established	PROF	T0 + max (Ts12, Ts13)	Message-1 (Packet STM-1; Packet STM-15)	TIU	Ts14	ETCS/ERTMS on-board releases the Emergency Brake
					DMI	Ts15	The message "NTC X is not available" is removed

#### STM Test Case

Not applicable



Message 1 (Packet STM-1) : STM → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	1	Packet identifier (STM-1)
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	4	FFFIS STM version number, major number: X
N_VERMINOR	8	0	FFFIS STM version number, minor number: Y
NID_PACKET	8	15	Packet identifier (STM-15)
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	7	Data Available (DA)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked





End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Standstill	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## TEST CASE 6h.1

TEST CASE HEADER	
Test Case Identification	Data Available functionality
	6h.0.0.0.0
	ETCS data (ETCS National values & ETCS Additional Data)
ERTMS/ETCS on-board Requirements Tested	Subset-035 : 10.4.1.6, 10.4.1.8 b), 10.4.1.9 b)
STM Requirements Tested	Subset-035: None
Packets Transmitted via FFFIS STM	STM-177, STM-178
ERTMS/ETCS on-board Configuration	
Comments and constraints	



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Moving	
ETCS Train Data	Valid	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	New National Values are received	BTM	T0	Telegram-B1 (Packet 3 – National values)	PROF	Ts16	Message-1 (Packet STM-178)
2	Adhesion factor is changed	DMI	T0 + 5s	Driver changes Adhesion factor	PROF		Message-2 (Packet STM-177)
3	Train Running Number is changed	DMI	T0 + 10s	Driver changes Train Running Number	PROF		Message-3 (Packet STM-177) NID_OPERATIONAL_STM (Message-2) ≠ NID_OPERATIONAL_STM (Message-3)

#### STM Test Case

Not applicable



Telegram B1 : Balise → ETCS			
VARIABLE	Length	VALUE	COMMENTS
Q_UPDOWN	1	1	Balise telegram transmission direction (1: track to train)
M_VERSION	7	010 0000	Version of the ETCS system (Version 2.0, introduced in SRS 3.3.0)
Q_MEDIA	1	0	Qualifier to indicate the type of media (0: balise)
N_PIG	3	0	Position in Group
N_TOTAL	3	0	Total number of balise(s) in the group
M_DUP	2	00b	Duplicate balise (00b: No duplicates)
M_MCOUNT	8	FINITE VALUE	Message counter
NID_C	10	FINITE VALUE	Identity number of the country or region
NID_BG	14	FINITE VALUE	Identity number of the balise group
Q_LINK	1	0	Link Qualifier (0: unlinked)
NID_PACKET	8	3	Packet identifier (3: National Values)
Q_DIR	2	10b	Validity direction of transmitted data (Both directions)
L_PACKET	13	COMPUTED	Packet length
Q_SCALE	2	FINITE VALUE	Qualifier for the distance scale (10cm, 1m, 10m)
D_VALIDNV	15	32767	Distance to start of validity of national values(32767: Now (National Values are immediately applicable))
NID_C	10	FINITE VALUE	Identification of national areas to which the set applies (NID_C equals to the previous NID_C value in header)
N_ITER	5	0	Number of iterations of a data set following this variable in a packet
V_NVSHUNT	7	FINITE VALUE	Shunting mode speed limit (0 – 600 Km/h)
V_NVSTFF	7	FINITE VALUE	Staff Responsible mode speed limit (0 – 600 Km/h)
V_NVONSIGHT	7	FINITE VALUE	On Sight mode speed limit (0 – 600 Km/h)
V_NVLIMSUPERV	7	FINITE VALUE	Limited Supervision mode speed limit (0 – 600 Km/h)
V_NVUNFIT	7	FINITE VALUE	Unfitted mode speed limit (0 – 600 Km/h)
V_NVREL	7	FINITE VALUE	Release Speed (0 – 600 Km/h)

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Telegram B1 : Balise → ETCS			
VARIABLE	Length	VALUE	COMMENTS
D_NVROLL	15	FINITE VALUE	Roll away distance limit (depends on Q_SCALE)
Q_NVSBTSMPerm	1	FINITE VALUE	Permission to use service brake in target speed monitoring
Q_NVEMRRLS	1	FINITE VALUE	Qualifier Emergency Brake Release
Q_NVGUIPERM	1	FINITE VALUE	Permission to use the guidance curve
Q_NVSBFBPerm	1	FINITE VALUE	Permission to use the service brake feedback
Q_NVINHSMICPerm	1	FINITE VALUE	Permission to inhibit the compensation of the speed measurement inaccuracy
V_NVALLOWOVTRP	7	FINITE VALUE	Speed limit allowing the driver to select the “override” function
V_NVSUPOVTRP	7	FINITE VALUE	Override speed limit to be supervised when the “override” function is active
D_NVOVTRP	15	FINITE VALUE	Maximum distance for overriding the train trip
T_NVOVTRP	8	FINITE VALUE	Maximum time for overriding the train trip
D_NVPOTRP	15	FINITE VALUE	Maximum distance for reversing in Post Trip mode
M_NVCONTACT	2	FINITE VALUE	Indicates the reaction to be performed when T_NVCONTACT timer elapses (Train trip, apply service brake, no reaction)
T_NVCONTACT	8	FINITE VALUE	Maximal time without new “safe” message
M_NVDERUN	1	FINITE VALUE	Entry of Driver ID permitted while running
D_NVSTFF	15	FINITE VALUE	Maximum distance for running in Staff Responsible mode
Q_NVDRIVER_ADHES	1	1	Qualifier for the modification of trackside adhesion factor by driver (1: allowed)
A_NVMAXREDADH1	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions
A_NVMAXREDADH2	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions
A_NVMAXREDADH3	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions
Q_NVLOCACC	6	FINITE VALUE	Default accuracy of the balise location (absolute value)
M_NVAVADH	5	FINITE VALUE	Weighting factor for available wheel/rail adhesion
M_NVEBCL	4	FINITE VALUE	Confidence level for emergency brake safe deceleration on dry rails
Q_NVKINT	1	0	Qualifier for integrated correction factors
NID_PACKET	8	255	Packet identifier (255: End of Information)

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Telegram B1 : Balise → ETCS			
VARIABLE	Length	VALUE	COMMENTS
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 1 (Packet STM-178) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	178	Packet identifier (STM-178)
L_PACKET	13	COMPUTED	Packet length
Q_SCALE	2	FINITE VALUE	Qualifier for the distance scale (10cm, 1m, 10m)
V_NVSHUNT	7	FINITE VALUE	Shunting mode speed limit (0 – 600 Km/h)
V_NVSTFF	7	FINITE VALUE	Staff Responsible mode speed limit (0 – 600 Km/h)
V_NVONSIGHT	7	FINITE VALUE	On Sight mode speed limit (0 – 600 Km/h)
V_NVLIMSUPERV	7	FINITE VALUE	Limited Supervision mode speed limit (0 – 600 Km/h)
V_NVUNFIT	7	FINITE VALUE	Unfitted mode speed limit (0 – 600 Km/h)
V_NVREL	7	FINITE VALUE	Release Speed (0 – 600 Km/h)
D_NVROLL	15	FINITE VALUE	Roll away distance limit (depends on Q_SCALE)
Q_NVSBTSMPerm	1	FINITE VALUE	Permission to use service brake in target speed monitoring
Q_NVEMRRLS	1	FINITE VALUE	Qualifier Emergency Brake Release
Q_NVGUIPERM	1	FINITE VALUE	Permission to use the guidance curve
Q_NVSBFBPerm	1	FINITE VALUE	Permission to use the service brake feedback
Q_NVINHSMICPerm	1	FINITE VALUE	Permission to inhibit the compensation of the speed measurement inaccuracy
V_NVALLOWOVTRP	7	FINITE VALUE	Speed limit allowing the driver to select the “override” function
V_NVSUPOVTRP	7	FINITE VALUE	Override speed limit to be supervised when the “override” function is active
D_NVOVTRP	15	FINITE VALUE	Maximum distance for overriding the train trip
T_NVOVTRP	8	FINITE VALUE	Maximum time for overriding the train trip
D_NVPOTRP	15	FINITE VALUE	Maximum distance for reversing in Post Trip mode
M_NVCONTACT	2	FINITE VALUE	Indicates the reaction to be performed when T_NVCONTACT timer elapses (Train trip, apply service brake, no reaction)
T_NVCONTACT	8	FINITE VALUE	Maximal time without new “safe” message

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Message 1 (Packet STM-178) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
M_NVDERUN	1	FINITE VALUE	Entry of Driver ID permitted while running
D_NVSTFF	15	FINITE VALUE	Maximum distance for running in Staff Responsible mode
Q_NVDRIVER_ADHES	1	1	Qualifier for the modification of trackside adhesion factor by driver
A_NVMAXREDADH1	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions
A_NVMAXREDADH2	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions
A_NVMAXREDADH3	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions
Q_NVLOCACC	6	FINITE VALUE	Default accuracy of the balise location (absolute value)
M_NVAVADH	5	FINITE VALUE	Weighting factor for available wheel/rail adhesion
M_NVEBCL	4	FINITE VALUE	Confidence level for emergency brake safe deceleration on dry rails
Q_NVKINT	1	0	Qualifier for integrated correction factors
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 2 (Packet STM-177) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	177	Packet identifier (STM-177)
L_PACKET	13	COMPUTED	Packet length
NID_ENGINE	24	FINITE VALUE	Onboard ETCS identity
M_ADHESION	1	0	Adhesion factor (0 = Slippery rail)
YEAR	7	FINITE VALUE	Official year
MONTH	4	FINITE VALUE	Official month
DAY	5	FINITE VALUE	Official day
HOURL	5	FINITE VALUE	Official hour
MINUTES	6	FINITE VALUE	Official minutes
SECONDS	6	FINITE VALUE	Official seconds
TTS	5	FINITE VALUE	Official hundredth of second
NID_OPERATIONAL_STM	32	FINITE VALUE	Train Running Number
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 3 (Packet STM-177) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	177	Packet identifier (STM-177)
L_PACKET	13	COMPUTED	Packet length
NID_ENGINE	24	FINITE VALUE	Onboard ETCS identity
M_ADHESION	1	0	Adhesion factor (0 = Slippery rail)
YEAR	7	FINITE VALUE	Official year
MONTH	4	FINITE VALUE	Official month
DAY	5	FINITE VALUE	Official day
HOURL	5	FINITE VALUE	Official hour
MINUTES	6	FINITE VALUE	Official minutes
SECONDS	6	FINITE VALUE	Official seconds
TTS	5	FINITE VALUE	Official hundredth of second
NID_OPERATIONAL_STM	32	FINITE VALUE	Train Running Number
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Unchanged	
ETCS Train Data	Unchanged	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## TEST CASE 6i.1

### TEST CASE HEADER

<b>Test Case Identification</b>	Data Available functionality
	6i.1.0.0.0.0.0
	ETCS trackside data received from Balise
<b>ERTMS/ETCS on-board Requirements Tested</b>	Subset-035 : 10.11.1.1, 10.11.1.2, 10.11.1.3 Subset-026 : 3.6.3.1.4.1, 3.15.6.5, 7.4.2.11
<b>STM Requirements Tested</b>	Subset-035: None
<b>Packets Transmitted via FFFIS STM</b>	STM-8, STM-45
<b>ERTMS/ETCS on-board Configuration</b>	
<b>Comments and constraints</b>	Train moving at a constant speed of 100 Km/h



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Moving	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	On	
TIU Direction Controller Position Status	Forward	
TIU Cab Status	Cab A active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	



#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	The train runs at a constant speed of 100 Km/h	ODO	T0	Movement in positive direction at constant speed	PROF		Message-1 (Packet STM-8) Odometer multicast
2	Trackside data is received	BTM	T0 + 0.5s	Telegram-B1 (Packet 44 - Data used by applications outside the ERTMS/ETCS system)	PROF		Message-2 (STM-45)
3	The train runs at a constant speed of 100 Km/h	ODO	T0 + 2s	Movement in positive direction at constant speed	PROF		Message-3 (Packet STM-8) Odometer multicast D_ESTODO_BG value of Message-2 must be between D_EST of Message-1 and D_EST of Message-3

STM Test Case

Not applicable



Message 1 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	
V_EST	16	FINITE VALUE	
V_MIN	16	FINITE VALUE	
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked





Telegram B1 : Balise → ETCS			
VARIABLE	Length	VALUE	COMMENTS
Q_UPDOWN	1	1	Direction of the information (track to train)
M_VERSION	7	010 0000	Version of the ETCS system (Version 2.0, introduced in SRS 3.3.0)
Q_MEDIA	1	0	Qualifier to indicate the type of media (0: balise)
N_PIG	3	0	Position in Group
N_TOTAL	3	0	Total number of balise(s) in the group
M_DUP	2	00b	Duplicate balise (00b: No duplicates)
M_MCOUNT	8	FINITE VALUE	Message counter
NID_C	10	FINITE VALUE	Identity number of the country or region
NID_BG	14	FINITE VALUE	Identity number of the balise group
Q_LINK	1	FINITE VALUE	Link Qualifier
NID_PACKET	8	44	Packet identifier (44: Data used by applications outside the ERTMS/ETCS system)
Q_DIR	2	00b	Validity direction of transmitted data (Reverse)
L_PACKET	13	COMPUTED	Packet length
NID_XUSER	9	102	Identity of user system (102: National System functions)
NID_NTC	8	FINITE VALUE	National System identity (NID_NTC = NID_NTC = NID_NTC of the STM in DA)
N_LITER	8	16	Number of iterations of a data set following
M_DATA(1)	8	"E"	
M_DATA(2)	8	"T"	
M_DATA(3)	8	"C"	
M_DATA(4)	8	"S"	
M_DATA(5)	8	" "	
M_DATA(6)	8	"a"	
M_DATA(7)	8	"l"	
M_DATA(8)	8	"r"	
M_DATA(9)	8	"g"	

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Telegram B1 : Balise → ETCS			
VARIABLE	Length	VALUE	COMMENTS
M_DATA(10)	8	"a"	
M_DATA(11)	8	"p"	
M_DATA(12)	8	" "	
M_DATA(13)	8	"d"	
M_DATA(14)	8	"a"	
M_DATA(15)	8	"t"	
M_DATA(16)	8	"a"	
NID_PACKET	8	255	Packet identifier (255: End of Information)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

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Message 2 (Packet STM-45) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to (NID_STM = NID_NTC of Telegram B1)
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	45	Packet identifier (STM-45)
L_PACKET	13	COMPUTED	Packet length
D_ESTODO_BG	32	FINITE VALUE	Value of the estimated distance given from the ERTMS/ETCS on-board Odometer Function (D_EST) at the location reference of the balise group which transmitted the trackside message
N_LITER	8	22	Number of iterations of a data set following
M_DATA(1)	8	44	NID_PACKET of Telegram B1
M_DATA(2)	8	FINITE VALUE	Q_DIR (2 bits) + part of L_PACKET (6 bits) of Telegram B1
M_DATA(3)	8	FINITE VALUE	part of L_PACKET (7 bits) + part of NID_XUSER (1 bit) of Telegram B1
M_DATA(4)	8	FINITE VALUE	part of NID_XUSER (8 bits) of Telegram B1
M_DATA(5)	8	FINITE VALUE	NID_NTC of Telegram B1
M_DATA(6)	8	16	N_LITER of Telegram B1
M_DATA(7)	8	"E"	
M_DATA(8)	8	"T"	
M_DATA(9)	8	"C"	
M_DATA(10)	8	"S"	
M_DATA(11)	8	" "	
M_DATA(12)	8	"a"	
M_DATA(13)	8	"i"	
M_DATA(14)	8	"r"	
M_DATA(15)	8	"g"	
M_DATA(16)	8	"a"	

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Message 2 (Packet STM-45) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
M_DATA(17)	8	"p"	
M_DATA(18)	8	" "	
M_DATA(19)	8	"d"	
M_DATA(20)	8	"a"	
M_DATA(21)	8	"t"	
M_DATA(22)	8	"a"	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

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Message 3 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	
V_EST	16	FINITE VALUE	
V_MIN	16	FINITE VALUE	
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Unchanged	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Unchanged	
TIU Direction Controller Position Status	Unchanged	
TIU Cab Status	Unchanged	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	



## TEST CASE 6i.2

TEST CASE HEADER	
Test Case Identification	Data Available functionality
	6i.2.0.0.0.0
	ETCS trackside data received from RBC
ERTMS/ETCS on-board Requirements Tested	Subset-035 : 10.11.1.1, 10.11.1.2, 10.11.1.3 Subset-026 : 3.15.6.5, 7.4.2.11
STM Requirements Tested	Subset-035: None
Packets Transmitted via FFFIS STM	STM-8, STM-45
ERTMS/ETCS on-board Configuration	
Comments and constraints	Train moving at a constant speed of 100 Km/h



Starting Conditions	Value	Comments
STM State	DA	
ETCS Mode	SN	
ETCS Level	NTC	
Train State	Moving	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	On	
TIU Direction Controller Position Status	Forward	
TIU Cab Status	Cab A active	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Not isolated	





#### ERTMS/ETCS on-board Test Case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
-	Initial Condition: Set Position Report Parameters to report the train position at each balise	RTM		Telegram-R0	-		-
1	The train runs at a constant speed of 100 Km/h	ODO	T0	Movement at constant speed	PROF		Message-1 (Packet STM-8) Odometer multicast
2	A balise group is received	BTM	T0 + 2s	Telegram-B1 Telegram-B2	RTM	Ts17	Telegram-R1 (Packet 0 – Position Report) Time: T1
3	The train runs at a constant speed of 100 Km/h	ODO	T1 + 0.5s	Movement at constant speed	PROF		Message-2 (Packet STM-8) Odometer multicast
4	Trackside data is received from RBC	RTM	T1 + 10s	Telegram-R2 (Packet 44 - Data used by applications outside the ERTMS/ETCS system)	PROF		Message-3 (STM-45) ESTODO_BG value of Message-3 must be between D_EST of Message-1 and D_EST of Message-2

#### STM Test Case

Not applicable



Telegram R0 : RBC → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_MESSAGE	8	24	Message identifier (24: General message)
L_MESSAGE	10	COMPUTED	Message length
T_TRAIN	32	FINITE VALUE	Trainborne clock
M_ACK	1	0	Qualifier for acknowledgement request (No acknowledgement required)
NID_LRBG	10 + 14	FINITE VALUE	Identity of last relevant balise group
NID_PACKET	8	58	Packet identifier (58: Position Report Parameters)
Q_DIR	2	10b	Validity direction of transmitted data (Both directions)
L_PACKET	13	COMPUTED	Packet length
Q_SCALE	2	FINITE VALUE	Qualifier for the distance scale
T_CYCLOC	8	FINITE VALUE	Time Interval between two position reports sent by the train
D_CYCLOC	15	FINITE VALUE	Distance between two position reports from the train
M_LOC	3	001b	Special location/moment where the train has to report its position (Every LRBG compliant balise group)
N_ITER	5	0	Number of iterations of a data set following this variable in a packet
NID_PACKET	8	255	Packet identifier (255: End of Information)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 1 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	
V_EST	16	FINITE VALUE	
V_MIN	16	FINITE VALUE	
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Telegram B1 : Balise → ETCS			
VARIABLE	Length	VALUE	COMMENTS
Q_UPDOWN	1	1	Direction of the information (track to train)
M_VERSION	7	010 0000	Version of the ETCS system (Version 2.0, introduced in SRS 3.3.0)
Q_MEDIA	1	0	Qualifier to indicate the type of media (0: balise)
N_PIG	3	0	Position in Group
N_TOTAL	3	1	Total number of balise(s) in the group
M_DUP	2	00b	Duplicate balise (00b: No duplicates)
M_MCOUNT	8	FINITE VALUE	Message counter
NID_C	10	FINITE VALUE	Identity number of the country or region
NID_BG	14	FINITE VALUE	Identity number of the balise group
Q_LINK	1	1	Link Qualifier (Linked)
NID_PACKET	8	255	Packet identifier (255: End of Information)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Telegram B2 : Balise → ETCS			
VARIABLE	Length	VALUE	COMMENTS
Q_UPDOWN	1	1	Direction of the information (track to train)
M_VERSION	7	010 0000	Version of the ETCS system (Version 2.0, introduced in SRS 3.3.0)
Q_MEDIA	1	0	Qualifier to indicate the type of media (0: balise)
N_PIG	3	1	Position in Group
N_TOTAL	3	1	Total number of balise(s) in the group
M_DUP	2	00b	Duplicate balise (00b: No duplicates)
M_MCOUNT	8	FINITE VALUE	Message counter (same as)
NID_C	10	FINITE VALUE	Identity number of the country or region (same as Telegram B1)
NID_BG	14	FINITE VALUE	Identity number of the balise group (same as Telegram B1)
Q_LINK	1	1	Link Qualifier (Linked)
NID_PACKET	8	255	Packet identifier (255: End of Information)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked

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Telegram R1 : ETCS → RBC			
VARIABLE	Length	VALUE	COMMENTS
NID_MESSAGE	8	136	Message identifier (136: Train Position Report)
L_MESSAGE	10	COMPUTED	Message length
T_TRAIN	32	FINITE VALUE	Trainborne clock
NID_ENGINE	24	FINITE VALUE	Onboard ETCS identity
NID_PACKET	8	0	Packet identifier (0: Position Report)
L_PACKET	13	COMPUTED	Packet length
Q_SCALE	2	1	Qualifier for the distance scale (1 m scale)
NID_LRBG	10 + 14	FINITE VALUE	Identity of last relevant balise group (Corresponding to NID_C + NID_BG values of Telegram B1)
D_LRBG	15	FINITE VALUE	Distance between the last relevant balise group and the estimated front end of the train
Q_DIRLRBG	2	1	Orientation of the train in relation to the direction of the LRBG (Nominal)
Q_DLRBG	2	1	Qualifier telling on which side of the LRBG the estimated front end is (Nominal)
L_DOUBTOVER	15	FINITE VALUE	Over-reading amount plus the Q_LOCACC of the LRBG
L_DOUBTUNDER	15	FINITE VALUE	Under-reading amount plus the Q_LOCACC of the LRBG
Q_LENGTH	2	0	Qualifier for train integrity status
V_TRAIN	7	FINITE VALUE (between 15 - 25)	Train speed
Q_DIRTRAIN	2	1	Direction of train movement in relation to the LRBG orientation (Nominal)
M_MODE	4	13	Onboard operating mode (National System)
M_LEVEL	3	1	Current Operating Level (Level NTC)
NID_NTC	8	FINITE VALUE	National System identity (NID_NTC = NID_NTC of the STM in DA)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 2 (Packet STM-8) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	8	Packet identifier (STM-8)
L_PACKET	13	COMPUTED	Packet length
T_ODO	32	FINITE VALUE	
V_MAX	16	FINITE VALUE	
V_EST	16	FINITE VALUE	
V_MIN	16	FINITE VALUE	
D_MAX	32	FINITE VALUE	
D_EST	32	FINITE VALUE	
D_MIN	32	FINITE VALUE	
D_RES	8	FINITE VALUE	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Telegram R2 : RBC → ETCS			
VARIABLE	Length	VALUE	COMMENTS
NID_MESSAGE	8	24	Message identifier (24: General message)
L_MESSAGE	10	COMPUTED	Message length
T_TRAIN	32	FINITE VALUE	Trainborne clock
M_ACK	1	0	Qualifier for acknowledgement request (No acknowledgement required)
NID_LRBG	10 + 14	FINITE VALUE	Identity of last relevant balise group (same as Telegram B1)
NID_PACKET	8	44	Packet identifier (44: Data used by applications outside the ERTMS/ETCS system)
Q_DIR	2	10b	Validity direction of transmitted data (Both directions)
L_PACKET	13	COMPUTED	Packet length
NID_XUSER	9	102	Identity of user system (102: National System functions)
NID_NTC	8	FINITE VALUE	National System identity (NID_NTC =NID_STM of Telegram R1)
N_LITER	8	16	Number of iterations of a data set following
M_DATA(1)	8	"E"	
M_DATA(2)	8	"T"	
M_DATA(3)	8	"C"	
M_DATA(4)	8	"S"	
M_DATA(5)	8	" "	
M_DATA(6)	8	"a"	
M_DATA(7)	8	"i"	
M_DATA(8)	8	"r"	
M_DATA(9)	8	"g"	
M_DATA(10)	8	"a"	
M_DATA(11)	8	"p"	
M_DATA(12)	8	" "	
M_DATA(13)	8	"d"	
M_DATA(14)	8	"a"	

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Telegram R2 : RBC → ETCS

VARIABLE	Length	VALUE	COMMENTS
M_DATA(15)	8	"t"	
M_DATA(16)	8	"a"	
NID_PACKET	8	255	Packet identifier (255: End of Information)
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



Message 3 (Packet STM-45) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the ERTMS/ETCS on-board is connected to (NID_STM = NID_NTC of Telegram R1)
L_MESSAGE	8	COMPUTED	Message length
NID_PACKET	8	45	Packet identifier (STM-45)
L_PACKET	13	COMPUTED	Packet length
D_ESTODO_BG	32	FINITE VALUE	Odometer reading of the LRBG of Telegram R1
N_LITER	8	21	Number of iterations of a data set following
M_DATA(1)	8	44	NID_PACKET of Telegram R1
M_DATA(2)	8	FINITE VALUE	Q_DIR (2 bits) + part of L_PACKET (6 bits) of Telegram R1
M_DATA(3)	8	FINITE VALUE	part of L_PACKET (7 bits) + part of NID_XUSER (1 bit) of Telegram R1
M_DATA(4)	8	FINITE VALUE	part of NID_XUSER (8 bits) of Telegram R1
M_DATA(5)	8	FINITE VALUE	NID_NTC of Telegram R1
M_DATA(6)	8	16	N_LITER of Telegram R1
M_DATA(7)	8	"E"	
M_DATA(8)	8	"T"	
M_DATA(9)	8	"C"	
M_DATA(10)	8	"S"	
M_DATA(11)	8	" "	
M_DATA(12)	8	"a"	
M_DATA(13)	8	"i"	
M_DATA(14)	8	"r"	
M_DATA(15)	8	"g"	
M_DATA(16)	8	"a"	

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Message 3 (Packet STM-45) : ETCS → STM			
VARIABLE	Length	VALUE	COMMENTS
M_DATA(17)	8	"p"	
M_DATA(18)	8	" "	
M_DATA(19)	8	"d"	
M_DATA(20)	8	"a"	
M_DATA(21)	8	"t"	
M_DATA(22)	8	"a"	
PADDING BITS	COMPUTED	NOT RELEVANT	Value not to be checked



End Conditions	Value	Comments
STM State	Unchanged	
ETCS Mode	Unchanged	
ETCS Level	Unchanged	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Relevant	
Other DMI channels Connections	Not Relevant	
TIU Connection	Not Relevant	
BIU Connection	Not Relevant	
JD Connection	Not Relevant	
TIU Regenerative Brake Command	Not Relevant	
TIU Magnetic Shoes Brake Command	Not Relevant	
TIU Eddy Current Brake Command for Emergency Brake	Not Relevant	
TIU Eddy Current Brake Command for Service Brake	Not Relevant	
TIU Pantograph Command	Not Relevant	
TIU Air Tightness Command	Not Relevant	
TIU Main Switch / Circuit Breaker Command	Not Relevant	
TIU Traction Cut Off Command	Not Relevant	
TIU Traction Status	Not Relevant	
TIU Direction Controller Position Status	Not Relevant	
TIU Cab Status	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Not Relevant	
BIU Service Brake Status	Not Relevant	
NTC isolation status	Unchanged	