



ERTMS/ETCS

FFFIS STM test cases of Functional identity 002

APPLICATION START UP

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Table of Contents

Diagrams.....	6
General information	11
Supplier-specific delays table	11
Test case 2a.1	13
Test case 2a.2.....	17
Test case 2a.3.....	22
Test case 2a.4.....	27
Test case 2a.5.....	38
Test case 2a.6.....	48
Test case 2a.7.....	59
Test case 2a.8.....	78
Test case 2a.9.....	79
Test case 2a.10.....	105
Test case 2a.11.....	131
Test case 2a.12.....	153
Test case 2a.13.....	153
Test case 2a.14.....	153
Test case 2a.15.....	153
Test case 2a.16.....	154
Test case 2a.17.....	154
Test case 2a.18.....	154
Test case 2a.19.....	154
Test case 2a.20.....	154

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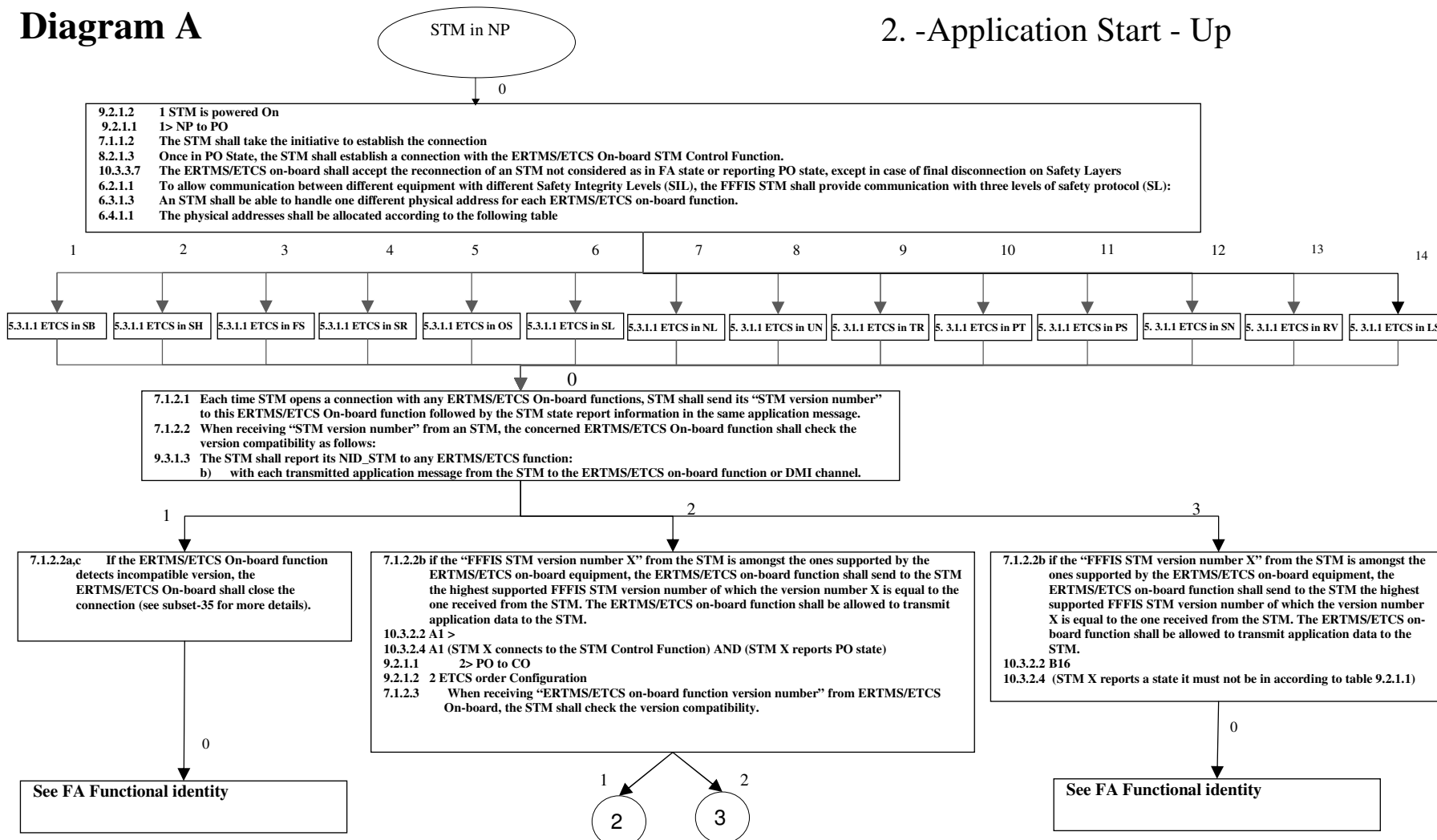


Test case 2a.21	155
Test case 2a.22	155
Test case 2a.23	155
Test case 2a.24	156

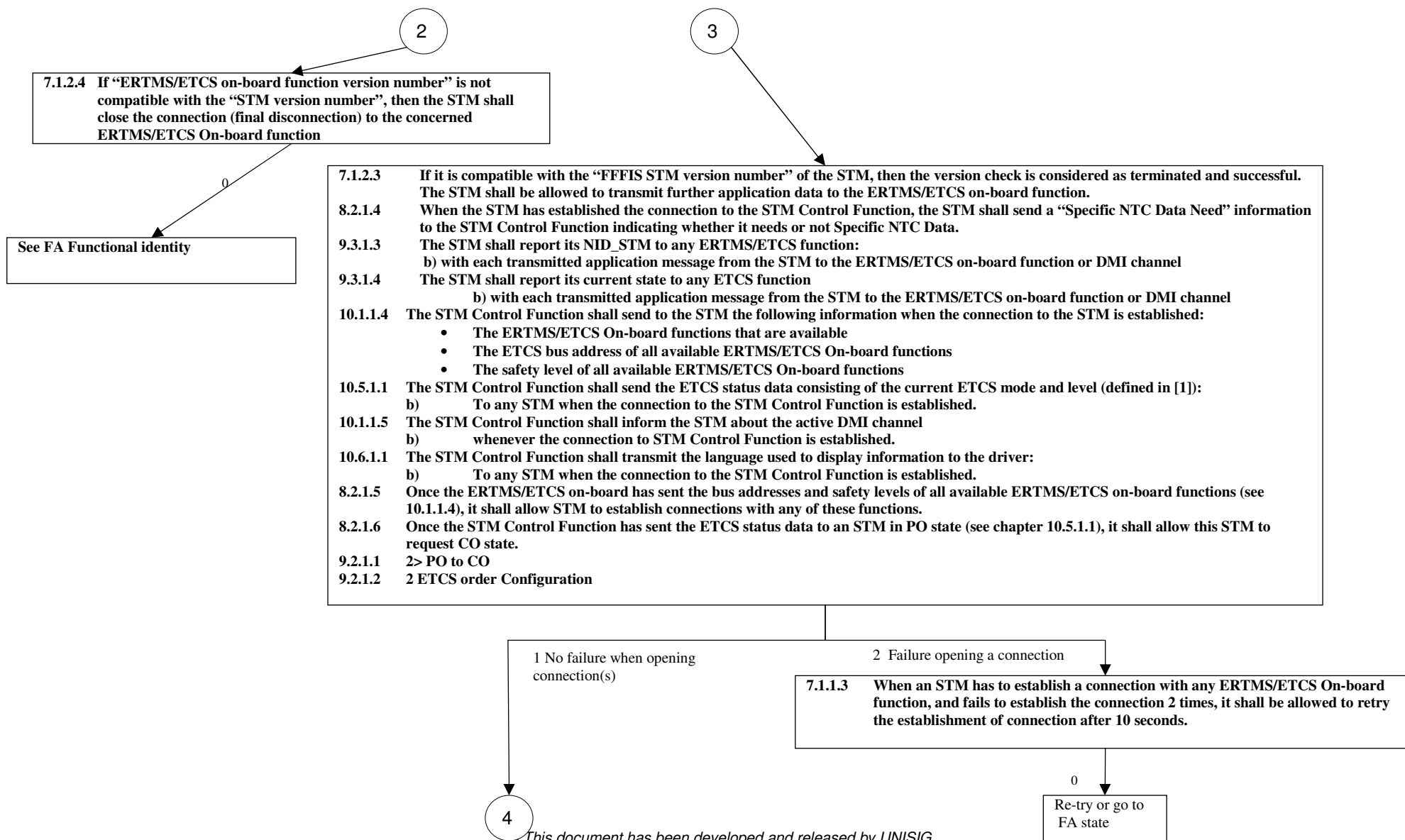
Diagrams

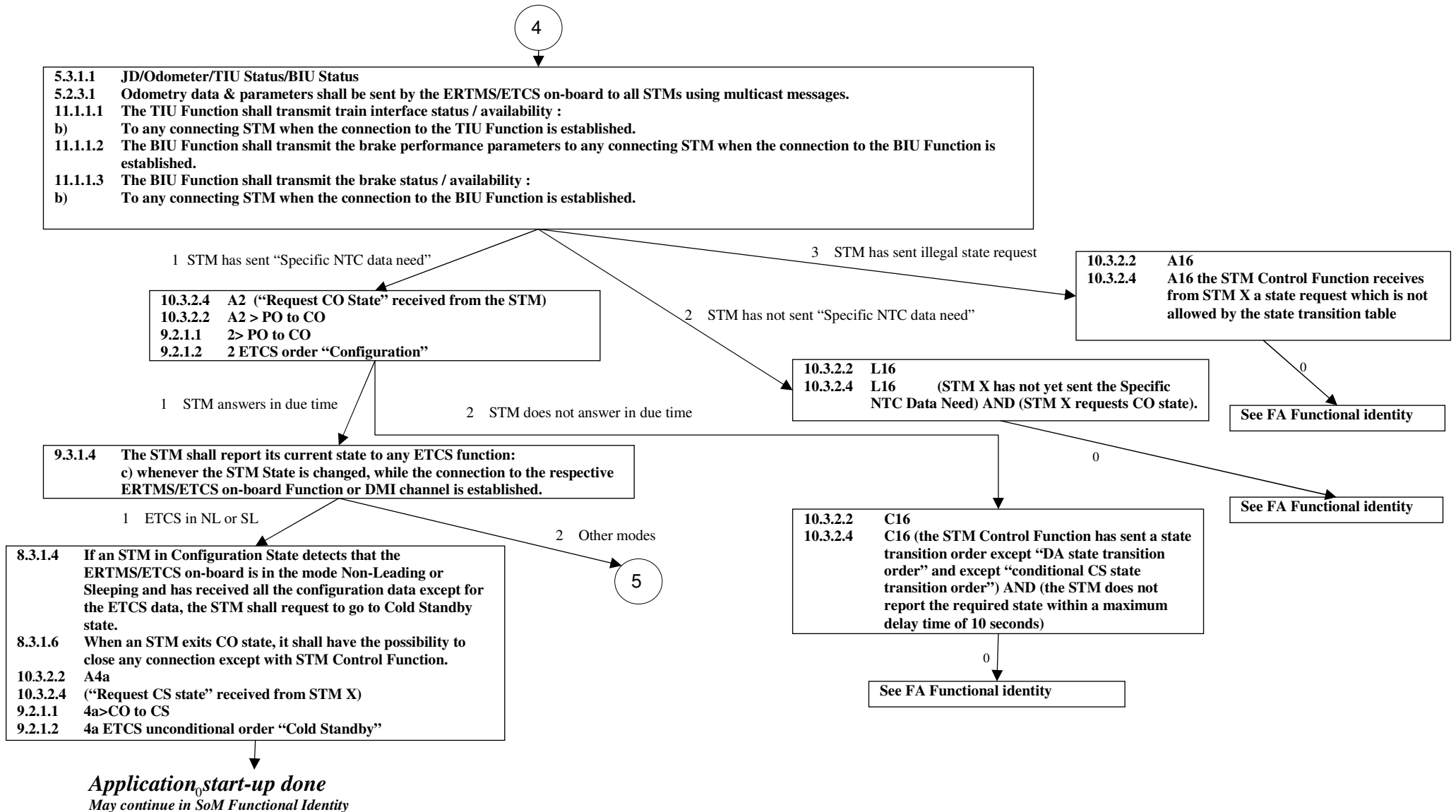
Diagram A

2. -Application Start - Up



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8.3.1.1	The STM CO state is used to wait until all configuration data between STM and ERTMS/ETCS on-board have been exchanged. "Configuration data" means data that is necessary for the national operation, except Specific NTC Data.
8.3.1.2	Configuration data from ERTMS/ETCS on-board to STMs consists of:
a)	ETCS data (see chapter 10.4)
b)	Status / availability of the train interface FFFIS STM signals (TIU)
c)	Status / availability of the brake interface FFFIS STM signals (BIU)
d)	Odometer performance parameters (see chapter 12.4)
e)	Brake performance parameters: Maximum time delay for the ERTMS/ETCS on-board to process the STM Emergency and the STM Service Brake commands. This is the time from receiving the brake command from the STM until the ETCS commands the brake.
10.4.1.1	The ETCS data transmitted by the ERTMS/ETCS on-board to the STMs shall include a subset of the ETCS Train Data (defined in [1]), as listed below:
a)	Train category(ies)
b)	Train length
c)	Traction / brake parameters
d)	Maximum train speed
e)	Loading gauge
f)	Axle load category
g)	Traction system(s) accepted by the engine
h)	Train fitted with airtight system
10.4.1.2	The ETCS data transmitted by the ERTMS/ETCS on-board to the STMs shall include a subset of the ETCS Train Data entry input fields (defined in [9]), as listed below:
a)	Train Type, if applicable for the train
10.4.1.4	The traction / brake parameters shall include:
a)	Equivalent brake build up time for full service brake for the combination of none of the special brakes being used
b)	Equivalent brake build up time for emergency brake for the combination of none of the special brakes being used
c)	Traction cut off time
d)	Brake position
e)	Brake percentage, if applicable for the train
10.4.1.5	The ETCS data transmitted by the ERTMS/ETCS on-board to the STMs shall include a subset of ETCS Additional Data (defined in [1]) as listed below:
a)	Train Running Number
b)	ETCS identity
c)	Adhesion factor
d)	Date and Time (UTC Time)

6

10.4.1.6 The ETCS data transmitted by the ERTMS/ETCS on-board to the STMs shall include the ETCS National / Default Values (defined in [1])
 10.4.1.8 The STM Control Function shall transmit the valid ETCS Additional Data
 a) when the STM has entered into Configuration (CO) state, and
 10.4.1.9 The STM Control Function shall transmit the currently used ETCS National / Default Values
 a) when the STM has entered into Configuration (CO) state, and
 b) when the currently used ETCS National Values have changed (this also includes the case when the National Values are reset to the Default Values).

1 No specific DE

2 Specific DE

8.3.1.3 Once the transmission of configuration data is finished and the Specific NTC Data Entry procedure is started, if the STM does not require any Specific NTC Data, then the STM shall request Cold Standby state to the STM Control Function.
 10.3.2.4 A4a (Request CS state" received from STM)
 10.3.2.2 4a> CO to CS
 9.2.1.1 4a> CO to CS
 9.2.1.2 4a ETCS unconditional order "Cold Standby"
 9.3.1.4 The STM shall report its current state to any ETCS function:
 c) whenever the STM State is changed, while the connection to the respective ERTMS/ETCS on-board Function or DMI channel is established.

8.3.1.5 Once the transmission of configuration data is finished and the Specific NTC Data Entry procedure is started, if the STM does require any Specific NTC Data, then the STM shall request Data Entry state to the STM Control Function.

See Data Entry Procedure FI-10a

1 STM answers in due time

2 STM does not answer in due time

Application start-up done
 May continue in SoM Functional Identity

10.3.2.2 C16
 10.3.2.4 C16 (the STM Control Function has sent a state transition order except "DA state transition order" and except "conditional CS state transition order") AND (the STM does not report the required state within a maximum delay time of 10 seconds)

0

See FA Functional identity



General information

The text “**STM establishes the connections to the**” followed by the name of one ETCS function is short-hand for sending STM-1 and STM-15 from the STM and getting STM-1 back from the ETCS function and verifying the compatibility.

Supplier-specific delays table

#	Supplier of	Start time	End time
Ts1	ETCS	Time-stamp of message including STM- 1	Reference time when STM Control function closes the connection because versions are not compatible.
Ts2	ETCS	Time-stamp of message including STM-15	STM Control function: time-stamp of message including state order FA to STM time-stamp (because STM reported illegal state).
Ts3	STM	Power on	Time-stamp of message including STM-1
Ts4	STM	Time-stamp of message including STM-1	Reference time when STM closes connection to STM control because of incompatible version.
Ts5	STM	Time-stamp of message including STM-1	Time-stamp of message including packet STM - 181 Specific data need time-stamp
Ts6	STM	Time-stamp of message including packet STM-2 ETCS bus addresses	Time-stamp of message including packet STM-1; STM tries to establish the connection
Ts7	STM	Time-stamp when STM tries to establish the connection	First try to establish a connection fails, STM tries again. Time-stamp of message including packet STM-1
Ts8	STM	Time-stamp when second try to establish a connection (which then fails)	STM may try again to establish the connection. Time-stamp of message including packet STM-1
Ts9	ETCS	Time-stamp of message including Packet STM-1	Time-stamp of message including packet STM-1
Ts10	ETCS	Time-stamp of message including Packet STM-1	Time-stamp of message including packet STM-5 ETCS Status, packet STM-31 Active DMI channel + packet STM-30 Driver language data time-stamp
Ts11	ETCS	Time-stamp of message including Packet STM-1	Time-stamp of message including packet STM-2 ETCS On-Board physical addresses and safety levels time-stamp
Ts12	ETCS	Time-stamp of message including Packet STM-1	Non-STM control connections: Time-stamp of message including packet STM-1
Ts13	ETCS	Time-stamp of message including Packet	Time-stamp of message including packet STM - 136

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		STM-1 to BIU	Brake Interface emergency and service brake status/availability + STM - 143 Emergency and service brake parameters to STM.
Ts14	ETCS	Time-stamp of message including Packet STM-13 State Request CO but STM has not sent "Specific NTC data need"	Time-stamp of message including Time-stamp of message including packet STM - 14 State order FA
Ts15	ETCS	Time-stamp of message including Packet STM-1 to TIU	Time-stamp of message including packet STM – 139 Train interface inputs + STM-141 Train interface command configuration to STM
Ts16	ETCS	Time-stamp of message including STM-13 State request CO	Time-stamp of message including packet STM - 14 State order CO
Ts17	ETCS	Time-stamp of message including State-order CO sent + 10s	Time-stamp of message including packet STM - 14 State order FA
Ts18	ETCS	Time-stamp of message including STM-13 State request CS	Time-stamp of message including packet STM - 14 State order CS
Ts19	STM	Time-stamp of message including STM- 5 ETCS status.	Time-stamp of message including STM-13 State request CO
Ts20	ETCS	Time-stamp of message including STM-15 CO state report	Time-stamp of message including STM-175, STM-176, STM-177, STM-178
Ts21	ETCS	Reference time when STM establishes connection with STM control	Time-stamp of message including STM-9 Odometer parameters received time-stamp
Ts22	ETCS	Time-stamp of message including STM – 9 Odometer parameters	Time-stamp of message including STM – 9 Odometer parameters (transmission interval)
Ts23	ETCS	Time-stamp of message including STM-8 odometer multicast	Time-stamp of message including STM-8 odometer multicast (transmission interval)

Note: If more than one packet is stated for a specific time delay, the delay is until all the information has been received in one or several messages.



Test case 2a.1

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.8.0.1.0
	The ETCS mode is UN. The STM Control Function version is not compatible with the STM and closes the connection.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – UN - STM Cntrl; 6.2.1.1; 6.3.1.3; 6.4.1.1; 10.3.3.7; 7.1.2.2a / c; 16.2.1.2;
STM requirements tested	Subset-035 None
Packets transmitted via FFFIS STM	STM-1; STM-15
ERTMS/ETCS on-board configuration	-
Comments and constraints	Incompatible versions, no continuation. Shall be tested with both lower and higher version for SIL 4, SIL 2 and SIL 0 protocol (SL4, SL2 & SL0).

Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	UN	
ETCS Level	Not Relevant	
Train State	Standstill	
ETCS Train Data	Not Relevant	



Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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 is powered up. STM takes the initiative to open the communication with the STM control function, but versions are not compatible and ETCS closes the connection.	PROF	T = 0	STM opens the connection with the STM Control Function and send its version number, which is incompatible. STM Control Connection: Message 1 sent packet STM- 1 + packet STM-15 STM State Report	PROF	Ts1	STM Control Connection: STM Control Function checks the version. STM Control function closes the connection because versions are not compatible.

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Message 1: STM → ETCS (Packet STM-1; STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	X	Incompatible FFFIS STM version number, major number
N_VERMINOR	8	Y	Incompatible FFFIS STM version number, minor number
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

End Conditions	Value	Comments
STM State	PO	
ETCS Mode	UN	
ETCS Level	Not Relevant	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Established	
Other DMI channels Connections	Not Established	
TIU Connection	Not Established	

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BIU Connection	Not Established	
JD Connection	Not 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	



Test case 2a.2

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.3.0.3.0
	The ETCS mode is FS. The STM Control Function version is compatible with the STM. The STM is not re-connecting. The STM reports PO and then reports another state it has not been ordered to to STM Control Function and is ordered to FA.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – FS - STM Cntrl; 6.2.1.1; 6.3.1.3; 6.4.1.1; 7.1.2.2b; 10.3.3.7; 10.3.2.2, 10.3.2.4 B16; 16.2.1.2;
STM requirements tested	Subset-035 None
Packets transmitted via FFFIS STM	STM-1; STM-14; STM-15
ERTMS/ETCS on-board configuration	-
Comments and constraints	Incorrect state reported, no continuation. Shall be done for SIL 4, SIL 2 and SIL 0 protocol.

Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	FS	
ETCS Level	Level 1-3	
Train State	Standstill	
ETCS Train Data	Not Relevant	



Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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 is powered up. STM takes the initiative to open the communication with the STM control function, reports PO.	PROF	T = 0	STM opens the connection with the STM Control Function and send its version number. STM Control Connection: Message 1 sent packet STM - 1 + packet STM-15 STM State Report PO state			<i>The output reactions in this step are not relevant for the test.</i>
2	The STM reports CS before being	PROF	T = 1	Message 3 sent packet STM-15	PROF	Ts2	STM Control Connection: STM Control

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	ordered to CS and is sent to FA for reporting a state that is not allowed.			STM State Report CS state			Function checks the state report. Wrong state detected. STM ordered to FA by the STM Control Function: message 2 sent packet STM - 14 State order FA to the STM
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Message 1: STM → ETCS (Packet STM-1; STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Reported STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 2 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	



NID_PACKET	8	14	STM State order to STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEORDER	4	8	Failure
PADDING_BITS	COMPUTED	Not Relevant	

Message 3: STM → ETCS (Packet STM-1; STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	4	Reported STM State: Cold Standby
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	FS	
ETCS Level	Not Relevant	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Established	
Other DMI channels Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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 (Desk 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	



Test case 2a.3

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.2.0.2.1.0
	The ETCS mode is SH. The STM Control Function version is not compatible with the STM and STM closes the connection (final disconnection).
ERTMS/ETCS on-board requirements tested	Subset-035 None
STM requirements tested	Subset-035 6.2.1.1; 6.3.1.3; 6.4.1.1; 7.1.1.2; 7.1.2.1; 7.1.2.3; 7.1.2.4; 8.2.1.3; 9.2.1.2, 9.2.1.1 1 NP to PO; 9.3.1.3b; 16.2.1.2;
Packets transmitted via FFFIS STM	STM-1; STM-15
ERTMS/ETCS on-board configuration	-
Comments and constraints	STM test case. Incompatible versions, no continuation.



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	SH	
ETCS Level	Not Relevant	
Train State	Standstill	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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	



STM Test case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	STM is powered up. STM takes the initiative to open the communication with the STM control function		T = 0	STM is powered on	PROF	Ts3	STM Control Connection: STM opens the communication session Message - 1 packet STM-1 STM/ETCS function version number + packet STM-15 STM State Report Time = T0
2	Incompatible Version sent from ETCS	PROF	T0 + 0.5s	STM Control Connection: ETCS sends its highest supported compatible version number Message – 2, sending an incompatible number	PROF	Ts4	STM checks received ETCS version number and detects incompatible versions. STM closes the connection

Message 1: STM → ETCS (Packet STM-1; STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Actual FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Actual FFFIS STM version number, minor number
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

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Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Incompatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Incompatible FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	FA or PO	STM may report FA or just disconnect from STM Control.
ETCS Mode	SH	
ETCS Level	Not Relevant	
Train State	Not Relevant	
Train Data	Not Relevant	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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 Relevant	



Test case 2a.4

TEST CASE HEADER	
Test case Identification	Application Start Up
	2a.0.3.0.2.2.2.0
	The ETCS mode is FS. The STM Control Function version is compatible with the STM. The establishment of one of the other connections fails twice. The STM may re-try after 10s.
ERTMS/ETCS on-board requirements tested	Subset-35 5.3.1.1 a – FS - STM Cntrl; 6.2.1.1a; 6.4.1.1; 7.1.1.3; 7.1.2.2b; 7.1.2.3; 8.2.1.5; 10.1.1.4; 10.1.1.5b; 10.3.2.2; 10.3.2.4 A1; NP to PO; 10.5.1.1a; 10.6.1.1b; 16.2.1.2;
STM requirements tested	Subset-035 6.2.1.1; 6.4.1.1; 7.1.2.3; 8.2.1.3; 8.2.1.4; 9.2.1.1, 9.2.1.2 1 NP to PO; 9.3.1.3b; 9.3.1.4b; 16.2.1.2;
Packets transmitted via FFFIS STM	STM-1; STM-2; STM-5; STM-15; STM-30; STM-31; STM-181;
ERTMS/ETCS on-board configuration	-
Comments and constraints	Connection establishment failure, STM may re-try. ETCS test to use SL 4 protocol. Note: This test case is not relevant for STMs that only connect to STM Control function, nor to STMs that do not re-try to open a connection.



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	FS	
ETCS Level	1	
Train State	Not Relevant	
ETCS Train Data	Valid	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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	One desk open	
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	



STM Test case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	STM takes the initiative to open the communication with the STM control function		T = 0	STM is powered on	PROF	Ts3	STM Control Connection: STM opens the communication session Message - 1 packet STM-1 STM/ETCS function version number + packet STM -15 STM State report. Time = T0.
2	STM Control Connection: STM Control Function checks the version. It is compatible, STM control sends its version number.	PROF	T0 + 3s	STM receives STM-1 from STM control	PROF		Version check is successful. STM is allowed to transmit application data
-	STM sends Specific Data need		-	-	PROF	Ts5	STM Control Connection: Message - 6 Sent packet STM - 181 Specific data need + packet STM -15 STM State report Time T1
	ETCS sends its status, bus addresses and active DMI channel & driver language	PROF	T1 + 4s	STM control connection: STM receives Message-4 packet STM-5 ETCS Status data, Message-3 packet STM-2 ETCS bus addresses, Message 9 packet STM-31 Active DMI channel + Packet STM-30 Driver language.			
3	STM tries to establish the connection with another ETCS function (select a connection used by the STM for this test)				PROF	Ts6	STM tries to establish the connection first time by sending message 7 packet STM-1 STM/ETCS function version number + packet STM -15 STM State report. ETCS function does not respond.
4	STM tries a second time			First establishment try failed	PROF	Ts7	STM tries again to establish the connection by sending message 7 packet STM-1 STM/ETCS function version number + packet STM -15 STM State report. ETCS function does not respond. STM may go to FA, or retry after 10s,

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							supplier-specific decision.
5	It is up to the STM to decide what to do now as this connection is not the STM Control Function one. The STM may retry after 10s or it may go to failure.		-	>= 10s has elapsed since last try	PROF	Ts8	STM may try again to establish the connection by sending message 7 packet STM-1 STM/ETCS function version number + packet STM -15 STM State report. Time = T2
6	ETCS responds	PROF	T2 + 1s	STM receives message 8 packet STM-1 STM/ETCS function version number from ETCS	STM		Connection is established

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	STM is powered on. STM takes the initiative to open the communication with the STM control function	PROF	T = 0	STM Control Connection: STM opens connection with the STM Control Function and send its version number Message - 1 packet STM-1 STM/ETCS function version number + packet STM -15 STM State report PO	PROF	Ts9	STM Control Connection: STM Control Function checks the STM version and ("if supported") sends the highest compatible and supported version number Message 2 STM-1 Time = T0.
2	STM receives message 2. Version check is successful. STM is allowed to transmit application data. STM sends Specific Data need and its current state	PROF	T0 + 4s	STM Control Connection: Message - 6 received packet STM - 181 Specific data need + STM -15 STM State report from STM		-	
-	ETCS sends its status				PROF	(T0 +) Ts10	STM control connection: Message-4 Sent packet STM-5 ETCS Status data
-	STM Control function sends the available functions and bus addresses of ETCS functions		-	-	PROF	(T0 +) Ts11	STM Control Connection: Message – 3 Sent packet STM-2 ETCS On-Board physical addresses and safety levels, Message 9 packet STM-31 Active DMI channel + Packet STM-30 Driver language.

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							Time T2
3	STM tries to establishes the connection with another ETCS functions	PROF	T2 + 0.5s	STM tries to establish the connection first time by sending message 7 packet STM-1 STM/ETCS function version number + packet STM -15 STM State report but with message error.			ETCS function does not respond
4	STM tries a second time	PROF	T2 + 2s	STM tries again to establish the connection by sending message 7 packet STM-1 STM/ETCS function version number + packet STM -15 STM State report but still with message error.			ETCS function does not respond
5	(7.6.1.3, 7.6.1.4). The STM tries again after 12s.	PROF	T2 + 14s	STM tries again to establish the connection by sending message 7 packet STM-1 STM/ETCS function version number + packet STM -15 STM State report but with no message error.	PROF	Ts9	ETCS function responds with message 8 packet STM-1 STM/ETCS function version number. Connection is established

Message 1: STM → ETCS (Packet STM-1; STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Actual FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Actual FFFIS STM version number, minor number

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NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	

Message 3: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on test equipment implementation



Q_ADDR_JD	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_TI	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_BI	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on test equipment implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 4 ETCS → STM (packet STM-5)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	5	ETCS Status data

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L_PACKET	13	COMPUTED	Packet length
M_LEVEL	3	2	Level 1
M_MODESTM	4	0	Full supervision
PADDING_BITS	COMPUTED	Not Relevant	

Message 6: STM → ETCS (packet STM-181, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	181	Specific Data need
L_PACKET	13	COMPUTED	
Q_DATAENTRY	1	0	Need for Specific NTC Data Entry = No
NID_PACKET	8	15	STM State report
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 7: STM → ETCS (Packet STM-1; STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number



L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Actual FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Actual FFFIS STM version number, minor number
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 8: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	

Message 9 ETCS → STM (packet STM-31, STM-30)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	31	Active DMI channel



L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	1	DMI channel 1
NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	PO	
ETCS Mode	FS	
ETCS Level	1	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Established/Established	At least one more connection than STM control shall be established, to fulfil specific STM needs.
Other DMI channels Connections	Not established	
TIU Connection	Not Established/Established	At least one more connection than STM control shall be established
BIU Connection	Not Established/Established	At least one more connection than STM control shall be established
JD Connection	Not Established/Established	At least one more connection than STM control shall be 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 (Desk 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 Isolated	



Test case 2a.5

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.14.0.2.2.1.2.0
	The ETCS mode is LS. The STM Control Function version is compatible with the STM. There is no failure in the opening of the communications. STM requests CO State, but has not sent "Specific NTC data need" and is ordered to FA State.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – LS - STM Cntrl, JD, BIU; 6.2.1.1; 6.4.1.1; 7.1.2.2b; 7.1.2.3; 8.2.1.4; 8.2.1.5; 8.2.1.6; 10.1.1.4; 10.1.1.5b; 10.3.2.2, 10.3.2.4 A1, A2, L16; 10.5.1.1b; 10.6.1.1b; 16.2.1.2; 16.3.1.4;
STM requirements tested	Subset-035 None
Packets transmitted via FFFIS STM	STM-1; STM-2; STM-5; STM-13; STM-14; STM-15; STM-30; STM-31; STM-136; STM-143;
ERTMS/ETCS on-board configuration	-
Comments and constraints	Incorrect start-up, ends in FA state. Test SL 4, SL 2 and SL 0.



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	LS	
ETCS Level	1	
Train State	Not Relevant	
ETCS Train Data	Valid	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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 (Desk Status)	Desk A opened	
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 is powered up. The communication between the STM and the STM Control Function is opened	PROF	T = 0	STM Control Connection: STM opens the connection with the STM Control Function and sends its version number. Message 1 sent packet STM- 1 + packet STM-15 STM State Report	PROF	Ts9	STM Control Connection: STM Control Function checks the STM version and ("if supported") sends the highest compatible and supported version number Message 2 STM-1
2			-	Version check is successful. ETCS is allowed to transmit application data			
-	STM Control function sends the available functions and bus addresses of ETCS functions		-	-	PROF	Ts11	STM Control Connection: Message - 3 Sent packet STM-2 ETCS On-Board physical addresses and safety levels. Time T0.
-	STM Control Function sends the current ETCS technical mode and active DMI channel + driver language		-	-	PROF	Ts10	STM Control Connection: Message - 4 Sent packet STM-5 ETCS status data, Message 15 packet STM-31 Active DMI channel and packet STM-30 Driver language. Time T1
3	JD connection is established	PROF	T0 + 0.5s	STM establishes the connections to the JD		Ts12	Function is available. Version check is successful. Message 2 STM-1 sent.
	Connection with the active DMI is established	PROF	T1 + 1s	STM establishes successfully the connection with the active DMI		Ts12	Function is available. Version check is successful. Message 2 STM-1 sent.
	BIU function availability	PROF	T1 + 2s	STM establishes successfully the connection with the BIU	PROF	Ts12	BIU Connection: Version check is successful. Message 2 STM-1 sent.
					PROF	Ts13	BIU Connection: Message 6 is sent packet STM - 136 Brake Interface emergency and service brake status/availability to STM + packet STM-143 Emergency and service brake parameters to STM;
4	STM requests CO State but has not sent "Specific NTC data need", ETCS orders FA State	PROF	T1 + 3s	STM Control Connection: STM Requests CO state. Message 7 received packet STM-13 State	PROF	Ts14	STM Control Connection: Message -8 sent packet STM - 14 State order FA to the STM

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			request from STM			
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Message 1: STM → ETCS (Packet STM-1 + STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FF FIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FF FIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FF FIS STM version number, major number (legal value)

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N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
PADDING_BITS	COMPUTED	Not Relevant	

Message 3: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_JD	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_TI	7	FINITE VALUE	Depends on ETCS implementation



Q_ADDR_TI	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_BI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 4 ETCS → STM (packet STM-5)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	5	ETCS Status data
L_PACKET	13	COMPUTED	Packet length
M_LEVEL	3	2	Level 1
M_MODESTM	4	12	Limited Supervision
PADDING_BITS	COMPUTED	Not Relevant	

Message 6 ETCS → STM (packet STM-136, STM-143)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	136	Brake interface emergency and service brake status/availability to STM
L_PACKET	13	COMPUTED	Packet length
M_BIEB_STATUS	2	FINITE VALUE	Depends on ETCS implementation

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M_BISB_STATUS	2	FINITE VALUE	Depends on ETCS implementation
NID_PACKET	8	143	Emergency and service brake parameters to STM
L_PACKET	13	COMPUTED	
T_EB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
T_SB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 7: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State request from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEREQUEST	4	2	Configuration
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 8 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to



L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	STM State order to STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEORDER	4	8	Failure
PADDING_BITS	COMPUTED	Not Relevant	

Message 10 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 11 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On



PADDING_BITS	COMPUTED	Not Relevant	
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Message 13 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 15 ETCS → STM (packet STM-31, STM-30)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	31	Active DMI channel
L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	1	DMI channel 1
NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	LS	
ETCS Level	1	
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 (Desk 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	



Test case 2a.6

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.4.0.2.2.1.1.2.0
	The ETCS mode is SR. The STM Control Function version is compatible with the STM. There is no failure in the opening of the communications. STM requests CO State. ETCS orders CO State but the STM does not answer in time.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – SR - STM Cntrl, JD, TIU, BIU; 6.2.1.1a; 6.4.1.1; 7.1.2.2b; 7.1.2.3; 8.2.1.4; 8.2.1.5; 8.2.1.6; 10.1.1.4; 10.1.1.5b; 10.3.2.2, 10.3.2.4 A1, A2, C16; 10.5.1.1b; 10.6.1.1b; 16.2.1.2; 16.3.1.4;
STM requirements tested	Subset-035 None
Packets transmitted via FFFIS STM	STM-1; STM-2; STM-5; STM-13; STM-14;STM-15; STM-30; STM-31; STM-136; STM-139; STM-141; STM-143; STM-181;
ERTMS/ETCS on-board configuration	-
Comments and constraints	Incorrect start-up, ends in FA state. Test SL 4.



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	SR	
ETCS Level	1	
Train State	Not Relevant	
ETCS Train Data	Valid	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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 (Desk Status)	Desk A opened	
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 STM is powered up. The communication between the STM and the STM Control Function is opened	PROF	T = 0	STM Control Connection: STM opens the connection with the STM Control Function and sends its version number. Message 1 sent packet STM- 1 + packet STM-15 STM State Report	PROF	Ts9	STM Control Connection: STM Control Function checks the STM version and ("if supported") sends the highest compatible and supported version number Message 2 STM-1
-			-	Version check is successful. ETCs is allowed to transmit application data			
2	STM Control function sends the available functions and bus addresses of ETCS functions		-	-	PROF	Ts11	STM Control Connection: Message - 3 Sent packet STM-2 ETCS On-Board physical addresses and safety levels. Time = T0.
-	STM Control Function sends the current ETCS technical mode and active DMI channel + driver language		-	-	PROF	Ts10	STM Control Connection: Message - 4 Sent packet STM-5 ETCS status data, Message 15 packet STM-31 Active DMI channel + packet STM-30 Driver language.
3	STM sends the specific data need	PROF	T0 + 1s	STM Control Connection: Message - 14 Sent packet STM - 181 Specific data need + packet STM-15 STM State Report	-	-	-
4	JD connection is established	PROF	T0 + 1s	STM establishes the connections to the JD			Connection is established
5		PROF	T0 + 1.5s	STM establishes successfully the connection with the active DMI			Connection is established
6	TIU function availability	PROF	T0 + 2s	STM establishes successfully the connection with the TIU	PROF	Ts15	TIU Connection: Message 5 is sent packet STM-139 Train interface inputs status/availability and STM-141 Train interface command configuration to STM
7	BIU function availability	PROF	T0 + 2.5s	STM establishes successfully the connection with the BIU	PROF	Ts13	BIU Connection: Message 6 is sent packet STM - 136 Brake Interface emergency and service brake status/availability + STM -

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							143 Emergency and service brake parameters to STM.
8	STM requests CO State and ETCS orders CO State	PROF	T0 + 3s	STM Control Connection: STM Requests CO state. Message 7 received packet STM-13 State request from STM	PROF	Ts16	STM Control Connection: Message -8 sent packet STM - 14 State order to the STM. Time = T1.
9	STM does not answer in due time and ETCS sends the order to go to FA State	PROF	T1	No answer from the STM	PROF	Ts17 + 10s	STM Control Connection: Message - 9 sent packet STM-14 State order FA to the STM

Message 1: STM → ETCS (Packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS

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NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Actual FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Actual FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	

Message 3: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_JD	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on ETCS implementation



N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_TI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_BI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 4 ETCS → STM (packet STM-5)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	5	ETCS Status data
L_PACKET	13	COMPUTED	Packet length
M_LEVEL	3	2	Level 1
M_MODESTM	4	2	SR
PADDING_BITS	COMPUTED	Not Relevant	

Message 5 ETCS → STM (packet STM-139, STM-141)			
VARIABLE	Length	VALUE	COMMENTS



NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	139	Train interface inputs status/availability to STM
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	FINITE VALUE	Traction status actual value
M_TIDIR_STATUS	3	FINITE VALUE	Direction controller actual value
M_TICAB_STATUS	2	01	Desk A opened
NID_PACKET	8	141	Train Interface command configuration to STM
L_PACKET	13	COMPUTED	
M_TIRB_CMD_AVAIL	1	FINITE VALUE	
M_TIMSH_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBEB_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBSB_CMD_AVAIL	1	FINITEVALUE	
M_TIPANTO_CMD_AVAIL	1	FINITEVALUE	
M_TIFLAP_CMD_AVAIL	1	FINITEVALUE	
M_TIMS_CMD_AVAIL	1	FINITEVALUE	
M_TITR_C_CMD_AVAIL	1	FINITEVALUE	
PADDING_BITS	COMPUTED	Not Relevant	

Message 6 ETCS → STM (packet STM-136, STM-143)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to



L_MESSAGE	8	COMPUTED	
NID_PACKET	8	136	Brake interface emergency and service brake status/availability to STM
L_PACKET	13	COMPUTED	Packet length
M_BIEB_STATUS	2	FINITE VALUE	Depends on ETCS implementation
M_BISB_STATUS	2	FINITE VALUE	Depends on ETCS implementation
NID_PACKET	8	143	Emergency and service brake parameters to STM
L_PACKET	13	COMPUTED	
T_EB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
T_SB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 7: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State request from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEREQUEST	4	2	Configuration
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	



Message 8 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	STM State order to STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEORDER	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 9 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	STM State order to STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEORDER	4	8	Failure
PADDING_BITS	COMPUTED	Not Relevant	

Message 14: STM → ETCS (packet STM-181, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	

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NID_PACKET	8	181	Specific NTC Data Need
L_PACKET	13	COMPUTED	
Q_DATAENTRY	1	1	Need
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 15 ETCS → STM (packet STM-31, STM-30)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	31	Active DMI channel
L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	1	DMI channel 1
NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	SR	
ETCS Level	1	
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 (Desk 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	



Test case 2a.7

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.6.0.2.2.1.1.1.0
	The ETCS mode is SL. The STM Control Function version is compatible with the STM. There is no failure in the opening of the communications. STM requests CO state. ETCS orders CO State, the STM switches to CO State, then requests to go to the CS State, is ordered to CS and reports CS in time. The STM closes the connections except to STM control.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – SL - STM Cntrl, JD, TIU, BIU, odo, ref time; 6.2.1.1a; 6.3.1.3; 6.4.1.1; 7.1.2.2b; 8.2.1.5; 8.2.1.6; 8.3.1.6; 10.1.1.4; 10.1.1.5b; 10.3.2.2, 10.3.2.4 A1; A2; A4a; NP to PO; PO to CO; CO to CS; 10.5.1.1b; 10.6.1.1b; 11.1.1.1b; 11.1.1.2; 11.1.1.3b; 16.2.1.2; 16.3.1.4;
STM requirements tested	Subset-035 6.2.1.1; 6.3.1.3; 6.4.1.1; 7.1.2.3 ; 8.2.1.3; 8.2.1.4; 8.3.1.4; 9.2.1.1 NP to PO; PO to CO; CO to CS; 9.2.1.2 1; 2; 4a; 9.3.1.3b; 9.3.1.4b,c; 16.2.1.2;
Packets transmitted via FFFIS STM	STM-1; STM-2; STM-5; STM-8; STM-9; STM-13; STM-14; STM-15; STM-30; STM-31; STM-136; STM-139; STM-141; STM-143; STM-181;
ERTMS/ETCS on-board configuration	-
Comments and constraints	Normal power-on, to be continued in e.g. SoM FID. ETCS test use SL 4. Check as end-condition that odometry and reference time are available. STM test shall use different physical addresses for each ETCS function. ETCS test shall use STM addresses both in NID_STM + 70 and configurable range (multiple tests, at least min, max and one in between in each group).



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	SL	
ETCS Level	1	
Train State	Standstill	
ETCS Train Data	Valid	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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 (Desk Status)	No desk open	
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 is powered on. The communication between the STM and STM Control Function is opened	PROF	T = 0	STM Control Connection: STM opens the connection with the STM Control Function and send its version number. Message 1 received packet STM-1 + packet STM-15 STM State Report	PROF	Ts9	STM Control Connection: STM Control Function checks the STM version and sends the highest compatible and supported version number Message 2 STM-1
			-	Version check is successful. ETCS is allowed to transmit application data			
	STM Control function sends the available functions and bus addresses of ETCS functions		-	-	PROF	Ts11	STM Control Connection: Message – 3a Sent packet STM-2 ETCS On-Board physical addresses and safety levels. Time T0.
	STM Control Function sends the current ETCS technical mode		-	-	PROF	Ts10	Message - 4 Sent packet STM-5 ETCS status data Time T1
	STM Control Function sends the Active DMI channel and Driver language.				PROF	Ts10	Message 18 sent packet STM-31 Active DMI channel + STM-30 Driver language.
	Odometer parameters are multicast.				PROF	Ts22	Odometry Connection: Message 11 sent packets STM-9 Odometer parameters to STM (this packet is multicast). <i>Exact time of reception not important, see subset-35 12.4.1.1.</i>
	Odometer is available				PROF	Ts23	Message 15 packet STM-8 sent regularly.
3	BIU function availability	PROF	T0 + 1s	STM establishes successfully the connection with the BIU. Message 1 received packet STM-1 + packet STM-15 STM State Report	PROF	Ts13	BIU connection: Message 6 is sent packet STM - 1 + STM - 136 Brake Interface emergency and service brake status/availability + STM - 143 Emergency and service brake parameters to STM.

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4	JD connection is established	PROF	T0 + 2s	STM establishes the connection to the JD. Message 1 received packet STM- 1 + packet STM-15 STM State Report			Functions are available. Sent Message 2 STM-1.
5	STM sends the specific data need	PROF	T0 + 3s	STM Control Connection: Message - 12 Sent packet STM - 181 Specific data need			-
6	TIU function availability	PROF	T0 + 3.5s	STM establishes successfully the connection with the TIU. Message 1 received packet STM- 1 + packet STM-15 STM State Report	PROF	Ts15	TIU Connection: Message 5 is sent packet STM - 1 + STM-139 Train interface inputs status/availability and STM-141 Train interface command configuration to STM
7	STM requests CO State and ETCS orders CO State	PROF	T1 + 4.5s	STM Control Connection: STM Requests CO state. Message 7 received packet STM-13 State request from STM	PROF	Ts16	STM Control Connection: Message -8 sent packet STM - 14 State order to the STM. Time T2.
8	STM confirms the CO State and sends the state request to CS State	PROF	T2 + 8s	STM Control Connection: STM (in SL mode) confirms CO State and requests CS State Message – 9 received packet STM-15 STM State report + STM – 13 State request from STM	PROF	Ts18	STM Control Connection: Message 10 sent packet STM –14 State order to the STM Time T3.
9	STM confirms CS state	PROF	T3 + 8s	STM Control Connection: Message – 13 received packet STM-15 STM State report CS			
10	STM closes connections except to STM Control	PROF	T3+8.5s	All connections except STM Control: STM closes connection.			Not ordered to FA. Reference Time is available.

STM Test case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	STM takes the initiative to open the communication with the STM control function		T = 0	STM is powered on	PROF	Ts3	STM Control Connection: STM opens the communication session Message - 1 packet STM-1 STM/ETCS function version number + packet STM-15

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							STM State Report. Time T0.
2	STM Control Connection: STM Control Function checks the version and sends its version number	PROF	T0 + 1s	STM Control Connection: STM Control Function checks the received version and sends its version number Message 2 STM-1 STM/ETCS function version number	PROF	Ts5	Version check is successful. STM is allowed to transmit application data. STM sends Specific Data need: STM Control Connection: Message - 12 Sent packet STM - 181 Specific data need + packet STM-15 STM State Report
3	After receiving physical addresses etc. STM establishes the connection with other ETCS functions. Each ETCS function shall have a separate address.	PROF	T0 + 2s	STM Control Connection: ETCS bus addresses received Message-3b packet STM 2 ETCS on-board physical addresses and safety levels	PROF		STM establishes the connection with all required ETCS functions
-					PROF	Ts6	TIU Connection established if required: send Message-16 packet STM-1 STM/ETCS function version number + STM-15 STM State report Time T1.
-					PROF	Ts6	BIU Connection established if required: send Message-17 STM-1 STM/ETCS function version number + packet STM-15 STM State report. Time T2.
-					PROF	Ts6	JD Connection established if required: send Message-14 STM-1 STM/ETCS function version number + packet STM-15 STM State report
					PROF	Ts6	Active DMI connection Established if required: send message-14 STM-1 STM/ETCS function version number + packet STM-15 State report
4	ETCS reports TIU status if	PROF	T1 + 0.5s	TIU Connection if opened:		-	

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	connection opened by STM			Message 5 is sent packet STM - 1 + STM-139 Train interface inputs status/availability and STM-141 Train interface command configuration to STM			
-	ETCS reports BIU status if connection opened by STM	PROF	T2 + 1s	BIU Connection if opened: Message 6 is sent packet STM - 1 + STM - 136 Brake Interface emergency and service brake status/availability and STM-143 Emergency and Service brake parameters to STM		-	
5	ETCS sends status information, STM requests CO state when receiving STM-5 ETCS status data	PROF	T0 + 10s	STM Control Connection: Message - 4 packet STM-5 ETCS status data and Message 18 packet STM-31 Active DMI channel + STM-30 Driver language.	PROF	Ts19	STM Control Connection: Message 7 sent packet STM-13 State request CO from STM + packet STM-15 STM State Report. Time T3.
6	STM switches to CO state and requests CS because ETCS is in NL or SL	PROF	T3 + 0.5s	STM Control Connection: Message -8 received packet STM - 14 State order to the STM	PROF	10s	STM Control Connection: Message – 9 sent packet STM – 13 State request from STM + packet STM-15 STM State Report Time T4
7	STM switches to CS state	PROF	T4 + 0.5s	STM Control Connection: Message 10 received packet STM –14 State order to the STM	PROF	10s	STM Control Connection: Message 13 sent packet STM-15 STM state report

Message 1: STM → ETCS (Packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number



L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	

Message 3a: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	



NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_JD	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_TI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_BI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 3b: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS



NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on test equipment implementation – see TC header for test requirement!
Q_ADDR_JD	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_TI	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_BI	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on test equipment implementation
PADDING_BITS	COMPUTED	Not Relevant	



Message 4 ETCS → STM (packet STM-5)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	5	ETCS Status data
L_PACKET	13	COMPUTED	Packet length
M_LEVEL	3	2	Level 1
M_MODESTM	4	FINITE VALUE	Depends on test-case conditions
PADDING_BITS	COMPUTED	Not Relevant	

Message 5 ETCS → STM (packet STM-1, STM-139, STM-141)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
NID_PACKET	8	139	Train interface inputs status/availability to STM
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	FINITE VALUE	
M_TIDIR_STATUS	3	FINITE VALUE	



M_TICAB_STATUS	2	11b	No cab active in SL (but in NL, 01b or 10b must be used)
NID_PACKET	8	141	Train Interface command configuration to STM
L_PACKET	13	COMPUTED	
M_TIRB_CMD_AVAIL	1	FINITE VALUE	
M_TIMSH_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBEB_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBSB_CMD_AVAIL	1	FINITEVALUE	
M_TIPANTO_CMD_AVAIL	1	FINITEVALUE	
M_TIFLAP_CMD_AVAIL	1	FINITEVALUE	
M_TIMS_CMD_AVAIL	1	FINITEVALUE	
M_TITR_C_CMD_AVAIL	1	FINITEVALUE	
PADDING_BITS	COMPUTED	Not Relevant	

Message 6 ETCS → STM (packet STM-1, STM-136, STM-143)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
NID_PACKET	8	136	Brake interface emergency and service brake status/availability to STM



L_PACKET	13	COMPUTED	Packet length
M_BIEB_STATUS	2	FINITE VALUE	“Available” (STM TC) / ETCS actual value (ETCS TC)
M_BISB_STATUS	2	FINITE VALUE	“Available” / ETCS actual value (ETCS test case)
NID_PACKET	8	143	Emergency and service brake parameters to STM
L_PACKET	13	COMPUTED	
T_EB_MAXDELAY	8	FINITE VALUE	Select value (STM TC) / Depends on ETCS implementation (ETCS TC)
T_SB_MAXDELAY	8	FINITE VALUE	Select value (STM TC) / Depends on ETCS implementation (ETCS TC)
PADDING_BITS	COMPUTED	Not Relevant	

Message 7: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State request from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEREQUEST	4	2	Configuration
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 8 ETCS → STM (packet STM-14)



VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	Packet length
NID_PACKET	8	14	STM State order to STM
NID_STMSTATEORDER	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 9 STM → ETCS (packet STM-15, STM-13)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	2	Configuration
NID_PACKET	8	13	STM State request from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEREQUEST	4	4	Cold StandBy
PADDING_BITS	COMPUTED	Not Relevant	

Message 10 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	

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NID_PACKET	8	14	STM State order to STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEORDER	4	4	Unconditional Cold Standby
PADDING_BITS	COMPUTED	Not Relevant	

Message 11 ETCS → STM (packet STM-9)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	9	Odometers parameters to STM
L_PACKET	13	COMPUTED	Length
T_ODOCYCLE	8	FINITE VALUE	ETCS test: actual product performance values. STM test: typical product value
T_ODOMAXPROD	8	FINITE VALUE	ETCS test: actual product performance values. STM test: typical product value
PADDING_BITS	COMPUTED	Not Relevant	

Message 12: STM → ETCS (packet STM-181, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	181	Specific NTC Data Need
L_PACKET	13	COMPUTED	
Q_DATAENTRY	1	0	No need
NID_PACKET	8	15	State report from STM

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L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 13: STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	4	Cold StandBy
PADDING_BITS	COMPUTED	Not Relevant	

Message 14 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Actual FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Actual FFFIS STM version number, minor number
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	



NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 15 ETCS → STM (packet STM-8)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	8	Odometer multicast to STM
L_PACKET	13	COMPUTED	Length
T_ODO	32	FINITE VALUE	Odometer instantaneous values
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	

Message 16 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	



NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Actual FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Actual FFFIS STM version number, minor number
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 17 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Actual FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Actual FFFIS STM version number, minor number
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 18 ETCS → STM (packet STM-30, STM-31)			
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VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	31	Active DMI channel
L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	FINITE VALUE	DMI channel
NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	CS	
ETCS Mode	SL	
ETCS Level	1	
Train State	Not Relevant	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Established/Not Relevant	ETCS TC / STM TC
Other DMI channel Connections	Not Established/Not Relevant	ETCS TC / STM TC
TIU Connection	Established/Not Relevant	ETCS TC / STM TC
BIU Connection	Established/Not Relevant	ETCS TC / STM TC
JD Connection	Established/Not Relevant	ETCS TC / STM TC
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 (Desk Status)	Not Relevant	
BIU Emergency Brake Command	Not Relevant	
BIU Service Brake Command	Not Relevant	
BIU Emergency Brake Status	Available/Actual value	ETCS test case : actual ETCS status data
BIU Service Brake Status	Available/Actual value	ETCS test case : actual ETCS status data
NTC isolation status	Not Isolated	



Test case 2a.8

Test case path 2a.0.7.0.2.2.1.1.1.1.0 is the same test case as Test case 2a.7 path A: 2a.0.6.0.2.2.1.1.1.1.0 with the exception of the ETCS Mode being NL.

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – NL - STM Cntrl, JD, TIU, BIU, ODO, ref time



Test case 2a.9

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.9.0.2.2.1.1.1.2.2
	The ETCS mode is TR. The STM Control Function version is compatible with the STM. There is no failure in the opening of the communications. ETCS orders CO State, the STM switches to CO State. The STM requires Specific NTC Data Entry and this test case is followed by one of FI 10a when ETCs sends start of Specific NTC Data Entry procedure.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – TR - STM Cntrl, JD, TIU, BIU, odo, ref time; 6.2.1.1; 6.3.1.3; 6.4.1.1; 7.1.2.2b; 8.2.1.5; 8.2.1.6; 8.3.1.2; 10.1.1.4; 10.1.1.5b; 10.3.2.2, 10.3.2.4 A1; A2; NP to PO; PO to CO; 10.4.1.1; 10.4.1.2; 10.4.1.4; 10.4.1.5; 10.4.1.6; 10.4.1.8; 10.4.1.9; 10.5.1.1b; 10.6.1.1b; 11.1.1.1b; 11.1.1.2; 11.1.1.3b; 16.2.1.2; 16.3.1.4;
STM requirements tested	Subset-035 6.2.1.1; 6.3.1.3; 6.4.1.1; 7.1.1.2; 7.1.2.1; 7.1.2.3 ; 8.2.1.3; 8.2.1.4; 8.3.1.3; 8.3.1.5; 9.2.1.1 1 NP to PO; 2 PO to CO; 9.2.1.2 1: 1, 2; 9.3.1.3b; 9.3.1.4b; 16.2.1.2;
Packets transmitted via FFFIS STM	STM-1; STM-2; STM-5; STM-9; STM-13; STM-14; STM-15; STM-30; STM-31; STM-136; STM-139; STM-141; STM-143; STM-175; STM-176; STM-177; STM-178; STM-181; STM-184;
ERTMS/ETCS on-board configuration	-
Comments and constraints	<p>The test case ends when the STM requests DE state to the ETCS after receiving STM-184 when ETCS data entry has finished. Therefore, one of the test cases of the functional identity 10 a will follow this one.</p> <p>Note: As the response-times for different actions are manufacturer-specific, the order of events as far as responses go in the test-cases is undefined. The test-cases do not require a response to happen before the next numbered test-step, only within the given response-time.</p> <p>ETCS test to test SL 0, SL 2 and SL 4.</p>



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	TR	
ETCS Level	1	
Train State	Standstill	
ETCS Train Data	Not Relevant	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
DMI Connection	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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	Inactive	
TIU Direction Controller Position Status	Forward	
TIU Cab Status (Desk Status)	Desk A opened	
BIU Emergency Brake Command	No command	
BIU Service Brake Command	No command	
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	STM is powered on. The communication between the STM and the STM Control Function is opened	PROF	T0	STM Control Connection: STM opens the connection with the STM Control Function and send its version number. Message 1 received packet STM-1 + packet STM-15 STM State Report	PROF	Ts9	STM Control Connection: STM Control Function checks the STM version and ("if supported") sends the highest compatible and supported version number Message 2 STM-1 Time= T1
2			-	Version check is successful. ETCS is allowed to transmit application data			
-	STM Control function sends the available functions and bus addresses of ETCS functions		-	-	PROF	Ts11	STM Control Connection: Message – 3a Sent packet STM-2 ETCS On-Board physical addresses and safety levels Time =T2
-	STM Control Function sends the current ETCS technical mode		-	-	PROF	Ts10	STM Control Connection: Message - 4 Sent packet STM-5 ETCS status data + packet STM-31 Active DMI channel + STM-30 Driver language Time = T3
3	STM sends the specific data need	PROF	T1 + 4s	STM Control Connection: Message - 16 received packet STM - 181 Specific data need		-	-
4	STM requests CO State and ETCS orders CO State	PROF	T3 + 1s	STM Control Connection: STM Requests CO state. Message 7 received packet STM-13 State request from STM	PROF	Ts16	STM Control Connection: Message -8 sent packet STM - 14 State order to the STM Time = T4
5	STM confirms the CO State	PROF	T4 + 8s	STM Control Connection: STM confirms CO State Message – 9 received packet STM – 15 State report from STM	-		
6	JD connection is established Odometer is available	PROF	T2 + 9.5s	STM establishes the connections to the JD. Message 12 received packet STM- 1 + packet STM-15 STM State Report	PROF	Ts9	Functions are available. Same "FFFIS STM version number" is reported as on STM control connection. Message 15 packet STM-8 received

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7	TIU function availability.	PROF	T2 + 10s	STM establishes successfully the connection with the TIU. Message 12 received packet STM- 1 + packet STM-15 STM State Report	PROF	Ts9	TIU Connection: Same “FFFIS STM version number” is reported as on STM control connection.
	Status / Availability of the train interface FFFIS STM signals and command configuration.				PROF	Ts15	Message 5 is sent packet STM-139 Train interface inputs status/availability and STM-141 Train interface command configuration to STM.
8	BIU function availability.	PROF	T2 + 10.5s	STM establishes successfully the connection with the BIU. Message 12 received packet STM- 1 + packet STM-15 STM State Report		Ts9	
	Status / Availability of brake commands, Maximum time delay for the ETCS to process the STM Emergency and the STM Service Brake commands				PROF	Ts13	BIU Connection: Message 6 is sent packet STM - 136 Brake Interface emergency and service brake status/availability and STM-143 Emergency and Service brake parameters to STM. Same “FFFIS STM version number” is reported as on STM control connection.
9	DMI function availability	PROF	T2 + 20s	STM establishes successfully the connection with the Active DMI. Message 12 received packet STM- 1 + packet STM-15 STM State Report	PROF	Ts9	Same “FFFIS STM version number” is reported as on STM control connection.
	ETCS transmit ETCS data to STM			-	PROF	Ts20	STM Control Connection: Message 10 sent packets STM-175 train data; STM-176 Train data Additional “braking characteristic” to STM; STM-177 Additional data values and date/time to STM; STM-178 National Values to STM
	ETCS transmit; Odometer parameters			-	PROF	Ts21	Odometry Connection: Message 11 sent packets STM-9 Odometer parameters to STM (this packet is multicast) <i>Exact time of reception not important, see subset-35 12.4.1.1.</i>

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STM Test case (This test case is only applicable for STMs which require STM Specific data.)

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	STM takes the initiative to open the communication with the STM control function		T 0	STM is powered on	PROF	Ts3	STM opens the STM control connection STM Control Connection: Message - 1 packet STM-1 STM/ETCS function version number + packet STM-15 STM State Report Time = T1.
2		PROF	T1 + 1	STM Control Connection: STM Control Function sends its version number and STM checks the received version Message 2 packet STM-1 STM/ETCS function version number			Version check is successful. STM is allowed to transmit application data
-	STM sends Specific Data need		-	-	PROF	Ts5	STM Control Connection: Message - 16 Sent packet STM - 181 Specific data need + STM-15 State Report
-	STM Control Function sends the current ETCS technical mode	PROF	T1 + 1.5	- STM Control Connection: Message - 4 Sent packet STM-5 ETCS status data + packet STM-31 Active DMI channel + STM-30 Driver language			
-	ETCS sends bus addresses of functions etc., STM establishes the connection with other ETCS functions	PROF	T1 + 2	STM Control Connection: Message-3b is received packet STM-2 ETCS on-board bus addresses, packet STM-31 Active DMI channel + STM-30 Driver language	PROF		<i>STM establishes the connection with all required ETCS functions</i>
-	<i>Note: The STM may delay opening the required optional</i>				PROF	Ts6	TIU Connection if required: send Message-20 packet STM-1 + STM-15 STM State

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	<i>connections until later. The state report shall then report the current STM state at the time of reporting.</i>						report Time = T2
-					PROF	Ts6	BIU Connection if required: Message-21 packet STM-1 + STM-15 STM State report Time = T3
-					PROF	Ts6	JD Connection if required: Message-18 packet STM-1 + STM-15 STM State report
-					PROF	Ts6	DMI Connection if required: Send message 22 packet STM-1 + STM-15 STM State report
-		PROF	T2 + 5	TIU Connection if opened: Message 5 is received packet STM-139 Train interface inputs status/availability and STM-141 Train interface command configuration to STM		-	
-		PROF	T3 + 5	BIU Connection if opened: Message 6 is received packet STM - 136 Brake Interface emergency and service brake status/availability and STM-143 Emergency and Service brake parameters to STM to STM		-	
3	STM requests CO state				PROF	Ts19	STM Control Connection: Message 7 sent packet STM-13 State request CO from STM Time = T4
4	STM reports CO state	PROF	T4 + 0.5	STM Control Connection: Message -8 received packet STM - 14 State order CO to the STM	PROF	10s	STM Control Connection: Message – 9 sent packet STM – 15 State report CO from STM Time = T5
5	ETCS sends data	PROF	T5 + 0.5	STM Control Connection: Messages 10 received packets		-	

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				STM-175 train data; STM-176 Train data Additional “braking characteristic” to STM; STM-177 Additional data values and date/time to STM; STM-178 National Values to STM. Message 11 received packets STM-9 Odometer parameters to STM <i>Exact time of reception not important, see subset-35 12.4.1.1.</i>			
	STM reports new state on all open connections after state change.						

Message 1: STM → ETCS (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	



Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	

Message 3a: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_JD	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on ETCS implementation



N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_TI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_BI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 3b: ETCS → STM (packet STM-2, STM-31, STM-30)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_JD	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on test equipment implementation



Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_TI	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_BI	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on test equipment implementation
NID_PACKET	8	31	Active DMI channel
L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	FINITE VALUE	Active DMI channel identifier
NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	

Message 4 ETCS → STM (packet STM-5, STM-31, STM-30)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to

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L_MESSAGE	8	COMPUTED	
NID_PACKET	8	5	ETCS Status data
L_PACKET	13	COMPUTED	Packet length
M_LEVEL	3	2	Level 1
M_MODESTM	4	7	Trip
NID_PACKET	8	31	Active DMI channel
L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	FINITE VALUE	Active DMI channel identifier
NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	

Message 5 ETCS → STM (packet STM-139, STM-141)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	139	Train interface inputs status/availability to STM
L_PACKET	13	COMPUTED	Packet length
M_TITR_STATUS	2	FINITE VALUE	Actual value / Traction off
M_TIDIR_STATUS	3	FINITE VALUE	Actual value / Forward
M_TICAB_STATUS	2	FINITE VALUE	Actual value / Cab A active



NID_PACKET	8	141	Train Interface command configuration to STM
L_PACKET	13	COMPUTED	
M_TIRB_CMD_AVAIL	1	FINITE VALUE	
M_TIMSH_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBEB_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBSB_CMD_AVAIL	1	FINITEVALUE	
M_TIPANTO_CMD_AVAIL	1	FINITEVALUE	
M_TIFLAP_CMD_AVAIL	1	FINITEVALUE	
M_TIMS_CMD_AVAIL	1	FINITEVALUE	
M_TITR_C_CMD_AVAIL	1	FINITEVALUE	
PADDING_BITS	COMPUTED	Not Relevant	

Message 6 ETCS → STM (packet STM-136, STM-143)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	136	Brake interface emergency and service brake status/availability to STM
L_PACKET	13	COMPUTED	Packet length
M_BIEB_STATUS	2	FINITE VALUE	Available / ETCS actual value
M_BISB_STATUS	2	FINITE VALUE	Available / ETCS actual value
NID_PACKET	8	143	Emergency and service brake parameters to STM
L_PACKET	13	COMPUTED	



T_EB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
T_SB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 7: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State request from STM
L_PACKET	13	COMPUTED	
NID_STMSTATEREQUEST	4	2	Configuration
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 8 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	STM State order to STM
L_PACKET	13	COMPUTED	Packet length



NID_STMSTATEORDER	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 9 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 10 ETCS → STM (packet STM-175, STM-176, STM-177, STM-178)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	175	Train Data
L_PACKET	13	COMPUTED	
NC_CDTRAIN	4	FINITE VALUE	Cant Deficiency Train Category
NC_TRAIN	15	FINITE VALUE	Other International Train Category
L_TRAIN	12	FINITE VALUE	Train length (example taken from the subset-076) entered by the driver
V_MAXTRAIN	7	FINITE VALUE	Maximum train speed (example taken from the subset-076) entered by the driver



M_LOADINGGAUGE	8	FINITE VALUE	Load Profile entered by the driver
M_AXLELOADCAT	7	FINITE VALUE	Axle Load entered by the driver
M_AIRTIGHT	2	FINITE VALUE	Airtight system presence entered by the driver
M_TRAINTYPE	8	FINITE VALUE	Train type
N_ITER	5	1	1 Iteration
M_VOLTAGE(1)	4	FINITE VALUE	E.g. 1 = AC 25kV, 2 = AC 15kV, 3 = DC 3kV
NID_CTRACTION(1)	10	FINITE VALUE	Traction System type entered by the driver
NID_PACKET	8	176	Train data additional "braking characteristic" to STM
L_PACKET	13	COMPUTED	Packet length
T_BRAKE_SERVICE	12	FINITE VALUE	Build up time for the service brake
T_BRAKE_EMERGENCY	12	FINITE VALUE	Build up time for the emergency brake
T_TRACTION_CUT_OFF	12	FINITE VALUE	Time to cut-off traction
M_BRAKE_POSITION	2	FINITE VALUE	Brake position
M_BRAKE_PERCENTAGE_STM	8	FINITE VALUE	Brake percentage
NID_PACKET	8	177	Additional data values and date/time to STM
L_PACKET	13	COMPUTED	Length
NID_ENGINE	24	FINITE VALUE	On-board ETCS identity(To be defined)
M_ADHESION	1	FINITE VALUE	Adhesion factor(0 = slippery rail, 1 = non-slippery rail)
YEAR	7	FINITE VALUE	Official year UTC(To be defined)
MONTH	4	FINITE VALUE	Official month UTC(To be defined)
DAY	5	FINITE VALUE	Official day UTC(To be defined)
HOURL	5	FINITE VALUE	Official hour UTC(To be defined)



MINUTES	6	FINITE VALUE	Official minutes UTC(To be defined)
SECONDS	6	FINITE VALUE	Official seconds UTC(To be defined)
TTS	5	FINITE VALUE	Official hundred of second UTC(To be defined)
NID_OPERATIONAL_STM	32	FINITE VALUE	Train Running Number
NID_PACKET	8	178	National Values to STM
L_PACKET	13	COMPUTED	Length
Q_SCALE	2	FINITE VALUE	Distance scale(To be defined)
V_NVSHUNT	7	FINITE VALUE	Shunting mode speed limit(To be defined)
V_NVSTFF	7	FINITE VALUE	Staff Responsible mode speed limit(To be defined)
V_NVONSIGHT	7	FINITE VALUE	On Sight mode speed limit(To be defined)
V_NVLIMSUPERV	7	FINITE VALUE	Limited Supervision mode speed limit
V_NVUNFIT	7	FINITE VALUE	Unfitted mode speed limit(To be defined)
V_NVREL	7	FINITE VALUE	Release Speed speed limit(To be defined)
D_NVROLL	15	FINITE VALUE	Roll away distance limit(To be defined)
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	Maximum speed limit allowing the driver to select the “override EOA” function(To be defined)
V_NVSUPOVTRP	7	FINITE VALUE	Override speed limit to be supervised when the “override” function is active (To be defined)



D_NVOVTRP	15	FINITE VALUE	Maximum distance for overriding the train trip(To be defined)
T_NVOVTRP	8	FINITE VALUE	Maximum time for overriding the train trip(To be defined)
D_NVPOTRP	15	FINITE VALUE	Maximum distance for reversing in Post Trip mode(To be defined)
M_NVCONTACT	2	FINITE VALUE	T_NVCONTACT 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(To be defined)
Q_NVDRIVER_ADHES	1	FINITE VALUE	Qualifier for the modification of trackside adhesion factor by driver(To be defined)
A_NVMAXREDADH1	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (1)
A_NVMAXREDADH2	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (2)
A_NVMAXREDADH3	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (3)
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	FINITE VALUE	Qualifier for integrated correction factors
Q_NVKVINTSET	2	FINITE VALUE	Only if Q_NVKINT = 1, Q_NVKVINTSET and the following variables follow
A_NVP12	6	FINITE VALUE	Only if Q_NVKVINTSET = 1
A_NVP23	6	FINITE VALUE	Only if Q_NVKVINTSET = 1
V_NVKVINT	7	FINITE VALUE	= 0 km/h
M_NVKVINT	7	FINITE VALUE	Valid between V_NVKVINT and V_NVKVINT(1) If Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT	7	FINITE VALUE	Only if Q_NVKVINTSET = 1

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			Valid between V_NVKVINT and V_NVKVINT(1) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
N_ITER	5	FINITE VALUE	
V_NVKVINT(n)	7	FINITE VALUE	Speed step used to define the integrated correction factor Kv
M_NVKVINT(n)	7	FINITE VALUE	Valid between V_NVKVINT(n) and V_NVKVINT(n+1) Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(n)	7	FINITE VALUE	Only if Q_NVKVINTSET = 1 Valid between V_NVKVINT(n) and V_NVKVINT(n+1) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
N_ITER	5	FINITE VALUE	
Q_NVKVINTSET(k)	2	FINITE VALUE	Type of Kv_int set
A_NVP12(k)	6	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1
A_NVP23(k)	6	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1
V_NVKVINT(k)	7	FINITE VALUE	= 0km/h
M_NVKVINT(k)	7	FINITE VALUE	Valid between V_NVKVINT(k) and V_NVKVINT(k,1) If Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(k)	7	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1 Valid between 0km/h and V_NVKVINT(k) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
N_ITER(k)	5	FINITE VALUE	
V_NVKVINT(k,m)	7	FINITE VALUE	Speed step used to define the integrated correction factor Kv
M_NVKVINT(k,m)	7	FINITE VALUE	Valid between V_NVKVINT(k,m) and V_NVKVINT(k,m+1) Q_NVKVSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(k,m)	7	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1 Valid between V_NVKVINT(k,m) and V_NVKVINT(k,m+1)



			Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
L_NVKRINT	5	FINITE VALUE	= 0m
M_NVKRINT	5	FINITE VALUE	Valid between L_NVKRINT and L_NVKRINT(1)
N_ITER	5	FINITE VALUE	
L_NVKRINT(l)	5	FINITE VALUE	Train length step used to define the integrated correction factor Kr
M_NVKRINT(l)	5	FINITE VALUE	Valid between L_NVKRINT(l) and L_NVKRINT(l+1)
M_NVKVINT	5	FINITE VALUE	Integrated correction factor Kv
PADDING_BITS	COMPUTED	Not Relevant	

Message 11 ETCS → STM (packet STM-9)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	9	Odometers parameters to STM
L_PACKET	13	COMPUTED	Length
T_ODOCYCLE	8	FINITE VALUE	ETCS test: actual product performance values. STM test: typical product value
T_ODOMAXPROD	8	FINITE VALUE	ETCS test: actual product performance values. STM test: typical product value
PADDING_BITS	COMPUTED	Not Relevant	

Message 12: STM → ETCS (Packet STM-1 + 15)			
VARIABLE	Length	VALUE	COMMENTS



NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	2	Actual STM State: Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 15 ETCS → STM (packet STM-8)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	8	Odometer multicast to STM
L_PACKET	13	COMPUTED	Length
T_ODO	32	FINITE VALUE	Odometer instantaneous values
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	

Message 16: STM → ETCS (packet STM-181, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	181	Specific NTC Data Need
L_PACKET	13	COMPUTED	Length
Q_DATAENTRY	1	1	Need
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Length
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 17: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State Request from STM
L_PACKET	13	COMPUTED	Length

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NID_STMSTATEREQUEST	4	3	Data Entry
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Length
NID_STMSTATE	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 18 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Length
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 20 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	

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NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Length
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 21 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Length
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 22 STM → ETCS (packet STM-1, STM-15)			
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VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Length
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 24 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Length
NID_DRV_LANG	16	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 25 ETCS → STM (packet STM-184)			
VARIABLE	Length	VALUE	COMMENTS



NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	184	Specific NTC Data Entry flag
L_PACKET	13	COMPUTED	Length
M_DATAENTRYFLAG	1	1	Start
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	CO	
ETCS Mode	TR	
ETCS Level	1	
Train State	Standstill	
ETCS Train Data	Valid	
Active DMI channel Connection	Established/if needed	ETCS test case: established. STM test case: Depends on STM, may be disconnected or connected
Other DMI channel Connections	Established/if needed	ETCS test case: established. STM test case: Depends on STM, may be disconnected or connected
TIU Connection	Established/if needed	ETCS test case: established. STM test case: Depends on STM, may be disconnected or connected
BIU Connection	Established/if needed	ETCS test case: established. STM test case: Depends on STM, may be disconnected or connected
JD Connection	Established/if needed	ETCS test case: established. STM test case: Depends on STM, may be disconnected or connected
TIU regenerative brake Command	Not relevant	
TIU magnetic shoes brake Command	Not relevant	
TIU Eddy current brake Command for Emergency Brake	Not relevant	
TIU Inhibit 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	Forward	
TIU Cab Status (Desk Status)	Desk A opened	
BIU Emergency Brake Command	No command	
BIU Service Brake Command	No command	
BIU Emergency Brake Status	Not relevant	
BIU Service Brake Status	Not relevant	
NTC isolation status	Not Isolated	

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Test case 2a.10

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.5.0.2.2.1.1.1.2.1.1
	The ETCS mode is OS. The STM Control Function version is compatible with the STM. There is no failure in the opening of the communications. ETCS orders CO State, the STM switches to CO State.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – OS - STM Cntrl, JD, TIU, BIU, ODO, ref time; 6.2.1.1a-c; 6.4.1.1; 7.1.2.2b; 8.2.1.4; 8.2.1.5; 8.2.1.6; 8.3.1.2; 10.1.1.4; 10.1.1.5b; 10.3.2.2, 10.3.2.4 A1; A2; A4a; NP to PO; PO to CO; CO to CS; 10.4.1.1; 10.4.1.2; 10.4.1.4; 10.4.1.5; 10.4.1.6; 10.4.1.8; 10.4.1.9; 10.5.1.1b; 10.6.1.1b; 16.2.1.2; 16.3.1.4;
STM requirements tested	Subset-035 035 6.2.1.1; 6.3.1.3; 6.4.1.1; 7.1.2.3; 8.2.1.3; 8.2.1.4; 8.3.1.3; 9.2.1.1 NP to PO; PO to CO; CO to CS; 9.2.1.2 1; 2; 4a; 9.3.1.3b; 9.3.1.4; 16.2.1.2;
Packets transmitted via FFFIS STM	STM-1; STM-2; STM-5; STM-9; STM-13; STM-14; STM-15; STM-30; STM-31; STM-136; STM-139; STM-141; STM-143; STM-161; STM-175; STM-176; STM-177; STM-178; STM-181; STM-184;
ERTMS/ETCS on-board configuration	-
Comments and constraints	<p>Normal power-on to be continued in e.g. SoM FID.</p> <p>The ETCS part of this test case shall be run three times, each time with a different SIL level of the simulated connecting STM, to cover the three possible protocol variants (SIL 0, SIL 2 and SIL 4).</p> <p>In the six tests use and check different STM physical addresses: 50, one in 51-68, 69, 70, one in 71-125 and 126.</p>



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	OS	
ETCS Level	1	
Train State	Standstill	
ETCS Train Data	Valid	
Active DMI channel Connection	Not Established	
Other DMI channels Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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	Inactive	
TIU Direction Controller Position Status	Forward	
TIU Cab Status (Desk Status)	Desk A open	
BIU Emergency Brake Command	No command	
BIU Service Brake Command	No command	
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 communication between the STM Control Function and the STM is opened	PROF	T = 0	STM Control Connection: STM opens the connection with the STM Control Function and send its version number. Message 1 received packet STM-1 + packet STM-15 STM State Report PO	PROF	Ts9	STM Control Connection: STM Control Function checks the STM version and ("if supported") sends the highest compatible and supported version number Message 2 STM-1 Time = T0.
2		-		Version check is successful. ETCS is allowed to transmit application data			
-	STM Control function sends the available functions and bus addresses of ETCS functions	-		-	PROF	Ts11	STM Control Connection: Message – 3a Sent packet STM-2 ETCS On-Board physical addresses and safety levels. Check that physical addresses are according to Subset-35 section 6.4. Time = T1.
-	STM Control Function sends the current ETCS technical mode and active DMI channel + driver language	-		-	PROF	Ts10	STM Control Connection: Message - 4 Sent packet STM-5 ETCS status data Message 31 packet STM-31 Active DMI channel and packet STM-30 Driver language.
-	STM sends the specific data need	PROF	T0 + 1s	STM Control Connection: Message - 19 received packet STM - 181 Specific data need	-		-
3	JD connection establishment Odometer is available	PROF	T1 + 0.5s	STM establishes the connection to the JD, Message 1 received packet STM- 1 + packet STM-15 STM State Report PO	PROF	Ts9	Functions are available. Message 2 STM-1. Same "FFFIS STM version number" is reported as on STM control connection.
4	TIU function availability	PROF	T1 + 0.75s	STM establishes successfully the connection with the TIU, Message 1 received packet STM-1 + packet STM-15 STM State	PROF	Ts9	Functions are available. Message 2 STM-1.Same "FFFIS STM version number" is reported as on STM control connection.

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				Report PO			
-					PROF	Ts15	- TIU Connection: Message 5 is sent packet STM-139 Train interface inputs status/availability and STM-141 Train interface command configuration to STM.
5	BIU function availability	PROF	T1 + 1s	STM establishes successfully the connection with the BIU, Message 1 received packet STM-1 + packet STM-15 STM State Report PO	PROF	Ts9	Message 2 STM-1. Same "FFFIS STM version number" is reported as on STM control connection.
-					PROF	Ts13	BIU Connection: Message 6 is sent packet STM - 136 Brake Interface emergency and service brake status/availability and STM-143 Emergency and Service brake parameters to STM.
6	DMI function availability	PROF	T1 + 1.25s	STM establishes successfully the connection with the DMI, Message 1 received packet STM-1 + packet STM-15 STM State Report PO	PROF	Ts9	Message 2 STM-1. Same "FFFIS STM version number" is reported as on STM control connection.
7	STM requests CO State and ETCS orders CO State	PROF	T1 + 7s	STM Control Connection: STM Requests CO state. Message 7 received packet STM-13 State request from STM	PROF	Ts16	STM Control Connection: Message -8 sent packet STM - 14 State order CO to the STM Time = T2.
8	T<10s STM confirms the CO State	PROF	T2 + 8s	STM Control Connection: STM confirms CO State Message – 9 received packet STM – 15 State report from STM			
-	STM reports current state to JD	PROF	T2 + 8.5s	JD Connection: Message-9 received packet STM-15 STM State report CO	-	-	-
	STM reports current state to DMI	PROF	T2 + 9s	DMI Connection: Message-9 received packet STM-15 STM State report CO	-	-	
-	STM reports current state to BIU	PROF	T2 + 9.5s	BIU Connection: Message-9	-	-	-

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				received packet STM-15 STM State report CO			
-	STM reports current state to TIU	PROF	T2 + 10s	TIU Connection: Message-9 received packet STM-15 STM State report CO	-	-	-
	STM sends data to JD	PROF	T2 + 12s	JD connection: message-30 received packet STM-161 STM information to JD + STM-15 State report from STM.			
			-	-	PROF	Ts21	Odometry Connection: Message 11 sent packets STM-9 Odometer parameters to STM (this packet is multicast) <i>Exact time of reception not important, see subset-35 12.4.1.1.</i>

STM Test case

Step	Description/Comments	Input I/F	Input time	Input Action	Output I/F	Output time limit	Output action
1	STM takes the initiative to open the communication with the STM control function	PROF	T = 0	STM is powered on	PROF	Ts3	STM opens the communication session STM Control Connection: Message - 1 sent packet STM-1 STM/ETCS function version number + packet STM-15 STM State Report Time = T0.
2		PROF	T0 + 1s	STM Control Connection: STM Control Function sends its version number and checks the version Message 2 received packet STM-1 STM/ETCS function version number			Version check is successful. STM is allowed to transmit application data
-	STM sends Specific Data need	-		-	PROF	Ts5	STM Control Connection: Message - 19 Sent packet STM - 181 Specific data need + STM State report

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-	ETCS send configuration data, STM establishes the connection with another ETCS functions	PROF	T0 + 5s	STM Control Connection: ETCS bus addresses received Message-3b, Message - 4 received packet STM-2 ETCS physical addresses			STM establishes the connection with all required ETCS functions
-					PROF	Ts7	TIU Connection if required: Message-23 sent packet STM-1 + STM-15 STM State report Time = T1.
-					PROF	Ts7	BIU Connection if required: Message-24 sent packet STM-1 + STM-15 STM State report Time = T2.
-					PROF	Ts7	JD Connection if required: Message-21 sent packet STM-1 + STM-15 STM State report
-					PROF	Ts7	DMI Connection if required: Send message 22 packet STM-1 + STM-15 STM State report
-		PROF	T1 + 1s	TIU Connection if opened: Message 5 received packet STM-139 Train interface inputs status/availability and STM-141 Train interface command configuration to STM	-		
-		PROF	T2 + 0.5s	BIU Connection if opened: Message 6 received packet STM - 136 Brake Interface emergency and service brake status/availability and STM-143 Emergency and Service brake parameters to STM	-		
3	STM requests CO state	PROF			PROF	Ts19	STM Control Connection: Message 7 sent packet STM-13 State request from STM

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							Time = T3.
4	STM switches to CO state	PROF	T3 + 3s	STM Control Connection: Message -8 received packet STM - 14 State order to the STM	PROF	10s	STM Control Connection: Message – 9 sent packet STM – 15 State report from STM
					PROF	10s	TIU Connection if required: Message-25 sent packet STM-15 STM State report
					PROF	10s	BIU Connection if required: Message-26 sent packet STM-15 STM State report
					PROF	10s	DMI Connection if required: Message-26 sent packet STM-15 STM State report
5		PROF	T3 + 6s	STM Control Connection Messages 10 sent packets STM- 175 train data; STM-176 Train data Additional “braking characteristic” to STM; STM-177 Additional data values and date/time to STM; STM-178 National Values to STM, message 11 sent packets STM-9 Odometer parameters to STM	-		-

Message 1: STM → ETCS (Packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)



NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	

Message 3a: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on ETCS implementation

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Q_ADDR_JD	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_TI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_BI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 3b: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length

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N_ADDR_JD	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_JD	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_TI	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on test equipment implementation
N_ADDR_BI	7	FINITE VALUE	Depends on test equipment implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on test equipment implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 4 ETCS → STM (packet STM-5)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	



NID_PACKET	8	5	ETCS Status data
M_LEVEL	3	2	Value for Level 1
M_MODESTM	4	1	On sight
PADDING_BITS	COMPUTED	Not Relevant	

Message 5 ETCS → STM (packet STM-139, STM-141)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	139	Train interface inputs status/availability to STM
L_PACKET	13	COMPUTED	
M_TITR_STATUS	2	01B	Traction off
M_TIDIR_STATUS	3	001	Forward
M_TICAB_STATUS	2	01	Cab A active
NID_PACKET	8	141	Train Interface command configuration to STM
L_PACKET	13	COMPUTED	
M_TIRB_CMD_AVAIL	1	FINITE VALUE	
M_TIMSH_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBEB_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBSB_CMD_AVAIL	1	FINITEVALUE	
M_TIPANTO_CMD_AVAIL	1	FINITEVALUE	
M_TIFLAP_CMD_AVAIL	1	FINITEVALUE	



M_TIMS_CMD_AVAIL	1	FINITEVALUE	
M_TITR_C_CMD_AVAIL	1	FINITEVALUE	
PADDING_BITS	COMPUTED	Not Relevant	

Message 6 ETCS → STM (packet STM-136, STM-143)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	136	Brake interface emergency and service brake status/availability to STM
M_BIEB_STATUS	2	FINITE VALUE	Available / ETCS actual value
M_BISB_STATUS	2	FINITE VALUE	Available / ETCS actual value
NID_PACKET	8	143	Emergency and service brake parameters to STM
L_PACKET	13	COMPUTED	
T_EB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
T_SB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 7: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State request from STM

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L_PACKET	13	COMPUTED	
NID_STMSTATEREQUEST	4	2	Configuration
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 8 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	STM State order to STM
NID_STMSTATEORDER	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 9 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	2	Configuration

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PADDING_BITS	COMPUTED	Not Relevant	
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Message 10 ETCS → STM (packet STM-175, STM-176, STM-177, STM-178)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	175	Train Data
L_PACKET	13	COMPUTED	
NC_CDTRAIN	4	FINITE VALUE	Cant Deficiency Train Category
NC_TRAIN	15	FINITE VALUE	Other International Train Category
L_TRAIN	12	FINITE VALUE	Train length (example taken from the subset-076) entered by the driver
V_MAXTRAIN	7	FINITE VALUE	Maximum train speed (example taken from the subset-076) entered by the driver
M_LOADINGGAUGE	8	FINITE VALUE	Load Profile entered by the driver
M_AXLELOADCAT	7	FINITE VALUE	Axle Load entered by the driver
M_AIRTIGHT	2	FINITE VALUE	Airtight system presence entered by the driver
M_TRAINTYPE	8	FINITE VALUE	Train type
N_ITER	5	1	1 Iteration
M_VOLTAGE(1)	4	FINITE VALUE	E.g. 1 = AC 25kV, 2 = AC 15kV, 3 = DC 3kV
NID_CTRACTION(1)	10	FINITE VALUE	Traction System type entered by the driver
NID_PACKET	8	176	Train data additional "braking characteristic" to STM
L_PACKET	13	COMPUTED	
T_BRAKE_SERVICE	12	FINITE VALUE	Build up time for the service brake

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T_BRAKE_EMERGENCY	12	FINITE VALUE	Build up time for the emergency brake
T_TRACTION_CUT_OFF	12	FINITE VALUE	Time to cut-off traction
M_BRAKE_POSITION	2	FINITE VALUE	Brake position
M_BRAKE_PERCENTAGE_STM	8	FINITE VALUE	Brake percentage
NID_PACKET	8	177	Additional data values and date/time to STM
L_PACKET	13	COMPUTED	
NID_ENGINE	24	FINITE VALUE	On-board ETCS identity(To be defined)
M_ADHESION	1	FINITE VALUE	Adhesion factor (0 = Slippery rail, 1 = Non slippery rail)
YEAR	7	FINITE VALUE	Official year UTC(To be defined)
MONTH	4	FINITE VALUE	Official month UTC(To be defined)
DAY	5	FINITE VALUE	Official day UTC(To be defined)
HOURL	5	FINITE VALUE	Official hour UTC(To be defined)
MINUTES	6	FINITE VALUE	Official minutes UTC(To be defined)
SECONDS	6	FINITE VALUE	Official seconds UTC(To be defined)
TTS	5	FINITE VALUE	Official hundred of second UTC(To be defined)
NID_OPERATIONAL_STM	32	FINITE VALUE	Train Running Number (8 digits, left-adjusted, no digit=F [numerically=15])
NID_PACKET	8	178	National Values to STM
L_PACKET	13	COMPUTED	Length
Q_SCALE	2	FINITE VALUE	Distance scale(To be defined)
V_NVSHUNT	7	FINITE VALUE	Shunting mode speed limit(To be defined)
V_NVSTFF	7	FINITE VALUE	Staff Responsible mode speed limit(To be defined)
V_NVONSIGHT	7	FINITE VALUE	On Sight mode speed limit(To be defined)

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V_NVLIMSUPERV	7	FINITE VALUE	Limited Supervision mode speed limit
V_NVUNFIT	7	FINITE VALUE	Unfitted mode speed limit(To be defined)
V_NVREL	7	FINITE VALUE	Release Speed speed limit(To be defined)
D_NVROLL	15	FINITE VALUE	Roll away distance limit(To be defined)
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	Maximum speed limit allowing the driver to select the “override EOA” function(To be defined)
V_NVSUPOVTRP	7	FINITE VALUE	Override speed limit to be supervised when the “override” function is active (To be defined)
D_NVOVTRP	15	FINITE VALUE	Maximum distance for overriding the train trip(To be defined)
T_NVOVTRP	8	FINITE VALUE	Maximum time for overriding the train trip(To be defined)
D_NVPOTRP	15	FINITE VALUE	Maximum distance for reversing in Post Trip mode(To be defined)
M_NVCONTACT	2	FINITE VALUE	T_NVCONTACT 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(To be defined)
Q_NVDRIVER_ADHES	1	FINITE VALUE	Qualifier for the modification of trackside adhesion factor by driver(To be defined)
A_NVMAXREDADH1	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (1)
A_NVMAXREDADH2	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (2)



A_NVMAXREDADH3	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (3)
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	FINITE VALUE	Qualifier for integrated correction factors
Q_NVKVINTSET	2	FINITE VALUE	Only if Q_NVKINT = 1, Q_NVKVINTSET and the following variables follow
A_NVP12	6	FINITE VALUE	Only if Q_NVKVINTSET = 1
A_NVP23	6	FINITE VALUE	Only if Q_NVKVINTSET = 1
V_NVKVINT	7	FINITE VALUE	1.1.1 = 0 km/h
M_NVKVINT	7	FINITE VALUE	Valid between V_NVKVINT and V_NVKVINT(1) If Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT	7	FINITE VALUE	Only if Q_NVKVINTSET = 1 Valid between V_NVKVINT and V_NVKVINT(1) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
N_ITER	5	FINITE VALUE	
V_NVKVINT(n)	7	FINITE VALUE	Speed step used to define the integrated correction factor Kv
M_NVKVINT(n)	7	FINITE VALUE	Valid between V_NVKVINT(n) and V_NVKVINT(n+1) If Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(n)	7	FINITE VALUE	Only if Q_NVKVINTSET = 1 Valid between V_NVKVINT(n) and V_NVKVINT(n+1) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
N_ITER	5	FINITE VALUE	
Q_NVKVINTSET(k)	2	FINITE VALUE	Type of Kv_int set



A_NVP12(k)	6	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1
A_NVP23(k)	6	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1
V_NVKVINT(k)	7	FINITE VALUE	= 0km/h
M_NVKVINT(k)	7	FINITE VALUE	Valid between V_NVKVINT(k) and V_NVKVINT(k,1) If Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(k)	7	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1 Valid between 0km/h and V_NVKVINT(k) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
N_ITER(k)	5	FINITE VALUE	
V_NVKVINT(k,m)	7	FINITE VALUE	Speed step used to define the integrated correction factor Kv
M_NVKVINT(k,m)	7	FINITE VALUE	Valid between V_NVKVINT(k,m) and V_NVKVINT(k,m+1) Q_NVKVSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(k,m)	7	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1 Valid between V_NVKVINT(k,m) and V_NVKVINT(k,m+1) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
L_NVKRINT	5	FINITE VALUE	= 0m
M_NVKRINT	5	FINITE VALUE	Valid between L_NVKRINT and L_NVKRINT(1)
N_ITER	5	FINITE VALUE	
L_NVKRINT(l)	5	FINITE VALUE	Train length step used to define the integrated correction factor Kr
M_NVKRINT(l)	5	FINITE VALUE	Valid between L_NVKRINT(l) and L_NVKRINT(l+1)
M_NVKVINT	5	FINITE VALUE	Integrated correction factor Kv
PADDING_BITS	COMPUTED	Not Relevant	

Message 11 ETCS → STM (packet STM-9)



VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	9	Odometers parameters to STM
T_ODOCYCLE	8	FINITE VALUE	ETCS test: actual product performance values. STM test: typical product value
T_ODOMAXPROD	8	FINITE VALUE	ETCS test: actual product performance values. STM test: typical product value
PADDING_BITS	COMPUTED	Not Relevant	

Message 19: STM → ETCS (packet STM-181, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	181	Specific NTC Data Need
L_PACKET	13	COMPUTED	
Q_DATAENTRY	1	1	Need
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	

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NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 20: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State Request from STM
L_PACKET	13	COMPUTED	
NID_STMSTATEREQUEST	4	3	Data Entry
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 21 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)



NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 22 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 23 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number



L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 24 STM → ETCS (packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 25 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS



NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Configuration
PADDING_BITS	Not Relevant	Not Relevant	

Message 26 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Configuration
PADDING_BITS	Not Relevant	Not Relevant	

Message 29 ETCS → STM (packet STM-184)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	184	Specific NTC Data Entry flag
L_PACKET	13	COMPUTED	Length
M_DATAENTRYFLAG	1	1	Start

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PADDING_BITS	Not Relevant	Not Relevant	
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Message 30 STM → ETCS (packet STM-161 + STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	161	STM information to JD
L_PACKET	13	COMPUTED	Length
T_JD	32	FINITE VALUE	Time Stamp
N_LITER	8	FINITE VALUE	Number of bytes in message
M_DATA()	N_LITER * 8	FINITE VALUE	Information to JD (N_LITER bytes)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	2	Configuration
PADDING_BITS	Not Relevant	Not Relevant	

Message 31 ETCS → STM (packet STM-31, STM-30)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	31	Active DMI channel
L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	3	DMI channel 3

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NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	CS	
ETCS Mode	OS	
ETCS Level	1	
Train State	Not Relevant	
ETCS Train Data	Valid	
Active DMI channel Connection	Established or Not Established	ETCS test case: established. STM test case: STM may close connection, even if needed. If open, check SAP and address
Other DMI channels Connections	Not Established	
TIU Connection	Established or Not Established	ETCS test case: established. STM test case: STM may close connection, even if needed.
BIU Connection	Established or Not Established	ETCS test case: established. STM test case: STM may close connection, even if needed.
JD Connection	Established or Not Established	ETCS test case: established. STM test case: STM may close connection, even if needed.
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	Inactive	
TIU Direction Controller Position Status	Unchanged	
TIU Cab Status (Desk 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 Isolated	



Test case 2a.11

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.10.0.2.2.1.1.1.2.1.2.0
	The ETCS mode is PT. The STM Control Function version is compatible with the STM. There is no failure in the opening of the communications. ETCS orders CO State, the STM switches to CO State. The STM does not require Specific NTC DE and is ordered to CS State. The STM does not answer in due time.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – PT - STM Cntrl, JD, TIU, BIU, ODO, ref time; 6.2.1.1a-c; 6.3.1.3; 6.4.1.1; 7.1.2.2b; 8.2.1.5; 8.2.1.6; 8.3.1.2; 10.1.1.4; 10.1.1.5b; 10.3.2.2, 10.3.2.4 A1; A2; A4a; C16; NP to PO; PO to CO; CO to CS; CO to FA; 10.3.3.7; 10.4.1.1; 10.4.1.2; 10.4.1.4; 10.4.1.5; 10.4.1.6; 10.4.1.8; 10.4.1.9; 10.5.1.1b; 10.6.1.1b; 11.1.1.1b; 11.1.1.2; 11.1.1.3b; 16.2.1.2; 16.3.1.4;
STM requirements tested	Subset-035 None
Packets transmitted via FFFIS STM	STM-1; STM-2; STM-5; STM-9; STM-13; STM-14; STM-15; STM-30; STM-31; STM-136; STM-139; STM-141; STM-143; STM-175; STM-176; STM-177; STM-178; STM-179; STM-181; STM-184;
ERTMS/ETCS on-board configuration	-
Comments and constraints	Incorrect start-up, ends in FA state. Test SL 4, SL 2 and SL 0.



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	PT	
ETCS Level	1	
Train State	Standstill	
ETCS Train Data	Valid	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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	Inactive	
TIU Direction Controller Position Status	Forward	
TIU Cab Status (Desk Status)	Desk A opened	
BIU Emergency Brake Command	No command	
BIU Service Brake Command	No command	
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 is powered on. The communication between the STM and the STM Control Function is opened		T = 0	STM Control Connection: STM opens the connection with the STM Control Function and send its version number. Message 1 received packet STM-1 + packet STM-15 STM State Report	PROF	Ts9	STM Control Connection: STM Control Function checks the STM version and ("if supported") sends the highest compatible and supported version number Message 2 STM-1
			-	Version check is successful. ETCS is allowed to transmit application data			
2	STM Control function sends the available functions and bus addresses of ETCS functions		-	-	PROF	Ts11	STM Control Connection: Message - 3 Sent packet STM-2 ETCS On-Board physical addresses and safety Time = T0.
-	STM Control Function sends the current ETCS technical mode, active DMI channel and driver language.		-	-	PROF	Ts10	STM Control Connection: Message - 4 Sent packet STM-5 ETCS status data, Message 15 packet STM-31 Active DMI channel + packet STM-30 Driver language.
-	STM sends the specific data need (= false)	PROF	T0 + 2s	STM Control Connection: Message - 18 received packet STM - 181 Specific data need	-		-
3	JD connection is established Odometer is available	PROF	T0 + 2.5s	STM establishes the connection to the JD. Message 1 received packet STM- 1 + packet STM-15 STM State Report		Ts9	Functions are available. Message 2 STM-1.
4	TIU function connection established	PROF	T0 + 4.5s	STM establishes successfully the connection with the TIU. Message 1 received packet STM- 1 + packet STM-15 STM State Report	PROF	Ts9	Functions are available. Message 2 STM-1.
-	TIU function availability and interface command configuration				PROF	Ts15	- TIU Connection: Message 5 is sent packet STM-139 Train interface inputs status/availability and STM-141 Train interface command configuration to STM

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5	BIU function availability	PROF	T0 + 6.5s	STM establishes successfully the connection with the BIU. Message 1 received packet STM- 1 + packet STM-15 STM State Report	PROF	Ts9	Functions are available. Message 2 STM-1.
-	Emergency and Service brake parameters				PROF	Ts13	BIU Connection: Message 6 is sent packet STM - 136 Brake Interface emergency and service brake status/availability and STM-143 Emergency and Service brake parameters to STM
6	DMI function availability	PROF	T0 + 8s	STM establishes successfully the connection with the DMI. Message 1 received packet STM- 1 + packet STM-15 STM State Report	PROF	Ts9	Functions are available. Message 2 STM-1.
7	STM requests CO State and ETCS orders CO State	PROF	T0 + 9.5s	STM Control Connection: STM Requests CO state. Message 7 received packet STM-13 State request from STM	PROF	Ts16	STM Control Connection: Message -8 sent packet STM - 14 State order to the STM Time = T1
8	STM confirms the CO State	PROF	T1 + 8s	STM Control Connection: STM confirms CO State Message – 9 received packet STM – 15 State report from STM	-		
-	STM reports current state to JD	PROF	T1 + 8.5s	JD Connection: Message-9 received packet STM-15 STM State report	-	-	-
	STM reports current state to DMI	PROF	T1 + 9s	DMI Connection: Message-9 received packet STM-15 STM State report	-	-	
-	STM reports current state to BIU	PROF	T1 + 9.5s	BIU Connection: Message-9 received packet STM-15 STM State report	-	-	-
-	STM reports current state to TIU	PROF	T1 + 10s	TIU Connection: Message-9 received packet STM-15 STM State report	-	-	-
	ETCS transmit Odometer parameters		-	-	PROF	Ts21	Odometry Connection: Message 11 sent packets STM-9 Odometer parameters to STM (this packet is multicast); <i>Exact time of reception not important, see subset-35</i>

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							12.4.1.1.
	Driver selects Data Entry, enters/confirms ETCS data. ETCS transmits "Start flag" and then ETCS data to STM	DMI	-	- ETCS data entry finished	PROF	Ts12	STM Control Connection: Message 23 sent packet STM-184 Specific NTC Data Entry Flag (start); Message 10 sent packets STM-175 Train data; STM-176 Train data Additional "braking characteristic" to STM; STM-177 Additional data values and date/time to STM; STM-178 National Values to STM Time = T2.
9	STM sends End of data entry, ETCS transmits Stop-flag		T2 + 1s	STM Control Connection: Message 14 packet STM-179 N_ITER = 0 received from STM	PROF	Ts13	Message 24 sent packet STM-184 Specific NTC Data Entry Flag (stop); T = T3
10	No Specific NTC data entry	PROF	T3 + 1s	STM Control Connection: STM requests CS. Message 15 received packet STM 13 State Request from STM	PROF	Ts14	STM Control Connection: ETCS orders CS State Message 16 sent packet STM – 14 State order to STM Time = T4.
11	The STM does not answer in due time and is ordered to FA state	PROF		Time-out	PROF	T4 + 10s + Ts15	STM Control Connection: Message 17 sent packet STM 14 State order FA to STM

Message 1: STM → ETCS (Packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number

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L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Compatible FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Compatible FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	

Message 3: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	

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NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_JD	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	1.1.2 Depends on ETCS implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_ODO	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_TI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_BI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 4 ETCS → STM (packet STM-5)			
VARIABLE	Length	VALUE	COMMENTS

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NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	5	ETCS Status data
M_LEVEL	3	2	Value for Level 1
M_MODESTM	4	8	Post Trip
PADDING_BITS	COMPUTED	Not Relevant	

Message 5 ETCS → STM (packet STM-139, STM-141)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	139	Train interface inputs status/availability to STM
M_TITR_STATUS	2	01B	Traction off
M_TIDIR_STATUS	3	001	Forward
M_TICAB_STATUS	2	01	Cab A active
NID_PACKET	8	141	Train Interface command configuration to STM
L_PACKET	13	COMPUTED	
M_TIRB_CMD_AVAIL	1	FINITE VALUE	
M_TIMSH_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBEB_CMD_AVAIL	1	FINITEVALUE	
M_TIEDCBSB_CMD_AVAIL	1	FINITEVALUE	
M_TIPANTO_CMD_AVAIL	1	FINITEVALUE	



M_TIFLAP_CMD_AVAIL	1	FINITEVALUE	
M_TIMS_CMD_AVAIL	1	FINITEVALUE	
M_TITR_C_CMD_AVAIL	1	FINITEVALUE	
PADDING_BITS	COMPUTED	Not Relevant	

Message 6 ETCS → STM (packet STM-136, STM-143)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	136	Brake interface emergency and service brake status/availability to STM
M_BIEB_STATUS	2	FINITE VALUE	Depends on ETCS implementation
M_BISB_STATUS	2	FINITE VALUE	Depends on ETCS implementation
NID_PACKET	8	143	Emergency and service brake parameters to STM
L_PACKET	13	COMPUTED	
T_EB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
T_SB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 7: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	

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NID_PACKET	8	13	STM State request from STM
L_PACKET	13	COMPUTED	
NID_STMSTATEREQUEST	4	2	Configuration
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 8 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	STM State order to STM
NID_STMSTATEORDER	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 9 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	

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NID_STMSTATE	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 10 ETCS → STM (packet STM-175, STM-176, STM-177, STM-178)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	175	Train Data
L_PACKET	13	COMPUTED	
NC_CDTRAIN	4	FINITE VALUE	Cant Deficiency Train Category
NC_TRAIN	15	FINITE VALUE	Other International Train Category
L_TRAIN	12	FINITE VALUE	Train length (example taken from the subset-076) entered by the driver
V_MAXTRAIN	7	FINITE VALUE	Maximum train speed (example taken from the subset-076) entered by the driver
M_LOADINGGAUGE	8	FINITE VALUE	Load Profile entered by the driver
M_AXLELOADCAT	7	FINITE VALUE	Axle Load entered by the driver
M_AIRTIGHT	2	FINITE VALUE	Airtight system presence entered by the driver
M_TRAINTYPE	8	FINITE VALUE	Train type
N_ITER	5	1	1 Iteration
M_VOLTAGE(1)	4	FINITE VALUE	E.g. 1 = AC 25kV, 2 = AC 15kV, 3 = DC 3kV
NID_CTRACTION(1)	10	FINITE VALUE	Traction System type entered by the driver
NID_PACKET	8	176	Train data additional "braking characteristic" to STM
L_PACKET	13	COMPUTED	Length



T_BRAKE_SERVICE	12	FINITE VALUE	Build up time for the service brake
T_BRAKE_EMERGENCY	12	FINITE VALUE	Build up time for the emergency brake
T_TRACTION_CUT_OFF	12	FINITE VALUE	Time to cut-off traction
M_BRAKE_POSITION	2	FINITE VALUE	Brake position
M_BRAKE_PERCENTAGE_STM	8	FINITE VALUE	Brake percentage
NID_PACKET	8	177	Additional data values and date/time to STM
L_PACKET	13	COMPUTED	Length
NID_DRIVER	128	FINITE VALUE	Driver identity
NID_ENGINE	24	FINITE VALUE	On-board ETCS identity(To be defined)
M_ADHESION	1	FINITE VALUE	Adhesion factor(To be defined)
YEAR	7	FINITE VALUE	Official year UTC(To be defined)
MONTH	4	FINITE VALUE	Official month UTC(To be defined)
DAY	5	FINITE VALUE	Official day UTC(To be defined)
HOURL	5	FINITE VALUE	Official hour UTC(To be defined)
MINUTES	6	FINITE VALUE	Official minutes UTC(To be defined)
SECONDS	6	FINITE VALUE	Official seconds UTC(To be defined)
TTS	5	FINITE VALUE	Official hundred of second UTC(To be defined)
NID_OPERATIONAL_STM	32	FINITE VALUE	Train Running Number
NID_PACKET	8	178	National Values to STM
L_PACKET	13	COMPUTED	Length
Q_SCALE	2	FINITE VALUE	Distance scale(To be defined)
V_NVSHUNT	7	FINITE VALUE	Shunting mode speed limit(To be defined)

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V_NVSTFF	7	FINITE VALUE	Staff Responsible mode speed limit(To be defined)
V_NVONSIGHT	7	FINITE VALUE	On Sight mode speed limit(To be defined)
V_NVLIMSUPERV	7	FINITE VALUE	Limited Supervision mode speed limit
V_NVUNFIT	7	FINITE VALUE	Unfitted mode speed limit(To be defined)
V_NVREL	7	FINITE VALUE	Release Speed speed limit(To be defined)
D_NVROLL	15	FINITE VALUE	Roll away distance limit(To be defined)
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	Maximum speed limit allowing the driver to select the “override EOA” function(To be defined)
V_NVSUPOVTRP	7	FINITE VALUE	Override speed limit to be supervised when the “override” function is active (To be defined)
D_NVOVTRP	15	FINITE VALUE	Maximum distance for overriding the train trip(To be defined)
T_NVOVTRP	8	FINITE VALUE	Maximum time for overriding the train trip(To be defined)
D_NVPOTRP	15	FINITE VALUE	Maximum distance for reversing in Post Trip mode(To be defined)
M_NVCONTACT	2	FINITE VALUE	T_NVCONTACT 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(To be defined)
Q_NVDRIVER_ADHES	1	FINITE VALUE	Qualifier for the modification of trackside adhesion factor by driver(To be defined)



A_NVMAXREDADH1	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (1)
A_NVMAXREDADH2	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (2)
A_NVMAXREDADH3	6	FINITE VALUE	Maximum deceleration under reduced adhesion conditions (3)
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	FINITE VALUE	Qualifier for integrated correction factors
Q_NVKVINTSET	2	FINITE VALUE	Only if Q_NVKINT = 1, Q_NVKVINTSET and the following variables follow
A_NVP12	6	FINITE VALUE	Only if Q_NVKVINTSET = 1
A_NVP23	6	FINITE VALUE	Only if Q_NVKVINTSET = 1
V_NVKVINT	7	FINITE VALUE	= 0 km/h
M_NVKVINT	7	FINITE VALUE	Valid between V_NVKVINT and V_NVKVINT(1) If Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT	7	FINITE VALUE	Only if Q_NVKVINTSET = 1 Valid between V_NVKVINT and V_NVKVINT(1) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
N_ITER	5	FINITE VALUE	
V_NVKVINT(n)	7	FINITE VALUE	Speed step used to define the integrated correction factor Kv
M_NVKVINT(n)	7	FINITE VALUE	Valid between V_NVKVINT(n) and V_NVKVINT(n+1) If Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(n)	7	FINITE VALUE	Only if Q_NVKVINTSET = 1 Valid between V_NVKVINT(n) and V_NVKVINT(n+1) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23



N_ITER	5	FINITE VALUE	
Q_NVKVINTSET(k)	2	FINITE VALUE	Type of Kv_int set
A_NVP12(k)	6	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1
A_NVP23(k)	6	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1
V_NVKVINT(k)	7	FINITE VALUE	= 0km/h
M_NVKVINT(k)	7	FINITE VALUE	Valid between V_NVKVINT(k) and V_NVKVINT(k,1) If Q_NVKVINTSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(k)	7	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1 Valid between 0km/h and V_NVKVINT(k) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
N_ITER(k)	5	FINITE VALUE	
V_NVKVINT(k,m)	7	FINITE VALUE	Speed step used to define the integrated correction factor Kv
M_NVKVINT(k,m)	7	FINITE VALUE	Valid between V_NVKVINT(k,m) and V_NVKVINT(k,m+1) Q_NVKVSET = 1, gives the correction factor if maximum emergency brake deceleration is lower than A_NVP12
M_NVKVINT(k,m)	7	FINITE VALUE	Only if Q_NVKVINTSET(k) = 1 Valid between V_NVKVINT(k,m) and V_NVKVINT(k,m+1) Gives the correction factor if maximum emergency brake deceleration is higher than A_NVP23
L_NVKRINT	5	FINITE VALUE	= 0m
M_NVKRINT	5	FINITE VALUE	Valid between L_NVKRINT and L_NVKRINT(1)
N_ITER	5	FINITE VALUE	
L_NVKRINT(l)	5	FINITE VALUE	Train length step used to define the integrated correction factor Kr
M_NVKRINT(l)	5	FINITE VALUE	Valid between L_NVKRINT(l) and L_NVKRINT(l+1)
M_NVKVINT	5	FINITE VALUE	Integrated correction factor Kv
PADDING_BITS	COMPUTED	Not Relevant	



Message 11 ETCS → STM (packet STM-9)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	255	Multicast
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	9	Odometers parameters to STM
L_PACKET	13	COMPUTED	Length
T_ODOCYCLE	8	FINITE VALUE	ETCS test: actual product performance values.
T_ODOMAXPROD	8	FINITE VALUE	ETCS test: actual product performance values.
PADDING_BITS	COMPUTED	Not Relevant	

Message 14: STM → ETCS (packet STM-179, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	179	Specific NTC Data Entry request
L_PACKET	13	COMPUTED	
Q_FOLLOWING	1	0	
N_ITER	5	0	“End of specific NTC Data Entry”
NID_PACKET	8	15	State Report
L_PACKET	13	COMPUTED	

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NID_STMSTATE	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 15: STM → ETCS (packet STM-13 + 15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State Request from STM
L_PACKET	13	COMPUTED	
NID_STMSTATEREQUEST	4	4	Cold Standby
NID_PACKET	8	15	State Report
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	2	Configuration
PADDING_BITS	COMPUTED	Not Relevant	

Message 16: ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	State Order to STM
L_PACKET	13	COMPUTED	
NID_STMSTATEORDER	4	4	Cold Standby

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PADDING_BITS	COMPUTED	Not Relevant	
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Message 17: ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	State Order to STM
L_PACKET	13	COMPUTED	
NID_STMSTATEORDER	4	8	Failure
PADDING_BITS	COMPUTED	Not Relevant	

Message 18: STM → ETCS (packet STM-181, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	181	Specific NTC Data Need
L_PACKET	13	COMPUTED	
Q_DATAENTRY	1	0	No Need
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	



Message 19 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 20 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 21 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM



L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 22 STM → ETCS (packet STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 23 ETCS → STM (packet STM-184)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	184	Specific NTC Data Entry flag
L_PACKET	13	COMPUTED	Length
M_DATAENTRYFLAG	1	1	Start
PADDING_BITS	COMPUTED	Not Relevant	

Message 24 ETCS → STM (packet STM-184)			
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VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	184	Specific NTC Data Entry flag
L_PACKET	13	COMPUTED	Length
M_DATAENTRYFLAG	1	0	Stop
PADDING_BITS	COMPUTED	Not Relevant	

Message 25 ETCS → STM (packet STM-31, STM-30)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	31	Active DMI channel
L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	2	DMI channel 2
NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	PT	
ETCS Level	1	
Train State	Standstill	
ETCS Train Data	Valid	
Active DMI channel Connection	Established	
Other DMI channel Connections	Not Established	
TIU Connection	Established	
BIU Connection	Established	
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 (Desk 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	



Test case 2a.12

Note! All test cases below are basically the same as another one and only requires a change of the parameters in telegrams related to the starting ETCS mode for the specific test, as given by the number in the first position in the test case path – e.g. 10 = LS in this test case. Only SIL 4 protocol to be tested.

Test case path 2a.12: 2a.0.14.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – LS - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.13

Test case 2a.13 path 2a.0.11.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – PS - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.14

Test case 2a.14 path 2a.0.12.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – SN - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.15

Test case 2a.15 path 2a.0.13.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – RV - STM Cntrl, JD, TIU, BIU, ODO, ref time



Test case 2a.16

Test case 2a.16 path 2a.0.1.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1
The purpose of this test case is to completely test the table 5.3.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – SB - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.17

Test case 2a.17 path 2a.0.2.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1
The purpose of this test case is to completely test the table 5.3.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – SH - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.18

Test case 2a.18 path 2a.0.3.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1
The purpose of this test case is to completely test the table 5.3.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – FS - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.19

Test case 2a.19 path 2a.0.4.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1
The purpose of this test case is to completely test the table 5.3.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – SR - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.20

Test case 2a.20 path 2a.0.7.0.2.2.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1
The purpose of this test case is to completely test the table 5.3.1.1



ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – NL - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.21

Test case 2a.21 path 2a.0.8.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1
The purpose of this test case is to completely test the table 5.3.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – UN - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.22

Test case 2a.22 path 2a.0.9.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1
The purpose of this test case is to completely test the table 5.3.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – TR - STM Cntrl, JD, TIU, BIU, ODO, ref time

Test case 2a.23

Test case 2a.23 path 2a.0.6.0.2.2.1.1.1.2.1.1 is the same as Test case 2a.10 path 2a.0.5.0.2.2.1.1.1.2.1.1
The purpose of this test case is to completely test the table 5.3.1.1

ERTMS/ETCS on-board requirements tested: 5.3.1.1 a – SL - STM Cntrl, JD, TIU, BIU, ODO, ref time



Test case 2a.24

TEST CASE HEADER	
Test case identification	Application Start Up
	2a.0.1.0.2.2.1.3.0
	The ETCS mode is SB. The STM Control Function version is compatible with the STM. There is no failure in the opening of the communications. STM requests DE State and is ordered to FA State.
ERTMS/ETCS on-board requirements tested	Subset-035 5.3.1.1 a – SB - STM Cntrl, BIU, JD, ODO; 6.2.1.1a; 6.4.1.1; 7.1.2.2b; 8.2.1.3; 8.2.1.4; 8.2.1.5; 8.2.1.6; 10.1.1.4; 10.1.1.5b; 10.5.1.1b; 10.6.1.1b; 10.3.2.2, 10.3.2.4 A1, A16; 11.1.1.1b; 11.1.1.2; 11.1.1.3b;
STM requirements tested	Subset-035 None
Packets transmitted via FFFIS STM	STM-1; STM-2; STM-5; STM-13; STM-14; STM-15; STM-30; STM-31; STM-136; STM-143;
ERTMS/ETCS on-board Configuration	-
Comments and constraints	Incorrect state request, ends in FA state. SL 4.



Starting Conditions	Value	Comments
STM State	NP	
ETCS Mode	LS	
ETCS Level	1	
Train State	Not Relevant	
ETCS Train Data	Valid	
Active DMI channel Connection	Not Established	
Other DMI channel Connections	Not Established	
TIU Connection	Not Established	
BIU Connection	Not Established	
JD Connection	Not 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 (Desk Status)	Desk A opened	
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 is powered up. The communication between the STM and the STM Control Function is opened	PROF	T = 0	STM Control Connection: STM opens the connection with the STM Control Function and sends its version number. Message 1 sent packet STM- 1 + packet STM-15 STM State Report PO	PROF	Ts9	STM Control Connection: STM Control Function checks the STM version and ("if supported") sends the highest compatible and supported version number Message 2 STM-1
2			-	Version check is successful. ETCS is allowed to transmit application data			
-	STM Control function sends the available functions and bus addresses of ETCS functions		-	-	PROF	Ts11	STM Control Connection: Message - 3 Sent packet STM-2 ETCS On-Board physical addresses and safety levels. Time T0.
-	STM Control Function sends the current ETCS technical mode and active DMI channel + driver language		-	-	PROF	Ts10	STM Control Connection: Message - 4 Sent packet STM-5 ETCS status data, Message 15 packet STM-31 Active DMI channel and packet STM-30 Driver language. Time T1
3	JD connection is established	PROF	T0 + 0.5s	STM establishes the connections to the JD. Message 1 sent packet STM- 1 + packet STM-15 STM State Report PO		Ts9	Function is available. Message 2 STM-1. Version check is successful.
	DMI function	PROF	T1 + 1s	STM establishes successfully the connection with the active DMI. Message 1 sent packet STM- 1 + packet STM-15 STM State Report PO		Ts9	Function is available. Message 2 STM-1. Version check is successful.
	BIU function availability	PROF	T1 + 2s	STM establishes successfully the connection with the BIU. Message 1 sent packet STM- 1 + packet STM-15 STM State Report PO	PROF	Ts13	Message 2 STM-1. Version check is successful. BIU Connection: Message 6 is sent packet STM - 136 Brake Interface emergency and service brake status/availability to STM +

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							packet STM-143 Emergency and service brake parameters to STM;
4	STM requests DE State, ETCS orders FA State	PROF	T1 + 3s	STM Control Connection: STM Requests DE state. Message 7 received packet STM-13 State request from STM	PROF	Ts2	STM Control Connection: Message -8 sent packet STM - 14 State order FA to the STM

Message 1: STM → ETCS (Packet STM-1, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	FFFIS STM version number, major number (legal value)
N_VERMINOR	8	FINITE VALUE	FFFIS STM version number, minor number (legal value)
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATE	4	1	Actual STM State: Power On
PADDING_BITS	COMPUTED	Not Relevant	

Message 2: ETCS → STM (Packet STM-1)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	

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NID_PACKET	8	1	STM/ETCS function version number
L_PACKET	13	COMPUTED	Packet length
N_VERMAJOR	8	FINITE VALUE	Actual FFFIS STM version number, major number
N_VERMINOR	8	FINITE VALUE	Actual FFFIS STM version number, minor number
PADDING_BITS	COMPUTED	Not Relevant	

Message 3: ETCS → STM (packet STM-2)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	2	ETCS On-board physical addresses, safety levels and Product identity
L_PACKET	13	COMPUTED	Packet length
N_ADDR_JD	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_JD	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL1	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL1	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL2	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL2	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL3	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL3	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_DMI_CHANNEL4	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_DMI_CHANNEL4	2	FINITE VALUE	Depends on ETCS implementation

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N_ADDR_ODO	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_ODO	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_TI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_TI	2	FINITE VALUE	Depends on ETCS implementation
N_ADDR_BI	7	FINITE VALUE	Depends on ETCS implementation
Q_ADDR_BI	2	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 4 ETCS → STM (packet STM-5)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	5	ETCS Status data
L_PACKET	13	COMPUTED	Packet length
M_LEVEL	3	2	Level 1
M_MODESTM	4	12	Limited Supervision
PADDING_BITS	COMPUTED	Not Relevant	

Message 6 ETCS → STM (packet STM-136, STM-143)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	

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NID_PACKET	8	136	Brake interface emergency and service brake status/availability to STM
L_PACKET	13	COMPUTED	Packet length
M_BIEB_STATUS	2	FINITE VALUE	Depends on ETCS implementation
M_BISB_STATUS	2	FINITE VALUE	Depends on ETCS implementation
NID_PACKET	8	143	Emergency and service brake parameters to STM
L_PACKET	13	COMPUTED	
T_EB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
T_SB_MAXDELAY	8	FINITE VALUE	Depends on ETCS implementation
PADDING_BITS	COMPUTED	Not Relevant	

Message 7: STM → ETCS (packet STM-13, STM-15)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	13	STM State request from STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEREQUEST	4	3	DataEntry
NID_PACKET	8	15	State report from STM
L_PACKET	13	COMPUTED	
NID_STMSTATE	4	1	Power On
PADDING_BITS	COMPUTED	Not Relevant	



Message 8 ETCS → STM (packet STM-14)			
VARIABLE	Length	VALUE	COMMENTS
NID	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	14	STM State order to STM
L_PACKET	13	COMPUTED	Packet length
NID_STMSTATEORDER	4	8	Failure
PADDING_BITS	COMPUTED	Not Relevant	

Message 15 ETCS → STM (packet STM-31, STM-30)			
VARIABLE	Length	VALUE	COMMENTS
NID_STM	8	FINITE VALUE	The NID_STM which the EVC is connected to
L_MESSAGE	8	COMPUTED	
NID_PACKET	8	31	Active DMI channel
L_PACKET	13	COMPUTED	Packet length
NID_DMICHANNEL	3	1	DMI channel 1
NID_PACKET	8	30	Driver language
L_PACKET	13	COMPUTED	Packet length
NID_DRV_LANG	16	FINITE VALUE	Driver language ID
PADDING_BITS	COMPUTED	Not Relevant	



End Conditions	Value	Comments
STM State	FA	
ETCS Mode	LS	
ETCS Level	1	
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 (Desk 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	