

ERTMS/ETCS – Class 1

FFFIS STM Test cases of Functional identity 05

Level Transition STM -> STM

Total: 23 Test cases

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| Company | Technical Approval | Management approval |
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Modification History

| Issue Number Date | Section Number | Modification / Description | Author |
|----------------------|--|--|---------------------------|
| 0.0.1 2004-08-25 | All | Document created base on the Test case document Id 3, including Test case 5a.0.0.1.1.1.0.0.0, Test case 5a.0.0.1.1.3.1.0, Test case 5a.0.0.2.2.0.0.0, Test case 5a.0.0.2.3.2, Test case 5a.0.0.1.2.1.0.1.0.0.0, Test case 5a.0.0.1.2.2.2.0.1.0.0.0, Test case 5a.0.0.3.2.1.2.0.0.0, Test case 5b.1.2.1.1.1.1.0, Test case 5b.2.0, Test case 5b.3.0 | U. Dräger |
| 0.0.2 2004-09-07 | | Diagrams included, V-Permit modified, Additional SRS requirements included (SRS 4.8.3.1.1, 4.8.4.2, 4.10.1.3) Additional Test cases for the phase "in between" Test cases 5b.1.2.1.1.1.1.0, 5b.1.1.2.0, 5b.1.2.3.0, 5b.1.2.4.0, 5b.1.2.2.2.0, 5b.1.2.2.1.2.0, 5b.1.2.2.1.3.0 | U. Dräger |
| 0.0.3 | Test case diagram, new test cases | Including STM packet number and name into the test case description | U. Dräger |
| 0.0.4 2005-01-06 | Footer Several Test Cases All Test Cases Several Test Cases Several Test Cases | Footer corrected. The selected language shall be "English". Updates of the template included ("Reference Time Data" included in the end conditions, "Odometry Connection" replaced by "Odometry Data" in the end conditions, Connection information for all transmitted PROFIBUS messages added in the Test Cases). Test case 5a.0.0.1.1.1.0.0.0, Test case 5a.0.0.1.2.1.0.1.0.0.0, Test case 5a.0.0.2.2.0.0.0 updated. All test cases where the STM does not follow a state transition order (Test case 5a.0.0.1.1.3.1.0, Test case 5a.0.0.1.2.2.2.0.1.0.0.0, and Test case 5a.0.0.2.3.2, Test case 5a.0.0.3.2.1.2.0.0.0) replaced by a reference to the Functional Identities 3 (ETCS -> STM) and 4 (STM -> ETCS), as all the cases regarding an STM that does not follow a state transition order at a level transition announcement or at a level transition border are tested in these Functional Identities and due to the fact that these test cases belong (somehow) to a degraded situation. Test case 5a.0.0.3.1.0.1.0.0.0 added. | P. Lühns (Siemens) |
| 0.0.5 2005-01-20 | Several Test Cases | Test case 5a.0.0.1.1.1.0.0.0, Test case 5a.0.0.1.2.1.0.1.0.0.0, Test case 5a.0.0.2.2.0.0.0, and Test case 5a.0.0.3.1.0.1.0.0.0 updated (new feature of the test equipment: parallel time lines, minor mistakes corrected). | P. Lühns (Siemens) |
| 0.0.6 2005-01-21 | Add test diagram + test 5b, 5c & 5c1 | Add test diagram update thanks to Alcatel. Modify the test case 5b. create the test case 5c & 5c1 | F. Bernaudin (Ansaldo) |

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|---------------------|--|--------------------------------|---------------------------|
| 0.1.0 2005-01-27 | | Editorial changes for delivery | F. Bernaudin (Ansaldo) |
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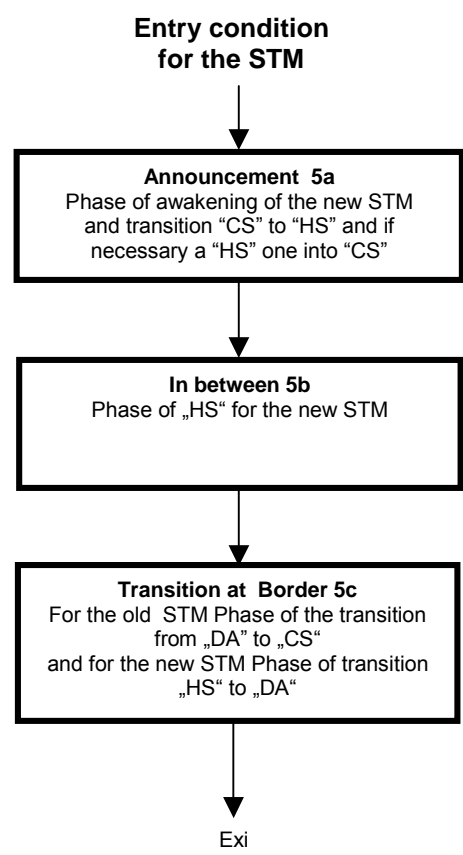
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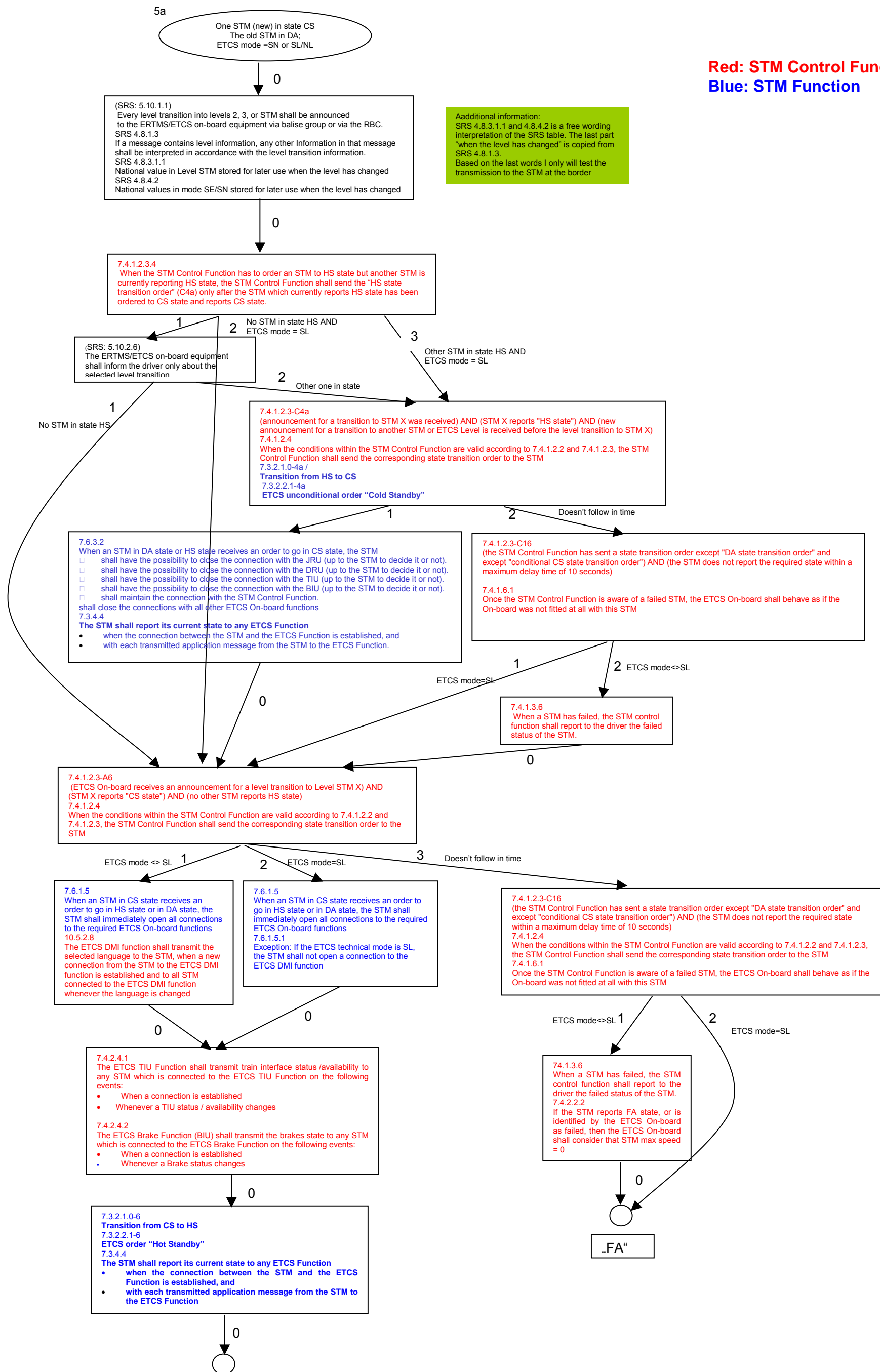
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TEST CASE DIAGRAMS

Overview



Announcement of a Transition STM -> STM 5a



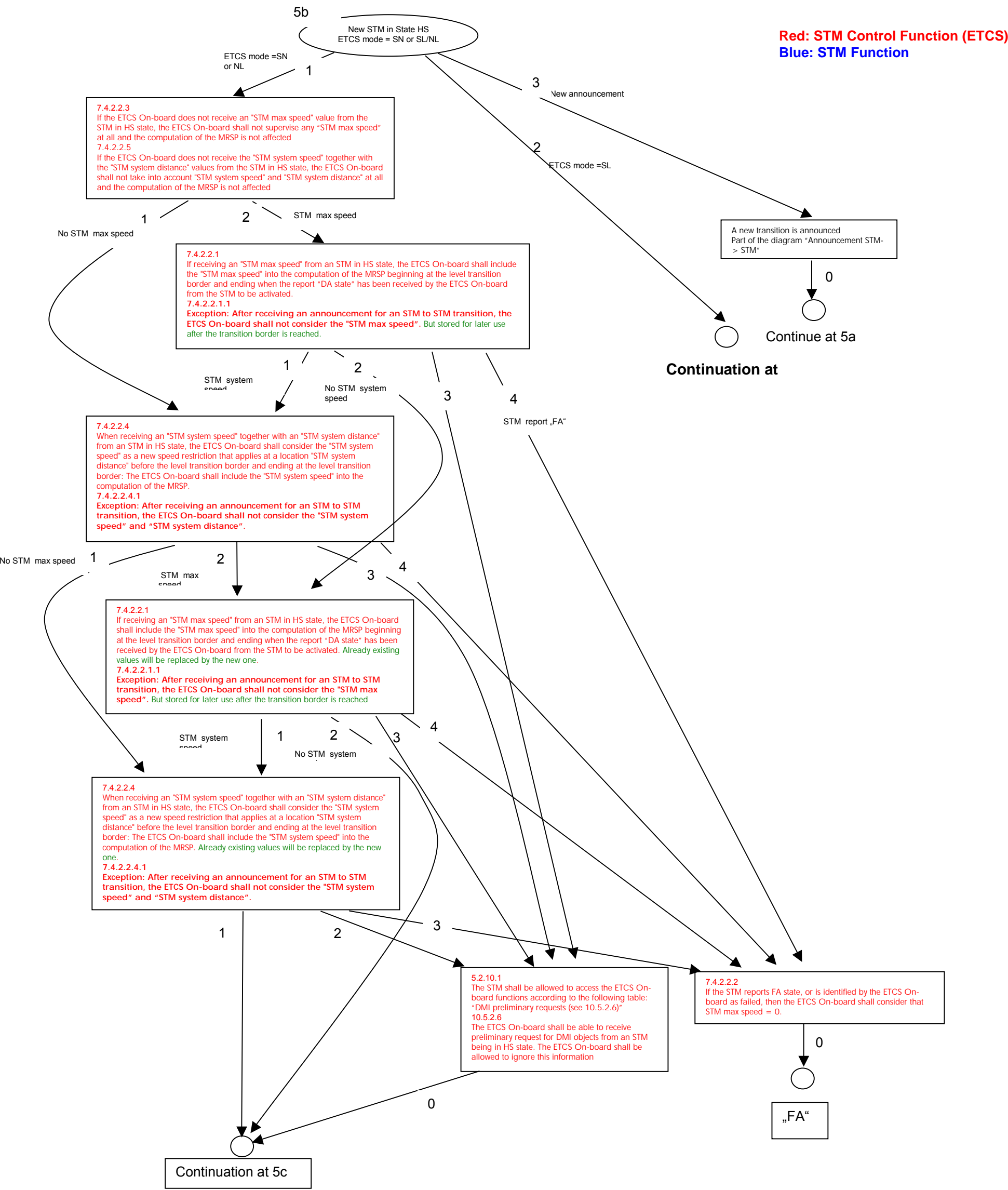
Red: STM Control Function (ETCS)
Blue: STM Function

Continuation at 5b

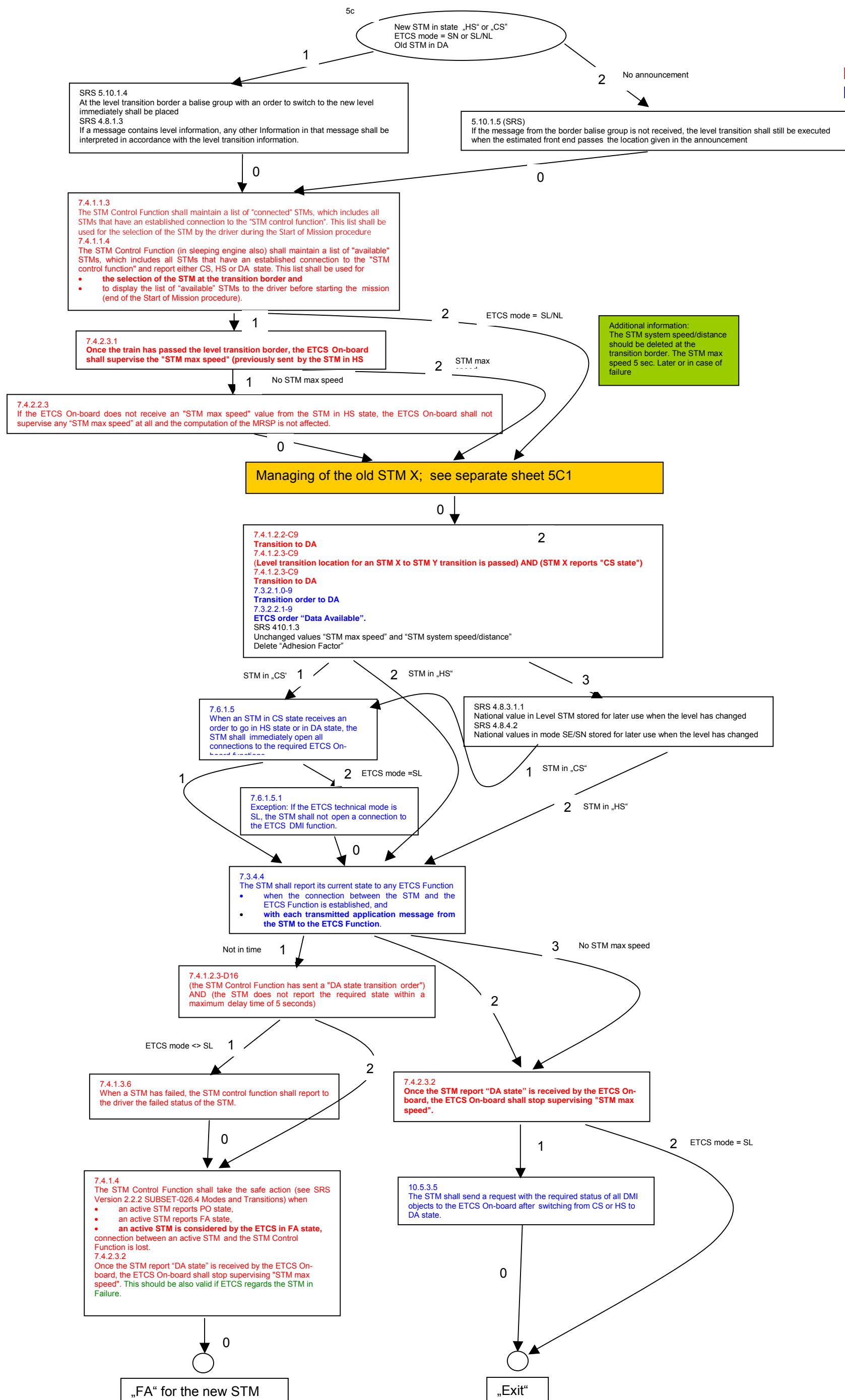
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Between Announcement and Transition 5b



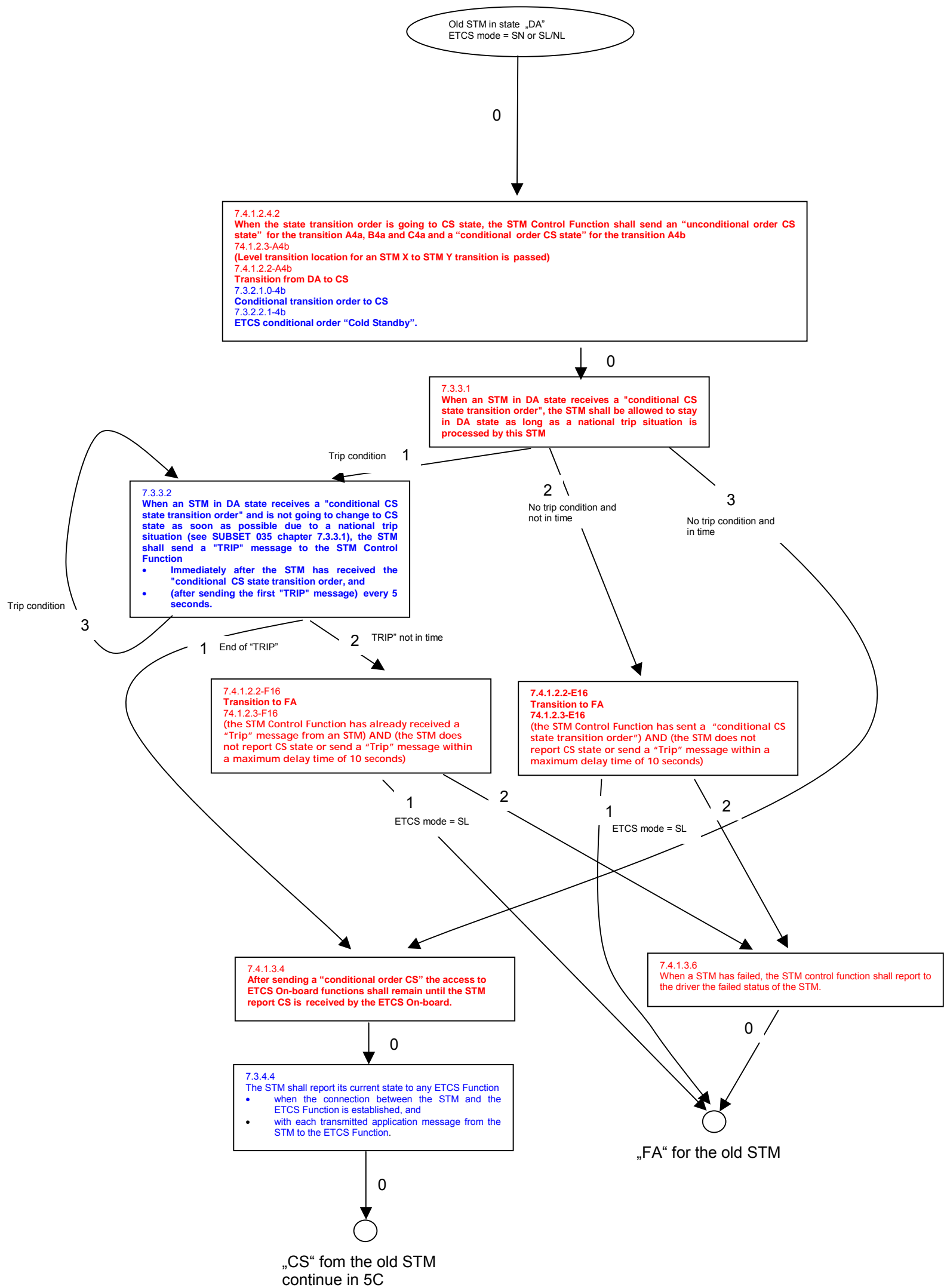
Level Transition Border 5c



Red: STM Control Function ()
Blue: STM Function ()

Level Transition Border 5c1

Red: STM Control Function (ETCS)
Blue: STM Function



TEST CASES

Test case 5a.0.0.1.1.1.0.0.0

| TEST CASE HEADER | |
|-----------------------------------|--|
| Test case Identification | Level Transition STM -> STM (Level Transition Announcement) |
| | Check the behaviour of the ETCS On-board (not in the ETCS technical mode SL) and the STM at a level transition announcement for an STM to STM transition (announced by balise group), when no other STM is currently in the state HS and the STM follows the state transition order to state HS in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.2.2 (CS to HS), 7.4.1.2.3.4, 7.4.1.2.3 (A6), 7.4.1.2.4, 7.4.2.4.1, 7.4.2.4.2, 10.5.2.8 |
| | SUBSET-026 5.10.1.1, 4.8.1.3, 4.8.3.1.1, 4.8.4.2 |
| STM Requirements Tested | SUBSET-035 7.3.2.1 (6), 7.3.2.2.1 (CS to HS), 7.3.4.4 |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-14, STM-15, STM-30, STM-43, STM-136, STM-139 |
| Comments and constraints | <p>The objective of this test is to check that the ETCS On-board (STM Control Function) orders the STM to the state HS when a level transition announcement to this STM is received and that the ETCS On-board BIU and TIU Functions send the current status / availability information to the STM when the connection to these functions is opened by the STM and that the ETCS DMI Function sends the current selected language to the STM when the connection to the DMI function is opened.</p> <p>The objective of this test is also to check that the STM follows a state transition order to the state HS.</p> <p>The selected language shall be "English".</p> |

| Starting Conditions | Value | Comments |
|---------------------|-------|----------------------------------|
| STM State | CS | another STM shall be in state DA |
| ETCS Mode | SN | |

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| Starting Conditions | Value | Comments |
|---|-----------------|---|
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | |
| DMI Connection | not established | the DMI Connection to the STM in DA shall be established |
| Odometry Data | transmitted | |
| Reference Time Data | transmitted | |
| TIU Connection | not established | the state of the TIU Connection to the STM in DA is not relevant |
| BIU Connection | not established | the state of the BIU Connection to the STM in DA is not relevant |
| JRU Connection | not relevant | the state of the JRU Connection to the STM in DA is not relevant |
| Other connections | not relevant | the state of the other connections to the STM in DA is not relevant |
| TIU Regenerative Brake Command | not relevant | |
| TIU Magnetic Shoes Command | not relevant | |
| TIU Eddy Current Brake Command | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | 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 Sleeping Status | not sleeping | |
| TIU Traction Cut Off Status | inactive | |
| TIU Direction Controller Position Status | forward | |
| TIU Cab Status (Desk Status) | desk A opened | |
| BIU Status | not relevant | |
| BIU Emergency Brake Command | not relevant | |
| BIU Service Brake Command | not relevant | |
| BIU Emergency Brake Status | Release | |
| BIU Service Brake Status | Release | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|---|------|------------|--|
| - | Initial condition: Display information from the (old) STM in DA | Prof | DMI Connection (old STM): Message-So1 (STM-43 - National ETCS DMI) | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 1 | Level Transition announcement for an STM -> STM transition: order announced STM (new STM) to HS state Time: T0 | BTM | Message-B1 (SRS 41 - Level Transition Order) Message-B2 | ETCS | Prof | STM Control Connection (new STM): Message-EC1 (STM-14 - state order to STM) |
| | | - | - | ETCS | DMI | Indication to the driver about the selected level transition |
| 2 | Connection to the ETCS On-board BIU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish BIU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the BIU Function by the new STM | Prof | BIU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|---|
| | Transmit current status / availability of BIU signals | - | - | ETCS | Prof | BIU Connection (new STM): Message-EB1 (STM-136 - brake interface emergency and service brake status / availability to STM) |
| 3 | Connection to the ETCS On-board TIU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish TIU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the TIU Function by the new STM | Prof | TIU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current status / availability of TIU signals | - | - | ETCS | Prof | TIU Connection (new STM): Message-ET1 (STM-139 - train interface inputs status / availability to STM) |
| 4 | Connection to the ETCS On-board JRU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish JRU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the JRU Function by the new STM | Prof | JRU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| 5 | Connection to the ETCS On-board DMI Function (cab A) is established by the new STM (SLL/STL/Application Layer) | Prof | establish DMI connection, cab A (new STM) | - | - | - |
| | The current state (CS) is reported to the DMI Function by the new STM | Prof | DMI Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current select language | - | - | ETCS | Prof | DMI Connection (new STM): Message-ED1 (STM-30 - driver language transmission) |
| 6 | Time: T0 + 8 seconds The new STM reports state HS in due time to all connected ETCS Functions | Prof | STM Control Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|----------------------|-----------|---|-----|------------|---------------|
| | | Prof | BIU Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | TIU (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | JRU Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | DMI Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |

STM Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|--|-----|------------|--|
| 1 | STM is ordered to state HS | Prof | STM Control Connection (new STM): Message-EC1 STM 14 (state order to STM) | - | - | - |
| 2a1 | Connection to the ETCS On-board BIU Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish BIU connection (new STM) - optional - |
| 2a2 | The current state (CS) is reported to the BIU Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | BIU Connection (new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2f1" is not yet performed - |
| | Transmission of the BIU status / availability information to the STM | Prof | BIU connection (new STM) - if opened -: Message-EB1 (STM-136 – brake interface emergency and service brake status / availability to STM) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|---|-----|------------|--|
| | The new STM reports state HS to the ETCS On-board BIU Function | - | - | STM | Prof | BIU Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |
| 2b1 | Connection to the ETCS On-board TIU Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish TIU connection (new STM) - optional - |
| 2b2 | The current state (CS) is reported to the TIU Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | TIU Connection (new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2f1" is not yet performed - |
| | Transmission of the TIU status / availability information to the STM | Prof | TIU connection (new STM) - if opened -: Message-ET1 (STM-139 - train interface inputs status / availability to STM) | - | - | - |
| | The new STM reports state HS to the ETCS On-board TIU Function | - | - | STM | Prof | TIU Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |
| 2c1 | Connection to the ETCS On-board JRU Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish JRU Connection - optional - |
| 2c2 | The current state (CS) is reported to the JRU Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | JRU Connection (new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2f1" is not yet performed - |
| | The new STM reports state HS to the ETCS On-board JRU Function | - | - | STM | Prof | JRU Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|--|-----|------------|--|
| 2d1 | Optional connection to the ETCS On-board DRU Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish DRU Connection - optional - |
| 2d2 | The current state (CS) is reported to the DRU Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | DRU Connection (new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2f1" is not yet performed - |
| | The new STM reports state HS to all connected ETCS Functions | - | - | STM | Prof | DRU Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |
| 2e1 | Connection to the ETCS On-board DMI Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish DMI connection, cab A (new STM) - optional - |
| 2e2 | The current state (CS) is reported to the DMI Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | DMI Connection (new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2f1" is not yet performed - |
| | Transmission of the selected language to the STM | Prof | DMI connection (new STM) - if opened -: Message-ED1 (STM - driver language transmission) | - | - | - |
| | The new STM reports state HS to all connected ETCS Functions | - | - | STM | Prof | DMI Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |
| | | | | | | |
| | | | | | | |
| 2f1 | The new STM reports state HS to the ETCS STM Control Function | - | - | STM | Prof | STM Control Connection (new STM): Message-Sn2 (STM-15 - state report from STM) |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|----------------------|-----------|--------------|-----|------------|---------------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | National ETCS DMI (STM-43) |
| L_PACKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Telegram-B1: Balise-Information (L1 MA, Gradient Profile, International Speed Profile. Level Transition Order) | | | |
|--|--------|--------------|-------------|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |

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| Telegram-B1: Balise-Information (L1 MA, Gradient Profile, International Speed Profile. Level Transition Order) | | | |
|--|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 2000 | 2000 m |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-B2: Balise-Information | | | |
|--------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

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| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 6 | state order HS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1 (state report from STM): STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EB1 (brake interface emergency and service brake status / availability to STM): ETCS BIU Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 136 | Brake Interface emergency and service brake status / availability to STM (STM-136) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_BIEB_STATUS | 2 | 2 | emergency brake released |
| M_BISB_STATUS | 2 | 2 | service brake released |
| Padding bits | COMPUTED | COMPUTED | |

| Message-ET1 (train interface inputs status / availability to STM): ETCS TIU Function → STM | | | |
|--|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 139 | Train Interface inputs status / availability to STM (STM-139) |
| L_PACKET | 13 | COMPUTED | packet length |

| Message-ET1 (train interface inputs status / availability to STM): ETCS TIU Function → STM | | | |
|--|----------|----------|---------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| M_TITR_C_STATUS | 2 | 2 | no traction cut off |
| M_TIDIR_STATUS | 2 | 1 | forward |
| M_TICAB_STATUS | 2 | 1 | cab A opened |
| Padding bits | COMPUTED | COMPUTED | |

| Message-ED1 (driver language transmission): ETCS DMI Function → STM | | | |
|---|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 30 | Driver language transmission (STM-30) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_DRV_LANG | 2 | en | English |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn2 (state report from STM): STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---------------------------------|-----------|----------|
| STM State | HS | |
| ETCS Mode | unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |

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| | | |
|---|-------------|--|
| DMI Connection | established | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | established | |
| BIU Connection | established | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5a.0.0.1.1.3.1.0

As all the cases that an STM does not follow a state transition order at a level transition announcement or at a level transition border are tested in the Functional Identities 3 (ETCS -> STM) and 4 (STM -> ETCS) and due to the fact that this test case belongs to a degraded situation, no test case is included here.

Test case 5a.0.0.1.2.1.0.1.0.0.0

| TEST CASE HEADER | |
|--|---|
| Test case Identification | Level Transition STM -> STM (Level Transition Announcement) |
| | Check the behaviour of the ETCS On-board and the STMs at a level transition announcement for an STM to STM transition (announced by balise group), when another STM is in the state HS and the STMs follow the state transition orders in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.2.3.4, 7.4.1.2.3 (C4a, A6), 7.4.1.2.4, 7.4.2.4.1, 7.4.2.4.2, 10.5.2.8 |
| | SUBSET-026 5.10.1.1, 5.10.2.6, 4.8.1.3, 4.8.3.1.1, 4.8.4.2 |
| STM Requirements Tested | SUBSET-035 7.3.2.2 (4a, 6), 7.3.2.1 (HS to CS, CS to HS), 7.3.4.4, 7.6.1.5, 7.6.3.2 |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-14, STM-15, STM-30, STM-43, STM-136, STM-139 |
| Comments and constraints | <p>The objective of this test is to check that the ETCS On-board (STM Control Function) orders the STM n to the state HS when a level transition announcement to this STM is received after any other STM in state HS was ordered to the state CS and that the ETCS On-board BTM Function and TIU Functions send the current status / availability information to the STM when the connection to these functions are opened by the STM which was ordered to the state HS and that the ETCS DMI Function sends the current selected language to the STM when the connection to the DMI function is opened by the STM which was ordered to the state HS.</p> <p>The objective of this test is also to check that the STM n follows a state transition order to the state HS.</p> <p>The selected language shall be "English".</p> |

| Starting Conditions | Value | Comments |
|---------------------|--------|---|
| STM State | CS | another STM shall be in state HS and a third STM shall be in state DA |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | moving | |

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| Starting Conditions | Value | Comments |
|---|-----------------|--|
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | |
| DMI Connection | not established | the STM in state HS and the STM in state DA shall have an established connection to the DMI function |
| Odometry Data | transmitted | |
| Reference Time Data | transmitted | |
| TIU Connection | established | the state of the TIU Connection to the STM in HS and to the STM in DA is not relevant |
| BIU Connection | established | the state of the BIU Connection to the STM in HS and to the STM in DA is not relevant |
| JRU Connection | not relevant | the state of the JRU Connection to the STM in HS and to the STM in DA is not relevant |
| Other connections | not relevant | the state of the other connections to the STM in HS and to the STM in DA is not relevant |
| TIU Regenerative Brake Command | not relevant | |
| TIU Magnetic Shoes Command | not relevant | |
| TIU Eddy Current Brake Command | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | 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 Sleeping Status | not sleeping | |
| TIU Traction Cut Off Status | inactive | |
| TIU Direction Controller Position Status | forward | |
| TIU Cab Status (Desk Status) | desk A opened | |
| BIU Status | not relevant | |
| BIU Emergency Brake Command | not relevant | |
| BIU Service Brake Command | not relevant | |
| BIU Emergency Brake Status | release | |
| BIU Service Brake Status | release | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|--|------|------------|---|
| - | Display information from the (old) STM in DA | Prof | DMI Connection (old STM): Message-So1 (STM-43 - National ETCS DMI-Information) | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 1 | Level Transition announcement for an STM -> STM transition: order previously announced STM (STM in HS) to CS state Time: T0 | BTM | Message-B1 (SRS-41 - Level Transition Order) Message-B2 | ETCS | Prof | STM Control Connection (STM in HS): Message-EC1 (STM-14 - state order to STM) |
| | | - | - | ETCS | DMI | Indication to the driver about the new selected level transition |
| 2 | Time: T0 + 3 seconds The previously announced STM (STM in HS) closes the connection to the ETCS DMI function (cab A) and reports CS state in due time. | Prof | close DMI connection, cab A (STM in HS) | - | - | - |
| | Previously announced STM (STM in HS) reports CS state in due time. | Prof | Message-Sm1 (STM-15 - state report from STM) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|---|
| 3 | New STM is ordered to state HS | - | - | ETCS | Prof | STM Control Connection (new STM): Message-EC2 (STM-14 - state order to STM) |
| 4 | Connection to the ETCS On-board BIU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish BIU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the BIU Function by the new STM | Prof | BIU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current status / availability of BIU signals | - | - | ETCS | Prof | BIU Connection (new STM): Message-EB1 (STM-136 - brake interface emergency and service brake status / availability to STM) |
| 5 | Connection to the ETCS On-board TIU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish TIU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the TIU Function by the new STM | Prof | TIU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current status / availability of TIU signals | - | - | ETCS | Prof | TIU Connection (new STM): Message-ET1 (STM-139 - train interface inputs status / availability to STM) |
| 6 | Connection to the ETCS On-board JRU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish JRU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the JRU Function by the new STM | Prof | JRU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| 7 | Connection to the ETCS On-board DMI Function (cab A) is established by the new STM (SLL/STL/Application Layer) | Prof | establish DMI connection, cab A (new STM) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|---|------|------------|--|
| | The current state (CS) is reported to the DMI Function by the new STM | Prof | DMI Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current select language | - | - | ETCS | Prof | DMI Connection (new STM): Message-ED1 (STM-30 - driver language transmission) |
| 8 | Time: T0 + 8 seconds The new STM reports state HS in due time | Prof | STM Control Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | | Prof | BIU Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | TIU (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | JRU Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | DMI Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |

STM Test Case

As this test case is the same as the Test case 3a.0.0.1.2.1.0.1.0.0.0 (Functional Identity 3, ETCS -> STM), no test case is performed here.

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |

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| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | National ETCS DMI (STM-43) |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Message-B1: Balise-Information (Level Transition Order) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level transition order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 2000 | 2000 m |

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Message-B1: Balise-Information (Level Transition Order)

| VARIABLE | Length | VALUE | COMMENTS |
|--------------|--------|--------------|---|
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_ACKLEVELTR | 15 | 200 | acknowledgement area starts 200 m in front of the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

Message-B2: Balise-Information

| VARIABLE | Length | VALUE | COMMENTS |
|------------|--------|--------------|--|
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

Message-EC1 (state order to STM m): ETCS STM Control Function → STM

| VARIABLE | Length | VALUE | COMMENTS |
|-------------------|----------|--------------|---|
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM m (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 4 | state CS (unconditional order) |
| Padding bits | COMPUTED | COMPUTED | |

Message-EC2 (state order to STM n): ETCS STM Control Function → STM

| VARIABLE | Length | VALUE | COMMENTS |
|-----------|--------|--------------|---|
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |

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| Message-EC2 (state order to STM n): ETCS STM Control Function → STM | | | |
|---|----------|----------|-------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_PACKET | 8 | 14 | State order to STM n (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 6 | state HS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EB1 (brake interface emergency and service brake status / availability to STM): ETCS BIU Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 136 | Brake Interface emergency and service brake status / availability to STM (STM-136) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_BIEB_STATUS | 2 | 2 | emergency brake released |
| M_BISB_STATUS | 2 | 2 | service brake released |
| Padding bits | COMPUTED | COMPUTED | |

| Message-ET1 (train interface inputs status / availability to STM): ETCS TIU Function → STM | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 139 | Train Interface inputs status / availability to STM (STM-139) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_TITR_C_STATUS | 2 | 2 | no traction cut off |
| M_TIDIR_STATUS | 2 | 1 | forward |
| M_TICAB_STATUS | 2 | 1 | cab A opened |
| Padding bits | COMPUTED | COMPUTED | |

| Message-ED1 (driver language transmission): ETCS DMI Function → STM | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 30 | Driver language transmission (STM-30) |
| L_PACKET | 13 | COMPUTED | packet length |

| Message-ED1 (driver language transmission): ETCS DMI Function → STM | | | |
|---|----------|----------|----------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_DRV_LANG | 2 | en | English |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sm1 (state report from STM m): STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM m (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1 (state report from STM n): STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---------------------------------|-------------|--|
| STM State | HS | another STM in state CS (previously in state HS) and another STM in DA |
| ETCS Mode | unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | established | the DMI Connection of the STM in state CS (previously in state HS) is |

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| | | |
|---|-------------|--------|
| | | closed |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | established | |
| BIU Connection | established | |
| JRU Connection | established | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5a.0.0.1.2.2.2.0.1.0.0.0

As all the cases regarding an STM that does not follow a state transition order at a level transition announcement or at a level transition border are tested in the Functional Identities 3 (ETCS -> STM) and 4 (STM -> ETCS) and due to the fact that these test cases (somehow) belong to a degraded situation, no test case is included here.

Test case 5a.0.0.2.2.0.0.0

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition STM -> STM (Level Transition Announcement) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition announcement for an STM to STM transition (announced by balise group), when the ETCS technical mode is SL (Sleeping) and no STM is currently in the state HS and the STM follows the state transition order to state HS in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.2.3.4, 7.4.1.2.3 (A6), 7.4.1.2.4, 7.4.2.4.1, 7.4.2.4.2 |
| | SUBSET-026 5.10.1.1, 5.10.2.6, 4.8.1.3, 4.8.3.1.1, 4.8.4.2 |
| STM Requirements Tested | SUBSET-035 7.3.2.2 (6), 7.3.2.1 (CS to HS), 7.3.4.4, 7.6.1.5, 7.6.1.5.1 |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-14, STM-15, STM-43, STM-136, STM-139 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) orders the STM to the state HS when a level transition announcement to this STM is received and that the ETCS On-board BTM Function and TIU Functions send the current status / availability information to the STM when the connection to these functions are opened by the STM. |
| | The objective of this test is also to check that the STM follows a state transition order to the state HS. |

| Starting Conditions | Value | Comments |
|---------------------------------|-------------|----------------------------------|
| STM State | CS | another STM shall be in state DA |
| ETCS Mode | SL | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | Valid | |
| STM Control Function Connection | established | |

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| Starting Conditions | | Value | Comments |
|---|------------|-----------------|---|
| DMI Connection | | not established | |
| Odometry Data | | transmitted | |
| Reference Time Data | | transmitted | |
| TIU Connection | | not established | the state of the TIU Connection to the STM in DA is not relevant |
| BIU Connection | | not established | the state of the BIU Connection to the STM in DA is not relevant |
| JRU Connection | | not relevant | the state of the JRU Connection to the STM in DA is not relevant |
| Other connections | | not relevant | the state of the other connections to the STM in DA is not relevant |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | sleeping | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | neutral | |
| TIU Cab Status (Desk Status) | | desk A&B closed | |
| BIU Status | | not relevant | |
| BIU Emergency Brake Command | | not relevant | |
| BIU Service Brake Command | | not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|---|------|------------|---|
| - | Initial condition: Display information from the (old) STM in DA | Prof | DMI Connection (old STM) Message-So1 (STM-43 - National ETCS DMI) | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 1 | Level Transition announcement for an STM -> STM transition: order announced STM (new STM) to HS state Time: T0 | BTM | Message-B1 (SRS-41 - Level Transition Order) Message-B2 | ETCS | Prof | STM Control Connection (new STM): Message-EC1 (STM-14 – state order to STM) |
| 2 | Connection to the ETCS On-board BIU Function establishes is established by the new STM (SLL/STL) | Prof | establish BIU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the BIU Function by the new STM | Prof | BIU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current status / availability of BIU signals | - | - | ETCS | Prof | BIU Connection (new STM): Message-EB1 (STM-136 - brake interface emergency and service brake status / availability to STM) |
| 3 | Connection to the ETCS On-board TIU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish TIU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the TIU Function by the new STM | Prof | TIU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|--|
| | Transmit current status / availability of TIU signals | - | - | ETCS | Prof | TIU Connection (new STM): Message-ET1 (STM-139 - train interface inputs status / availability to STM) |
| 4 | Connection to the ETCS On-board JRU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish JRU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the JRU Function by the new STM | Prof | JRU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| 5 | Time: T0 + 8 seconds The new STM n reports state HS in due time | Prof | STM Control Connection (new STM): Message-Sn2 (STM-15 - state report from STM) | - | - | - |
| | | Prof | BIU Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | TIU (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | JRU Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |

STM Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|----------------------------|-----------|--|-----|------------|---------------|
| 1 | STM is ordered to state HS | Prof | STM Control Connection (new STM): Message-EC1 (STM-15 - state order to STM) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|---|-----|------------|--|
| 2a1 | Connection to the ETCS On-board BIU Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish BIU connection (new STM) - optional - |
| 2a2 | The current state (CS) is reported to the BIU Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | BIU Connection (new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2e1" is not yet performed - |
| | Transmission of the BIU status / availability information to the new STM | Prof | BIU connection – if opened -: - Message-EB1 (STM-136 - brake interface emergency and service brake status / availability to STM) | - | - | - |
| | The new STM reports state HS to the ETCS On-board BIU Function | - | - | STM | Prof | BIU Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |
| 2b1 | Connection to the ETCS On-board TIU Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish TIU connection (new STM) - optional - |
| 2b2 | The current state (CS) is reported to the TIU Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | TIU Connection (new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2e1" is not yet performed - |
| | Transmission of the TIU status / availability information to the new STM | Prof | TIU connection – if opened -: - Message-ET1 (STM-139 - train interface inputs status / availability to STM) | - | - | - |
| | The new STM reports state HS to the ETCS On-board TIU Function | - | - | STM | Prof | TIU Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|--------------|-----|------------|--|
| 2c1 | Connection to the ETCS On-board JRU Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish JRU Connection - optional - |
| 2c2 | The current state (CS) is reported to the JRU Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | JRU Connection new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2e1" is not yet performed - |
| | The new STM reports state HS to the ETCS On-board JRU Function | - | - | STM | Prof | JRU Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |
| 2d1 | Connection to the ETCS On-board DRU Function is established by the new STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish DRU Connection - optional - |
| 2d2 | The current state (CS) is reported to the DRU Function by the new STM (only if the state is not yet HS when the connection is opened) | - | - | STM | Prof | DRU Connection (new STM) - if opened -: Message-Sn1 (STM-15 - state report from STM) - only if "2e1" is not yet performed - |
| | The new STM reports state HS to the ETCS On-board DRU Function | - | - | STM | Prof | DRU Connection (new STM) - if opened -: Message-Sn2 (STM-15 - state report from STM) |
| | | | | | | |
| | | | | | | |
| 2e1 | The new STM reports state HS to the ETCS STM Control Function | - | - | STM | Prof | STM Control Connection (new STM): Message-Sn2 (STM-15 - state report from STM) |
| | | | | | | |
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| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | National ETCS DMI (STM-43) |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Message-B1: Balise-Information (Level Transition Order) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |

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| Message-B1: Balise-Information (Level Transition Order) | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 2000 | 2000 m |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_ACKLEVELTR | 15 | 200 | acknowledgement area starts 200 m in front of the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-B2: Balise-Information | | | |
|--------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 6 | state HS |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|----------|----------|
| VARIABLE | Length | VALUE | COMMENTS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1 (state report from STM): STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EB1 (brake interface emergency and service brake status / availability to STM): ETCS BIU Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 136 | Brake Interface emergency and service brake status / availability to STM n (STM-136) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_BIEB_STATUS | 2 | 2 | emergency brake released |
| M_BISB_STATUS | 2 | 2 | service brake released |
| Padding bits | COMPUTED | COMPUTED | |

| Message-ET1 (train interface inputs status / availability to STM): ETCS TIU Function → STM | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 139 | Train Interface inputs status / availability to STM n (STM-139) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_TITR_C_STATUS | 2 | 2 | no traction cut off |
| M_TIDIR_STATUS | 2 | 2 | neutral |
| M_TICAB_STATUS | 2 | 2 | cab A&B closed |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn2 (state report from STM): STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---|-----------|----------|
| STM State | HS | |
| ETCS Mode | unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |

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| | | |
|--|-----------|--|
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5a.0.0.2.3.2

As all the cases regarding an STM that does not follow a state transition order at a level transition announcement or at a level transition border are tested in the Functional Identities 3 (ETCS -> STM) and 4 (STM -> ETCS) and due to the fact that these test cases (somehow) belong to a degraded situation, no test case is included here.

Test case 5a.0.0.3.1.0.1.0.0.0

| TEST CASE HEADER | |
|-----------------------------------|---|
| Test case Identification | Level Transition STM -> STM (Level Transition Announcement) |
| | Check the behaviour of the ETCS On-board and the STMs at a level transition announcement for an STM to STM transition (announced by balise group), when the ETCS technical mode is SL (Sleeping) and another STM is in the state HS and the STMs follow the state transition orders in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.2.3.4, 7.4.1.2.3 (C4a, A6), 7.4.1.2.4, 7.4.2.4.1, 7.4.2.4.2 |
| | SUBSET-026 5.10.1.1, 5.10.2.6, 4.8.1.3, 4.8.3.1.1, 4.8.4.2 |
| STM Requirements Tested | SUBSET-035 7.3.2.2 (4a, 6), 7.3.2.1 (HS to CS, CS to HS), 7.3.4.4, 7.6.1.5, 7.6.3.2 |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-14, STM-15, STM-43, STM-136, STM-139 |
| Comments and constraints | <p>The objective of this test is to check that the ETCS On-board (STM Control Function) orders the STM n to the state HS when a level transition announcement to this STM is received after any other STM in state HS was ordered to the state CS and that the ETCS On-board BTM Function and TIU Functions send the current status / availability information to the STM when the connection to these functions are opened by the STM which was ordered to the state HS.</p> <p>The objective of this test is also to check that the STM n follows a state transition order to the state HS.</p> |

| Starting Conditions | Value | Comments |
|---------------------------------|-------------|---|
| STM State | CS | another STM shall be in state HS and a third STM shall be in state DA |
| ETCS Mode | SL | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | |

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| Starting Conditions | | Value | Comments |
|---|------------|-----------------|--|
| DMI Connection | | not established | |
| Odometry Data | | transmitted | |
| Reference Time Data | | transmitted | |
| TIU Connection | | established | the state of the TIU Connection to the STM in HS and to the STM in DA is not relevant |
| BIU Connection | | established | the state of the BIU Connection to the STM in HS and to the STM in DA is not relevant |
| JRU Connection | | not relevant | the state of the JRU Connection to the STM in HS and to the STM in DA is not relevant |
| Other connections | | not relevant | the state of the other connections to the STM in HS and to the STM in DA is not relevant |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | sleeping | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | neutral | |
| TIU Cab Status (Desk Status) | | desk A&B closed | |
| BIU Status | | not relevant | |
| BIU Emergency Brake Command | | not relevant | |
| BIU Service Brake Command | | not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|---|
| 1 | Level Transition announcement for an STM -> STM transition: order previously announced STM (STM in HS) to CS state Time: T0 | BTM | Message-B1 (SRS-41 - Level Transition Order) Message-B2 | ETCS | Prof | STM Control Connection (STM in HS): Message-EC1 (STM-14 - state order to STM) |
| 2 | Time: T0 + 1 second Previously announced STM (STM in HS) reports CS state in due time. | Prof | Message-Sm1 (STM-15 - state report from STM) | - | - | - |
| 3 | New STM is ordered to state HS | - | - | ETCS | Prof | STM Control Connection (new STM): Message-EC2 (STM-14 - state order to STM) |
| 4 | Connection to the ETCS On-board BIU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish BIU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the BIU Function by the new STM | Prof | BIU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current status / availability of BIU signals | - | - | ETCS | Prof | BIU Connection (new STM): Message-EB1 (STM-136 - brake interface emergency and service brake status / availability to STM) |
| 5 | Connection to the ETCS On-board TIU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish TIU connection (new STM) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|--|
| | The current state (CS) is reported to the TIU Function by the new STM | Prof | TIU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current status / availability of TIU signals | - | - | ETCS | Prof | TIU Connection (new STM): Message-ET1 (STM-139 - train interface inputs status / availability to STM) |
| 6 | Connection to the ETCS On-board JRU Function is established by the new STM (SLL/STL/Application Layer) | Prof | establish JRU connection (new STM) | - | - | - |
| | The current state (CS) is reported to the JRU Function by the new STM | Prof | JRU Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| 7 | Time: T0 + 8 seconds The new STM reports state HS in due time | Prof | STM Control Connection (new STM): Message-Sn1 (STM-15 - state report from STM) | - | - | - |
| | | Prof | BIU Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | TIU (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |
| | | Prof | JRU Connection (new STM): Message-Sn2 (STM-15 - STM - state report from STM) | - | - | - |

STM Test Case

As this test case is the same as the Test case 3a.0.0.1.2.1.0.1.0.0.0 (Functional Identity 3, ETCS -> STM), no test case is performed here.

| Message-B1: Balise-Information (Level Transition Order) | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level transition order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 2000 | 2000 m |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_ACKLEVELTR | 15 | 200 | acknowledgement area starts 200 m in front of the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-B2: Balise-Information | | | |
|--------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |

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| Message-B2: Balise-Information | | | |
|--------------------------------|--------|----------|---------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-EC1 (state order to STM m): ETCS STM Control Function → STM | | | |
|---|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM m (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 4 | state CS (unconditional order) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC2 (state order to STM n): ETCS STM Control Function → STM | | | |
|---|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM n (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 6 | state HS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EB1 (brake interface emergency and service brake status / availability to STM): ETCS BIU Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 136 | Brake Interface emergency and service brake status / availability to STM (STM-136) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_BIEB_STATUS | 2 | 2 | emergency brake released |
| M_BISB_STATUS | 2 | 2 | service brake released |
| Padding bits | COMPUTED | COMPUTED | |

| Message-ET1 (train interface inputs status / availability to STM): ETCS TIU Function → STM | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 139 | Train Interface inputs status / availability to STM (STM-139) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_TITR_C_STATUS | 2 | 2 | no traction cut off |
| M_TIDIR_STATUS | 2 | 1 | forward |
| M_TICAB_STATUS | 2 | 1 | cab A opened |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sm1 (state report from STM m): STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM m (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1 (state report from STM n): STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state CS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|----------------|-----------|--|
| STM State | HS | another STM in state CS (previously in state HS) and another STM in DA |
| ETCS Mode | unchanged | |
| ETCS Level | unchanged | |

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| | | |
|---|-------------|--|
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | established | |
| BIU Connection | established | |
| JRU Connection | established | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5a.0.0.3.2.1.2.0.0.0

As all the cases regarding an STM that does not follow a state transition order at a level transition announcement or at a level transition border are tested in the Functional Identities 3 (ETCS -> STM) and 4 (STM -> ETCS) and due to the fact that these test cases (somehow) belong to a degraded situation, no test case is included here.

Test case 5b.1.1.4.0

| TEST CASE HEADER | |
|--|---|
| Test case Identification | Level Transition STM -> STM (area between announcement and transition) |
| | Check of handling of the STM max Speed and STM system Speed / Distance within the ETCS On-board (STM Control Function) during a level transition STM to STM. The STM is finally kept as failed. |
| ETCS Requirements Tested | SUBSET-035 7.4.2.2.1, 7.4.2.2.2, 7.4.2.2.3, 7.4.2.2.4, 7.4.2.2.5 |
| | SUBSET-026 None |
| STM Requirements Tested | SUBSET-035 None |
| | SUBSET-026 None |
| Packets Transmitted via FFFIS STM | Packet STM-14, STM-15, STM-16, STM-17, STM 43 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) is able to receive without any further processing STM max Speed as well as STM system Speed / Distance from an STM n in state HS during the approach of a level transition STM to STM. Due to the failed STM the STM max speed will be set to 0. |

| Starting Conditions | Value | Comments |
|---------------------------------|--------------|---|
| STM State | HS | Another STM shall be in state DA. |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | not relevant | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | no STM max Speed and STM system Speed / Distance messages (Packet STM-16, STM-17) were transmitted by the STM n after the current state change to state HS. |
| DMI Connection | established | |
| Odometry Data | transmitted | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| Reference Time Data | | transmitted | |
| TIU Connection | | not relevant | |
| BIU Connection | | not relevant | |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | not relevant | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU 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 | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | Value | Comments |
|---------------------|--------------|----------|
| Track Adhesion | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|---|------|------------|--|
| 1 | STM "MA" information from the STM in DA (constant is transmitted | Prof | DMI Connection: Message-So1 | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 2 | No STM max Speed and STM system Speed / Distance is taken into account while calculating the MRSP | - | - | ETCS | DMI | |
| 3 | "STM Max Speed" (120 km/h) is received and not processed (supervised) by the ETCS On-board | Prof | STM Control Connection: Message-Sn1 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |
| 4 | "STM System Speed / Distance" is received and not processed (supervised) by the ETCS On-board Time: T0 | Prof | STM Control Connection: Message-Sn2 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |
| 5 | The STM failed | Prof | STM Control Connection: Message-E1 State report FA state to the ETCS. | ETCS | DMI | Failed STM information shall be displayed to the Driver. |
| | | | | ETCS | JRU | Failed STM information is recorded in the JRU. |
| 6 | Set STM max speed = 0, to be taken into account at the level transition. | - | - | ETCS | BIU | The train will start braking at the transition border |

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |

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| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1: STM → ETCS STM Control Function | | | |
|--|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition). |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 24 | 120 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn2: STM → ETCS STM Control Function | | | |
|--|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |

| Message-Sn2: STM → ETCS STM Control Function | | | |
|--|----------|----------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 17 | Transition variables STM system speed and distance from STM n (STM-17) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMSYS | 7 | 28 | 140 km/h |
| D_STMSYS | 15 | 10 | 100 m |
| Padding bits | COMPUTED | COMPUTED | |

| Message-E1: ETCS STM Control Function -> STM | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State report from STM n (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 8 | state Failure |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---------------------------------|-----------|----------|
| STM State | FA | |
| ETCS Mode | Unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |

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| | | |
|---|-----------|--|
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5b.1.2.1.2.1.1

| TEST CASE HEADER | |
|--|---|
| Test case Identification | Level Transition STM -> STM (area between announcement and transition) |
| | Check of handling of the STM max Speed and STM system Speed / Distance within the ETCS On-board (STM Control Function) with one modification by a STM during a level transition STM to STM. |
| ETCS Requirements Tested | SUBSET-035 7.4.2.2.1.1, 7.4.2.2.4.1 |
| | SUBSET-026 None |
| STM Requirements Tested | SUBSET-035 None |
| | SUBSET-026 None |
| Packets Transmitted via FFFIS STM | Packet STM-15, STM-16, STM-17, STM-43 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) is able to receive without any further processing STM max Speed as well as STM system Speed / Distance from an STM n in state HS during the approach of a level transition STM to STM. It has to be also shown that the ETCS is able to override previously received values. |

| Starting Conditions | Value | Comments |
|---------------------------------|--------------|---|
| STM State | HS | Another STM shall be in state DA. |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | not relevant | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | no STM max Speed and STM system Speed / Distance messages (Packet STM-16, STM-17) were transmitted by the STM n after the current state change to state HS. |
| DMI Connection | established | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| Odometry Data | | transmitted | |
| Reference Time Data | | transmitted | |
| TIU Connection | | not relevant | |
| BIU Connection | | not relevant | |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | not relevant | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU 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 | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|-------------------------------------|------|------------|--|
| 1 | STM "MA" information from the STM in DA (constant is transmitted) | Prof | DMI Connection: Message-So1 | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 2 | No STM max Speed and STM system Speed / Distance is taken into account while calculating the MRSP | - | - | ETCS | DMI | |
| 3 | "STM Max Speed" (120 km/h) is received and not processed (supervised) by the ETCS On-board | Prof | STM Control Connection: Message-Sn1 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |
| 4 | "STM System Speed / Distance" is received and not processed (supervised) by the ETCS On-board Time: T0 | Prof | STM Control Connection: Message-Sn3 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |
| 5 | Time: T0 + 10 seconds An update of "STM Max Speed" is received and not processed by the ETCS On-board | Prof | STM Control Connection: Message-Sn2 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |
| 6 | An update of "STM System Speed / Distance" is received and not processed (supervised) by the ETCS On-board | Prof | STM Control Connection: Message-Sn4 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 24 | 120 km/h |
| Padding bits | COMPUTED | COMPUTED | |

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| Message-Sn2: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 12 | 60 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn3: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 17 | Transition variables STM system speed and distance from STM n (STM-17) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMSYS | 7 | 28 | 140 km/h |
| D_STMSYS | 15 | 10 | 100 m |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn4: STM → ETCS STM Control Function | | | |
|--|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 17 | Transition variables STM system speed and distance from STM n (STM-17) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMSYS | 7 | 10 | 50 km/h |

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| Message-Sn4: STM → ETCS STM Control Function | | | |
|--|----------|----------|----------|
| VARIABLE | Length | VALUE | COMMENTS |
| D_STMSYS | 15 | 10 | 100 m |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---|-----------|----------|
| STM State | Unchanged | |
| ETCS Mode | Unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |

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| | | |
|------------------------------|-----------|--|
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5b.1.2.2.1.1

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition STM -> STM (area between announcement and transition) |
| | Check of handling of the STM max Speed within the ETCS On-board (STM Control Function) during a level transition STM to STM. |
| ETCS Requirements Tested | SUBSET-035 7.4.2.2.1, 7.4.2.2.1.1, 7.4.2.2.3, 7.4.2.2.5, 7.4.2.2.4.1 |
| | SUBSET-026 None |
| STM Requirements Tested | SUBSET-035 None |
| | SUBSET-026 None |
| Packets Transmitted via FFFIS STM | Packet STM-15, STM-16, STM 43 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) is able to receive without any further processing STM max Speed from an STM n in state HS during the approach of a level transition STM to STM. |

| Starting Conditions | Value | Comments |
|---------------------------------|--------------|---|
| STM State | HS | Another STM shall be in state DA. |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | not relevant | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | no STM max Speed and STM system Speed / Distance messages (Packet STM-16, STM-17) were transmitted by the STM n after the current state change to state HS. |
| DMI Connection | established | |
| Odometry Data | transmitted | |
| Reference Time Data | transmitted | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| TIU Connection | | not relevant | |
| BIU Connection | | not relevant | |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | not relevant | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU 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 | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

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ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|--|------|------------|--|
| 1 | STM "MA" information from the STM in DA (constant is transmitted | Prof | DMI Connection: Message-So1 | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 2 | No STM max Speed and STM system Speed / Distance is taken into account while calculating the MRSP | - | - | ETCS | DMI | |
| 3 | "STM Max Speed" (120 km/h) is received and not processed (supervised) by the ETCS On-board Time: T0 | Prof | STM Control Connection: Message-Sn1 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |
| 4 | Time: T0 + 10 seconds An update of "STM Max Speed" is received and not processed by the ETCS On-board | Prof | STM Control Connection: Message-Sn2 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|--------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |

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| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|----------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| | | | |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 24 | 120 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn2: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 12 | 60 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---|-----------|----------|
| STM State | Unchanged | |
| ETCS Mode | Unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |

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| | | |
|--------------------------|-----------|--|
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

Test case 5b.1.2.2.1.3.0

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition STM -> STM (area between announcement and transition) |
| | Check of handling of the STM max Speed within the ETCS On-board (STM Control Function) with one modification by a STM during a level transition STM to STM. The final state for the STM will be Failure |
| ETCS Requirements Tested | SUBSET-035 7.4.2.2.1, 7.4.2.2.1.1, 7.4.2.2.2, 7.4.2.2.3, 7.4.2.2.5, 7.4.2.2.4.1 |
| | SUBSET-026 None |
| STM Requirements Tested | SUBSET-035 None |
| | SUBSET-026 None |
| Packets Transmitted via FFFIS STM | Packet STM 14, STM-15, STM-16, STM 43 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) is able to receive without any further processing STM max Speed from an STM n in state HS during the approach of a level transition STM to STM. Due to a timeout the ETCS will order the STM to failure |

| Starting Conditions | Value | Comments |
|---------------------------------|--------------|---|
| STM State | HS | Another STM shall be in state DA. |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | not relevant | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | no STM max Speed and STM system Speed / Distance messages (Packet STM-16, STM-17) were transmitted by the STM n after the current state change to state HS. |
| DMI Connection | established | |
| Odometry Data | transmitted | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| Reference Time Data | | transmitted | |
| TIU Connection | | not relevant | |
| BIU Connection | | not relevant | |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | not relevant | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU 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 | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | Value | Comments |
|---------------------|--------------|----------|
| Track Adhesion | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|-------------------------------------|------|------------|---|
| 1 | STM "MA" information from the STM in DA (constant is transmitted | Prof | DMI Connection: Message-So1 | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 2 | No STM max Speed and STM system Speed / Distance is taken into account while calculating the MRSP | - | - | ETCS | DMI | |
| 3 | "STM Max Speed" (120 km/h) is received and not processed (supervised) by the ETCS On-board Time: T0 | Prof | STM Control Connection: Message-Sn1 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance ins unchanged |
| 4 | Time: T0 + 10 seconds An update of "STM Max Speed" is received and not processed by the ETCS On-board | Prof | STM Control Connection: Message-Sn2 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance ins unchanged |
| 5 | Time: T0+15 seconds No messages from STM received (idle_cycle_timeout) ETCS orders the new STM to failure state | | | ETCS | Prof | STM Control Connection: Message-E1 |
| | | | | ETCS | DMI | Failed STM information shall be displayed to the Driver. |
| | | | | ETCS | JRU | Failed STM information is recorded in the JRU. |
| 6 | Set STM max speed = 0 , to be taken into account at the level transition. | - | - | ETCS | BIU | The train will start braking at the transition border |

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |

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| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 24 | 120 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn2: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 12 | 60 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Message-E1: ETCS STM Control Function -> STM | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State report from STM n (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 8 | State Failure |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---------------------------------|-----------|----------|
| STM State | Unchanged | |
| ETCS Mode | Unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |

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| | | |
|---|-----------|--|
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5b.1.2.2.3.0

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition STM -> STM (area between announcement and transition) |
| | Check of handling of the STM max Speed and STM system Speed / Distance within the ETCS On-board (STM Control Function) with one modification by a STM and preliminary DMI information during a level transition STM to STM. |
| ETCS Requirements Tested | SUBSET-035 7.4.2.2.1, 7.2.2.1.1, 7.4.2.2.3, , 7.4.2.2.4.1, 7.4.2.2.5, 10.5.2.6 |
| | SUBSET-026 None |
| STM Requirements Tested | SUBSET-035 None |
| | SUBSET-026 None |
| Packets Transmitted via FFFIS STM | Packet STM-15, STM-16, STM 43 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) is able to receive without any further processing STM max Speed and preliminary DMI information from an STM n in state HS during the approach of a level transition STM to STM. |

| Starting Conditions | Value | Comments |
|---------------------------------|--------------|---|
| STM State | HS | Another STM shall be in state DA |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | not relevant | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | no STM max Speed and STM system Speed / Distance messages (Packet STM-16, STM-17) were transmitted by the STM n after the current state change to state HS. |
| DMI Connection | established | |
| Odometry Data | transmitted | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| Reference Time Data | | transmitted | |
| TIU Connection | | not relevant | |
| BIU Connection | | not relevant | |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | not relevant | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU 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 | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | Value | Comments |
|---------------------|--------------|----------|
| Track Adhesion | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|--|------|------------|--|
| 1 | STM "MA" information from the STM in DA (constant is transmitted | Prof | DMI Connection: Message-So1 | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 2 | No STM max Speed and STM system Speed / Distance is taken into account while calculating the MRSP | - | - | ETCS | DMI | |
| 3 | "STM Max Speed" (120 km/h) is received and not processed (supervised) by the ETCS On-board | Prof | STM Control Connection: Message-Sn1 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |
| 4 | STM "DMI" information from the STM in HS (constant is transmitted) | Prof | DMI Connection: Message-Sn2 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|--------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |

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| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|----------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 24 | 120 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn2: National ETCS DMI-Information from the newSTM in DA | | | |
|--|--------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |

| Message-Sn2: National ETCS DMI-Information from the newSTM in DA | | | |
|--|----------|----------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 140 | Permitted speed 140 km/h |
| V_TARGET | 7 | 28 | Target speed 140 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 29 | Intervention speed 145 km/h |
| D_TARGET | 15 | 3000 | Target distance 3 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| | | | |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---|-----------|----------|
| STM State | Unchanged | |
| ETCS Mode | Unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |

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| | | |
|---|-----------|--|
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5b.1.2.3.0

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition STM -> STM (area between announcement and transition) |
| | Check of handling of the STM max Speed within the ETCS On-board (STM Control Function) during a level transition STM to STM and the acceptance of preliminary DMI Information. |
| ETCS Requirements Tested | SUBSET-035 7.4.2.2.1, 7.4.2.2.3, 7.2.2.5, 7.10.5.2.6 |
| | SUBSET-026 None |
| STM Requirements Tested | SUBSET-035 None |
| | SUBSET-026 None |
| Packets Transmitted via FFFIS STM | Packet STM-15, STM-16, STM 43 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) is able to receive without any further processing STM max Speed and preliminary DMI information from an STM n in state HS during the approach of a level transition STM to STM. |

| Starting Conditions | Value | Comments |
|---------------------------------|--------------|---|
| STM State | HS | Another STM shall be in state DA |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | not relevant | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | no STM max Speed and STM system Speed / Distance messages (Packet STM-16, STM-17) were transmitted by the STM n after the current state change to state HS. |
| DMI Connection | established | |
| Odometry Data | transmitted | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| Reference Time Data | | transmitted | |
| TIU Connection | | not relevant | |
| BIU Connection | | not relevant | |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | not relevant | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU 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 | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | Value | Comments |
|---------------------|--------------|----------|
| Track Adhesion | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|-------------------------------------|------|------------|--|
| 1 | STM "MA" information from the STM in DA (constant is transmitted | Prof | DMI Connection: Message-So1 | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 2 | No STM max Speed and STM system Speed / Distance is taken into account while calculating the MRSP | - | - | ETCS | DMI | |
| 3 | "STM Max Speed" (120 km/h) is received and not processed (supervised) by the ETCS On-board | Prof | STM Control Connection: Message-Sn1 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |
| 4 | STM "DMI" information from the STM in HS(constant is transmitted | Prof | DMI Connection: Message-Sn2 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance is unchanged |

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|--------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |

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| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|----------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 24 | 120 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn3: National ETCS DMI-Information from the new STM in DA | | | |
|---|--------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |

Message-Sn3: National ETCS DMI-Information from the new STM in DA

| VARIABLE | Length | VALUE | COMMENTS |
|-------------------|----------|----------|---|
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 140 | Permitted speed 140 km/h |
| V_TARGET | 7 | 28 | Target speed 140 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 29 | Intervention speed 145 km/h |
| D_TARGET | 15 | 3000 | Target distance 3 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| | | | |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---|-----------|----------|
| STM State | Unchanged | |
| ETCS Mode | Unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |

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| | | |
|---|-----------|--|
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5b.1.2.4.0

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition STM -> STM (area between announcement and transition) |
| | Check of handling of the STM max Speed within the ETCS On-board (STM Control Function) during a level transition STM to STM. The STM is finally kept as failed. |
| ETCS Requirements Tested | SUBSET-035 7.4.2.2.1, 7.2.2.2, 7.4.2.2.3, 7.4.2.2.5 |
| | SUBSET-026 None |
| STM Requirements Tested | SUBSET-035 None |
| | SUBSET-026 None |
| Packets Transmitted via FFFIS STM | Packet STM-14, STM-15, STM-16, STM 43 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) is able to receive without any further processing STM max Speed from an STM n in state HS during the approach of a level transition STM to STM. After detecting the failure situation the train will start braking at the transition border |

| Starting Conditions | Value | Comments |
|---------------------------------|--------------|---|
| STM State | HS | Another STM shall be in state DA |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | not relevant | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | no STM max Speed and STM system Speed / Distance messages (Packet STM-16, STM-17) were transmitted by the STM n after the current state change to state HS. |
| DMI Connection | established | |
| Odometry Data | transmitted | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| Reference Time Data | | transmitted | |
| TIU Connection | | not relevant | |
| BIU Connection | | not relevant | |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | not relevant | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU 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 | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | Value | Comments |
|---------------------|--------------|----------|
| Track Adhesion | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|---|-------|------------|---|
| 1 | STM "MA" information from the STM in DA (constant is transmitted | Prof | DMI Connection: Message-So1 | ETCS | DMI | The indication of the permitted speed and the target speed is "160 km/h" |
| 2 | No STM max Speed and STM system Speed / Distance is taken into account while calculating the MRSP | - | - | ETCS | DMI | |
| 3 | "STM Max Speed" (120 km/h) is received and not processed (supervised) by the ETCS On-board Time: T0 | Prof | STM Control Connection: Message-Sn1 | ETCS | DMI | The indication of the permitted speed, the target speed and the target distance ins unchanged |
| 4 | STM report failed status | | STM Control Connection: Report state FA (Packet STM_15) | -ETCS | DMI | Failed STM information is displayed to the driver |
| | | | | ETCS | JRU | Failed STM information is recorded to the JRU. |
| 5 | Set STM max speed = 0 , to be taken into account | - | - | ETCS | DMI | The train will start braking at the transition border |

| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state DA (according to the starting conditions) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 8 | state DA |
| NID_PACKET | 8 | 43 | Packet identifier Value = 43 |
| L_PAKET | 13 | COMPUTED | Packet length |
| Q_SCALE | 2 | 1 | 1 m scale |

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| Message-So1: National ETCS DMI-Information from the old STM in DA | | | |
|---|----------|-------------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | No warning to be displayed |
| Q_INDICATIONLIMIT | 1 | 0 | No indication status to be displayed |
| V_PERMIT | 10 | 160 | Permitted speed 160 km/h |
| V_TARGET | 7 | 32 | Target speed 160 km/h |
| V_RELEASE | 7 | 127 | Unknown value/Not displayed |
| V_INTERV | 7 | 33 | Intervention speed 165 km/h |
| D_TARGET | 15 | 5000 | Target distance 5 km |
| N_ITER | 5 | 0 | No STM-customised supervision information |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Sn1: STM → ETCS STM Control Function | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM n (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM n (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 24 | 120 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Message-E1: ETCS STM Control Function -> STM | | | |
|--|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | NID_STM of the STM in state HS (according to the init condition) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State report from STM n (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 8 | State Failure |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---|-----------|----------|
| STM State | FA | |
| ETCS Mode | unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |

| | | |
|----------------------------|-----------|--|
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

Test case 5c.1.0.1.2.(5C1.0.0.3.0.0).0.2.2.1.0

| TEST CASE HEADER | |
|-----------------------------------|--|
| Test case Identification | Level Transition STM -> STM (Level Transition Border) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition border (announced by balise group), when the ETCS On-board is in the ETCS technical mode SN (STM national) : ETCS On-board orders the old STM to state CS. When the ETCS On-board receives the CS state from the old STM, it orders the new STM to state DA and not supervises the "STM Max Speed". The STM follows the state transition order to state DA in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.1.3, 7.4.1.1.4, 7.4.1.2.2 (HS to DA), 7.4.1.2.3 (C9), 7.4.2.3.1, 7.4.2.3.2, 10.5.3.5 7.4.1.2.4.2, 7.4.1.2.3-A4b, 7.4.1.2.2-A4b, 7.3.3.1, 7.4.1.3.4 |
| | SUBSET-026 5.10.1.4; 4.8.1.8 |
| STM Requirements Tested | SUBSET-035 7.3.2.1 (HS to DA), 7.3.2.2 (9), 7.3.4.4, 10.5.3.5 7.3.2.1.0-4b, 7.3.2.2.1-4b, 7.3.4.4 |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-15, STM-16, STM-14, STM-5, STM-32, STM-35, STM-38, STM-43 |
| Comments and constraints | <p>The objective of this test is to check</p> <ul style="list-style-type: none"> that the ETCS On-board (STM Control Function) orders the old STM to the state CS when a level transition border to the new STM is passed and When the ETCS receives the state CS from the old STM, The ETCS order the state DA to the new STM. No supervision of "STM Max Speed" after the transition border until the state DA is reported by the STM as it is a STM to STM transition, and that the STM follows a state transition order to the state DA. |

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| Starting Conditions | Value | Comments |
|---|---------------|---|
| STM State | HS | The old STM is in state DA |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | Moving | train speed shall be 100 km/h |
| Train Data | Valid | |
| Additional Data | Valid | |
| National Values | Valid | |
| STM Control Function Connection | Established | |
| DMI Connection | Established | may be not established for STM Test Case (STM implementation) |
| Odometry Data | Transmitted | |
| Reference Time Data | Transmitted | |
| TIU Connection | Established | may be not established for STM Test Case (STM implementation) |
| BIU Connection | Established | may be not established for STM Test Case (STM implementation) |
| JRU Connection | not relevant | |
| Other connections | not relevant | |
| TIU Regenerative Brake Command | not relevant | |
| TIU Magnetic Shoes Command | not relevant | |
| TIU Eddy Current Brake Command | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | 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 Sleeping Status | not Sleeping | |
| TIU Traction Cut Off Status | Inactive | |
| TIU Direction Controller Position Status | Forward | |
| TIU Cab Status (Desk Status) | desk A opened | |
| BIU Status | not relevant | |
| BIU Emergency Brake Command | not relevant | |
| BIU Service Brake Command | not relevant | |
| BIU Emergency Brake Status | Release | |
| BIU Service Brake Status | Release | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|--|------|------------|---|
| - | Initial Condition: "STM Max Speed" (60 km/h) is transmitted to the ETCS On-board Note: This message shall be sent directly before the level transition border (see Step 1). | Prof | STM Control Connection: Message-S1 (STM-15 - state report from STM, STM-16 - transition variables STM max speed from STM) | - | - | - |
| 1 | Level Transition border for an STM -> STM transition: order announced STM to DA state Time: T0 | BTM | Telegram-B4 (41 - Level Transition Order) Telegram-B2 | ETCS | Prof | STM Control Connection: Message-Old-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 2 | | | STM Control Connection: Message-Old-S2 (STM-15 - state report from STM) | ETCS | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| | | - | - | ETCS | DMI | transition acknowledgement request displayed |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|--|------|------------|---|
| | Emergency brake has to be applied due to the "STM Max Speed" of 60 km/h and the actual speed of 100 km/h as it is just after transition border. | - | - | ETCS | BIU | emergency brake applied |
| | | - | - | ETCS | DMI | indication of an emergency brake application |
| 3 | Time: T0 + 1 second Driver acknowledges the transition | DMI | Driver acknowledges Transition | ETCS | DMI | transition acknowledgement request removed- |
| 4 | Time: T0 + 3 seconds STM reports state DA in due time to all connected ETCS Functions | Prof | STM Control Connection: Message-S2 (STM-15 - state report from STM) | ETCS | - | - |
| | | Prof | BIU Connection: Message-S2 (STM-15 - state report from STM) | - | - | - |
| | | Prof | TIU Connection: Message-S2 (STM-15 - state report from STM) | - | - | - |
| | | Prof | DMI Connection: Message-S2 (STM-15 - state report from STM) | - | - | - |
| 5 | Time: T0 + 4 seconds STM sends the information to be displayed at the DMI | Prof | DMI Connection: Message-S3 (STM-15 - state report from STM, STM-32 - button request, STM-35 - indicator request) DMI Connection: Message-S4 (STM-15 - state report from STM, STM-38 – text message, STM-38 – text message) DMI Connection: Message-S5 (STM-15 - state report from STM, STM-43 - national ETCS DMI, STM-46 – sound command) | ETCS | DMI | transmitted information is displayed at the DMI |

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STM Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|-----|------------|---|
| 1 | STM is ordered to state DA and follows state transition order in due time | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) | | | |
| 2a1 | | | | STM | Prof | STM Control Connection: Message-S2 (STM-15 - state report from STM) |
| 2b1 | | - | - | STM | Prof | BIU Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 2c1 | | - | - | STM | Prof | TIU Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 2d1 | | - | - | STM | Prof | JRU Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 2e1 | | - | - | STM | Prof | DRU Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 2f1 | | - | - | STM | Prof | DMI Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 2b2 | The STM takes the train supervision according to the national system behaviour | - | - | STM | Prof | BIU Connection: The STM may send a message with packet STM-128 – STM emergency and service brake command to brake interface (including packet STM-15 – state report from STM) |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|----------------------|-----------|--------------|-----|------------|---|
| 2c2 | | - | - | STM | Prof | TIU Connection: The STM may send a message or messages with packet STM-129 – STM specific brake control command, STM-130 – STM commands to train interface (including packet STM-15 – state report from STM) |
| 2f2 | | - | - | STM | Prof | DMI Connection: The STM may send a message or messages with packet STM-32 - button request, STM-35 - indicator request, STM-38 – text message, STM-43 - national ETCS DMI, STM-46 – sound command (including packet STM-15 – state report from STM) |

| Message-S1: STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 16 | Transition variables STM max speed from STM (STM-16) |
| L_PACKET | 13 | COMPUTED | packet length |
| V_STMMAX | 7 | 12 | 60 km/h |
| Padding bits | COMPUTED | COMPUTED | |

| Telegram-B4: Balise-Information (Level Transition Order) | | | |
|--|--------|--------------|-------------|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |

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| Telegram-B4: Balise-Information (Level Transition Order) | | | |
|--|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | Linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | Nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 32767 | now (the level transition is performed upon receipt of the order) |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-Old-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | valid value for NID_STM of the old STM in DA state |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 5 | Conditional CS |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM in DA state) |
| M_MODE | 4 | 13 | SN (STM National) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Old-S2 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM) |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 7 | state DA |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| M_MODE | 4 | 13 | SN (STM National) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S2 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 7 | state DA |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S3: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 6 | state HS |
| NID_PACKET | 8 | 32 | Button Request (STM-32) |
| L_PACKET | 13 | COMPUTED | packet length |
| N_ITER | 5 | 2 | request for 2 buttons |
| NID_STM(1) | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_BUTTON(1) | 8 | 1 | |
| NID_BUTPOS(1) | 4 | 1 | |
| NID_ICON(1) | 8 | 1 | |
| M_BUT_ATTRIB(1) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(1) | 5 | 9 | |
| X_CAPTION(1,1) | 8 | 'A' | |
| X_CAPTION(1,2) | 8 | 'T' | |
| X_CAPTION(1,3) | 8 | 'T' | |
| X_CAPTION(1,4) | 8 | 'E' | |
| X_CAPTION(1,5) | 8 | 'N' | |
| X_CAPTION(1,6) | 8 | 'T' | |
| X_CAPTION(1,7) | 8 | 'I' | |
| X_CAPTION(1,8) | 8 | 'O' | |
| X_CAPTION(1,9) | 8 | 'N' | |
| NID_STM(2) | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_BUTTON(2) | 8 | 2 | |
| NID_BUTPOS(2) | 4 | 3 | |
| NID_ICON(2) | 8 | 1 | |
| M_BUT_ATTRIB(2) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(2) | 5 | 4 | |
| X_CAPTION(2,1) | 8 | 'H' | |
| X_CAPTION(2,2) | 8 | 'E' | |
| X_CAPTION(2,3) | 8 | 'L' | |

| Message-S3: STM → ETCS DMI Function | | | |
|-------------------------------------|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| X_CAPTION(2,4) | 8 | 'P' | |
| NID_PACKET | 8 | 35 | Indicator Request (STM-35) |
| L_PACKET | 13 | COMPUTED | packet length |
| N_ITER | 5 | 3 | request for 3 indicators |
| NID_STM(1) | 8 | COMPUTED | any valid value for NID_STM |
| NID_INDICATOR(1) | 8 | 1 | |
| NID_INDPOS(1) | 4 | 1 | |
| NID_ICON(1) | 8 | 3 | |
| M_IND_ATTRIB(1) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(1) | 5 | 1 | |
| X_CAPTION(1,1) | 8 | 'A' | |
| NID_STM(2) | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_INDICATOR(2) | 8 | 2 | |
| NID_INDPOS(2) | 4 | 2 | |
| NID_ICON(2) | 8 | 3 | |
| M_IND_ATTRIB(2) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(2) | 5 | 1 | |
| X_CAPTION(2,1) | 8 | 'B' | |
| NID_STM(3) | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_INDICATOR(3) | 8 | 3 | |
| NID_INDPOS(3) | 4 | 3 | |
| NID_ICON(3) | 8 | 1 | |
| M_IND_ATTRIB(3) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(3) | 5 | 1 | |
| X_CAPTION(3,1) | 8 | 'C' | |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S4: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|--------------|--------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |

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| Message-S4: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|-------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STMSTATE | 4 | 7 | state DA |
| NID_PACKET | 8 | 38 | Text Message (STM-38) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_XMESSAGE | 8 | 1 | |
| M_XATTRIBUTE | 10 | 1000000001B | white text on black background, not flashing |
| Q_ACK | 1 | 0 | no acknowledgement required |
| L_TEXT | 8 | 39 | |
| X_TEXT(1) | 8 | 'P' | |
| X_TEXT(2) | 8 | 'a' | |
| X_TEXT(3) | 8 | 'c' | |
| X_TEXT(4) | 8 | 'k' | |
| X_TEXT(5) | 8 | ' ' | |
| X_TEXT(6) | 8 | 'm' | |
| X_TEXT(7) | 8 | 'y' | |
| X_TEXT(8) | 8 | ' ' | |
| X_TEXT(9) | 8 | 'b' | |
| X_TEXT(10) | 8 | 'o' | |
| X_TEXT(11) | 8 | 'x' | |
| X_TEXT(12) | 8 | ' ' | |
| X_TEXT(13) | 8 | 'w' | |
| X_TEXT(14) | 8 | 'i' | |
| X_TEXT(15) | 8 | 't' | |
| X_TEXT(16) | 8 | 'h' | |
| X_TEXT(17) | 8 | ' ' | |
| X_TEXT(18) | 8 | 'f' | |
| X_TEXT(19) | 8 | 'i' | |
| X_TEXT(20) | 8 | 'v' | |
| X_TEXT(21) | 8 | 'e' | |
| X_TEXT(22) | 8 | ' ' | |
| X_TEXT(23) | 8 | 'd' | |
| X_TEXT(24) | 8 | 'o' | |
| X_TEXT(25) | 8 | 'z' | |
| X_TEXT(26) | 8 | 'e' | |

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| Message-S4: STM → ETCS DMI Function | | | |
|-------------------------------------|----------|-------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| X_TEXT(27) | 8 | 'n' | |
| X_TEXT(28) | 8 | ' ' | |
| X_TEXT(29) | 8 | 'l' | |
| X_TEXT(30) | 8 | 'i' | |
| X_TEXT(31) | 8 | 'q' | |
| X_TEXT(32) | 8 | 'u' | |
| X_TEXT(33) | 8 | 'o' | |
| X_TEXT(34) | 8 | 'r' | |
| X_TEXT(35) | 8 | ' ' | |
| X_TEXT(36) | 8 | 'j' | |
| X_TEXT(37) | 8 | 'u' | |
| X_TEXT(38) | 8 | 'g' | |
| X_TEXT(39) | 8 | 's' | |
| NID_PACKET | 8 | 38 | Text Message (STM-38) |
| L_PACKET | 13 | RESERVED | packet length |
| NID_XMESSAGE | 8 | 2 | |
| M_XATTRIBUTE | 10 | 1000000001B | white text on black background, not flashing |
| Q_ACK | 1 | 1 | acknowledgement required |
| L_TEXT | 8 | 5 | |
| X_TEXT(1) | 8 | 'T' | |
| X_TEXT(2) | 8 | 'R' | |
| X_TEXT(3) | 8 | 'U' | |
| X_TEXT(4) | 8 | 'E' | |
| X_TEXT(5) | 8 | '?' | |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S5: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|--------------|--------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 7 | state DA |

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| Message-S5: STM → ETCS DMI Function | | | |
|-------------------------------------|----------|-------------------|---------------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_PACKET | 8 | 43 | National ETCS DMI (STM-43) |
| L_PACKET | 13 | COMPUTED | packet length |
| Q_SCALE | 2 | 1 | |
| Q_INDICATE | 12 | 000000000000 B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | |
| Q_INDICATIONLIMIT | 1 | 0 | |
| V_PERMIT | 10 | 100 | |
| V_TARGET | 7 | 0 | |
| V_RELEASE | 7 | 40 | |
| V_INTERV | 7 | 110 | |
| D_TARGET | 15 | 100 | |
| N_ITER | 5 | 0 | no customized supervision information |
| NID_PACKET | 8 | 46 | Sound Command (STM-46) |
| L_PACKET | 13 | COMPUTED | packet length |
| N_ITER | 5 | 1 | request for 1 sound |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_SOUND | 8 | 1 | |
| Q_SOUND | 2 | 1 | |
| N_ITER | 5 | 1 | one frequency |
| M_FREQ | 8 | 4000 | |
| T_SOUND | 8 | 1 | |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|-----------------|-----------|----------------------|
| STM State | DA | Old STM in CS state. |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |

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| | | |
|---|-----------|--|
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5c.1.0.2.(5c1.0.0.3.0.0).0.2.2.2

| TEST CASE HEADER | |
|--|---|
| Test case Identification | Level Transition STM -> STM (Level Transition Border) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition border (announced by balise group), when the ETCS On-board is in the ETCS technical mode SL (Sleeping) and the new STM follows the state transition order to state DA in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.1.3, 7.4.1.1.4, 7.4.1.2.2 (HS to DA), 7.4.1.2.3 (C9), 7.4.2.3.2, 10.5.3.5 7.4.1.2.4.2, 7.4.1.2.3-A4b, 7.4.1.2.2-A4b, 7.3.3.1, 7.4.1.3.4 |
| | SUBSET-026 5.10.1.4, 4.8.1.3 |
| STM Requirements Tested | SUBSET-035 7.3.2.1 (HS to DA), 7.3.2.2 (9), 7.3.4.4, 10.5.3.5 7.3.2.1.0-4b, 7.3.2.2.1-4b, 7.3.4.4 |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-5, STM-14, STM-15 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) orders the STM to the state DA when a level transition border to this STM is passed while the ETCS technical mode is SL and switches to the ETCS level STM. |
| | The objective of this test is also to check that the STM follows a state transition order to the state DA. |

| Starting Conditions | Value | Comments |
|---------------------|--------|---------------------|
| STM State | HS | Old STM in state DA |
| ETCS Mode | SL | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |

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| Starting Conditions | | Value | Comments |
|---|------------|-----------------|---|
| National Values | | valid | |
| STM Control Function Connection | | established | |
| DMI Connection | | not established | |
| Odometry Data | | transmitted | |
| Reference Time Data | | transmitted | |
| TIU Connection | | established | may be not established for STM Test Case (STM implementation) |
| BIU Connection | | established | may be not established for STM Test Case (STM implementation) |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | Sleeping | |
| TIU Traction Cut Off Status | | Inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU Status | | not relevant | |
| BIU Emergency Brake Command | | not relevant | |
| BIU Service Brake Command | | not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|---|-----------|---|------|------------|---|
| 1 | Level Transition border for an STM -> STM transition: order announced STM to DA state | BTM | Telegram-B1 (41 - Level Transition Order) Telegram-B2 | ETCS | Prof | STM Control Connection: Message-Old-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| | Time: T0 | | STM Control Connection: Message-Old-S1 (STM-15 - state report from STM) | ETCS | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 2 | Time: T0 + 1 second STM reports state DA in due time to all connected ETCS Functions | Prof | STM Control Connection: Message-S1 (STM-15 - state report from STM) | - | - | - |
| | | Prof | BIU Connection: Message-S1 (STM-15 - state report from STM) | - | - | - |
| | | Prof | TIU Connection: Message-S1 (STM-15 - state report from STM) | - | - | - |

STM Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|----------------------------|-----------|---|-----|------------|---------------|
| 1 | STM is ordered to state DA | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) | - | - | - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|--------------|-----|------------|--|
| 2a1 | STM reports state DA to all connected ETCS Functions | - | - | STM | Prof | STM Control Connection: Message-S1 (STM-15 - state report from STM) |
| 2b1 | | - | - | STM | Prof | BIU Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2c1 | | - | - | STM | Prof | TIU Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2d1 | | - | - | STM | Prof | JRU Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2e1 | | - | - | STM | Prof | DRU Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2b2 | The STM takes the train supervision according to the national system behaviour | - | - | STM | Prof | BIU Connection: The STM may send a message or messages with packet STM-129 – STM specific brake control command, (including packet STM-15 – state report from STM) |
| 2c2 | | | | STM | Prof | TIU Connection: The STM may send a message or messages with STM-130 – STM commands to train interface (including packet STM-15 – state report from STM) |

| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |

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| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 32767 | now (the level transition is performed upon receipt of the order) |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Telegram-B2: Balise-Information | | | |
|---------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-Old-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here : NID_STM of the old STM in DA state) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 5 | Conditional CS |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in DA state) |
| M_MODE | 4 | 5 | SL (Sleeping) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Old-S1 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|--------|--------------|-----------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 7 | state DA |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |

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| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| M_MODE | 4 | 5 | SL (Sleeping) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S1 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 7 | state DA |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---------------------------------|-----------|---------------------|
| STM State | DA | Old STM in CS state |
| ETCS Mode | unchanged | |
| ETCS Level | unchanged | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |

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| | | |
|---|-----------|--|
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5C.1.0.1.1.0.(5c1.0.0.3.0.0).0.1.1.2.1.0

| TEST CASE HEADER | |
|-----------------------------------|--|
| Test case Identification | Level Transition ETCS -> STM (Level Transition Border) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition border (transmitted by balise group) with no announcement of the transition, when the ETCS On-board is in the ETCS technical mode SN (STM national)) and the STM follows the state transition order to state DA in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.1.3, 7.4.1.1.4, 7.4.2.3.1, 7.4.2.2.3, 7.4.1.2.2-C9, 7.4.1.2.3-C9, 7.4.2.3.2 7.4.1.2.4.2, 7.4.1.2.3-A4b, 7.4.1.2.2-A4b, 7.3.3.1, 7.4.1.2.2-E16, 7.4.1.2.3-E16 |
| | SUBSET-026 5.10.1.4, 4.8.1.3 |
| STM Requirements Tested | SUBSET-035 7.3.2.1.0-9, 7.3.2.2.1-9, 7.6.1.5, 7.3.4.4, 10.5.3.5 7.3.2.1.0-4b, 7.3.2.2.1-4b |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-14, STM-5, STM-15, STM-136, STM-139, STM-30, STM-32, STM-35, STM-38, STM-43, STM-46 |
| Comments and constraints | <p>The objective of this test is to check</p> <ul style="list-style-type: none"> that the ETCS On-board (STM Control Function) orders the STM to the state DA when, without receiving an announcement, and that the STM follows a state transition order to the state DA. <p>The selected language shall be “English”.</p> |

| Starting Conditions | Value | Comments |
|---------------------|--------|---------------------|
| STM State | CS | old STM in state DA |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |

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| Starting Conditions | | Value | Comments |
|---|------------|-----------------|---|
| Additional Data | | valid | |
| National Values | | valid | |
| STM Control Function Connection | | established | |
| DMI Connection | | established | |
| Odometry Data | | transmitted | |
| Reference Time Data | | transmitted | |
| TIU Connection | | not established | may be established for STM Test Case (STM implementation) |
| BIU Connection | | not established | may be established for STM Test Case (STM implementation) |
| JRU Connection | | not established | may be established for STM Test Case (STM implementation) |
| Other connections | | not established | may be established for STM Test Case (STM implementation) |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | not relevant | |
| TIU Pantograph Command | | not relevant | |
| TIU Air Tightness Command | | not relevant | |
| TIU Main Switch / Circuit Breaker Command | | not relevant | |
| TIU Traction Cut Off Command | | not cut | |
| TIU Sleeping Status | | not Sleeping | |
| TIU Traction Cut Off Status | | Inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU Status | | not relevant | |
| BIU Emergency Brake Command | | not relevant | |
| BIU Service Brake Command | | not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|--|
| 1 | Level Transition border for an ETCS -> STM transition | BTM | Telegram-B1 (41 - Level Transition Order) Telegram-B2 | ETCS | Prof | STM Control Connection: Message-Old-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 2 | Time: T0 | | STM Control Connection: Message-Old-S1 (STM-15 - state report from STM) | ETCS | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 3 | Time: T0 + 2 seconds Connection to the ETCS On-board BIU Function is established by the STM (SLL/STL/Application Layer) | Prof | establish BIU Connection | - | - | - |
| | The current state (CS) is reported to the BIU Function | Prof | BIU Connection: Message-S1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current status / availability of BIU signals | - | - | ETCS | Prof | BIU Connection: Message-EB1 (STM-136 - brake interface emergency and service brake status / availability to STM) |
| | Connection to the ETCS On-board TIU Function is established by the STM (SLL/STL/Application Layer) | Prof | establish TIU Connection | - | - | - |
| | The current state (CS) is reported to the TIU Function | Prof | TIU Connection: Message-S1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current status / availability of TIU signals | - | - | ETCS | Prof | TIU Connection: Message-ET1 (STM-139 - train interface inputs status / availability to STM) |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|--|------|------------|---|
| | Connection to the ETCS On-board DMI Function (cab A) is established by the STM (SLL/STL/Application Layer) | Prof | establish DMI Connection (cab A) | - | - | - |
| | The current state (CS) is reported to the DMI Function | Prof | DMI Connection: Message-S1 (STM-15 - state report from STM) | - | - | - |
| | Transmit current select language | - | - | ETCS | Prof | DMI Connection: Message-ED1 (STM-30 - driver language transmission) |
| 4 | Time: T0 + 3 seconds STM reports state DA in due time to all connected ETCS Functions | Prof | STM Control Connection: Message-S2 (STM-15 - state report from STM) | - | - | - |
| | | Prof | BIU Connection: Message-S2 (STM-15 - state report from STM) | - | - | - |
| | | Prof | TIU Connection: Message-S2 (STM-15 - state report from STM) | - | - | - |
| | | Prof | DMI Connection: Message-S2 (STM-15 - state report from STM) | - | - | - |
| 6 | Time: T0 + 4 seconds STM sends the information to be displayed at the DMI | Prof | DMI Connection: Message-S3 (STM-15 - state report from STM, STM-32 - button request, STM-35 - indicator request) DMI Connection: Message-S4 (STM-15 - state report from STM, STM-38 – text message, STM-38 – text message) DMI Connection: Message-S5 (STM-15 - state report from STM, STM-43 - national ETCS DMI, STM-46 – sound command) | ETCS | DMI | transmitted information is displayed at the DMI |

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STM Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|--|-----|------------|--|
| 1 | STM is ordered to state DA | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) | - | - | - |
| 2a1 | Connection to the ETCS On-board BIU Function is established by the STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish BIU Connection - optional - |
| 2a2 | The current state (CS) is reported to the BIU Function | - | - | STM | Prof | BIU Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2b1 | Connection to the ETCS On-board TIU Function is established by the STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish TIU Connection - optional - |
| 2b2 | The current state (CS) is reported to the TIU Function | - | - | STM | Prof | TIU Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2c1 | Connection to the ETCS On-board JRU Function is established by the STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish JRU Connection - optional - |
| 2c2 | The current state (CS) is reported to the JRU Function | - | - | STM | Prof | JRU Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2d1 | Connection to the ETCS On-board DRU Function is established by the STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish DRU Connection - optional - |
| 2d2 | The current state (CS) is reported to the DRU Function | - | - | STM | Prof | DRU Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2e1 | Connection to the ETCS On-board DMI Function is established by the STM (SLL/STL/Application Layer) | - | - | STM | Prof | establish DMI (cab A) Connection - optional - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|-----|------------|--|
| 2e2 | The current state (CS) is reported to the DMI Function | - | - | STM | Prof | DMI Connection: Message-S1 (STM-15 - state report from STM) - if opened - |
| 2a3 | Transmission of the status / availability information to the STM | Prof | BIU Connection – if opened -: - Message-EB1 (STM-136 - brake interface emergency and service brake status / availability to STM) | - | - | - |
| 2b3 | | Prof | TIU Connection – if opened -: - Message-ET1 (STM-139 - train interface inputs status / availability to STM) | - | - | - |
| 2e3 | | Prof | DMI Connection – if opened -: - Message-ED1 (STM-30 - driver language transmission) | - | - | - |
| 3 | STM reports state DA to all connected ETCS Functions | - | - | STM | Prof | STM Control Connection: Message-S2 (STM-15 - state report from STM) |
| 3a1 | | - | - | STM | Prof | BIU Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 3b1 | | - | - | STM | Prof | TIU Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 3c1 | | - | - | STM | Prof | JRU Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 3d1 | | - | - | STM | Prof | DRU Connection: Message-S2 (STM-15 - state report from STM) - if opened - |
| 3e1 | | - | - | STM | Prof | DMI Connection: Message-S2 (STM-15 - state report from STM) - if opened - |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|--------------|-----|------------|--|
| 3b2 | The STM takes the train supervision according to the national system behaviour | - | - | STM | Prof | TIU Connection: The STM may send a message or messages with packet STM-129 – STM specific brake control command, STM-130 – STM commands to train interface (including packet STM-15 – state report from STM) |
| 3e2 | | - | - | STM | Prof | DMI Connection: The STM may send a message or messages with packet STM-32 - button request, STM-35 - indicator request, STM-38 – text message, STM-43 - national ETCS DMI, STM-46 – sound command (including packet STM-15 – state report from STM) DMI Connection: Message-S2 (STM-15 - state report from STM, STM-32 - button request, STM-35 - indicator request) - optional - DMI Connection: Message-S3 (STM-15 - state report from STM, STM-38 – text message, STM-38 – text message) - optional - DMI Connection: Message-S4 (STM-15 - state report from STM, STM-43 - national ETCS DMI, STM-46 – sound command) - optional - |

| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |

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| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 32767 | now (the level transition is performed upon receipt of the order) |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Telegram-B2: Balise-Information | | | |
|---------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-Old-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here : NID_STM of the old STM in DA state) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 5 | Conditional CS |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in DA state) |
| M_MODE | 4 | 13 | SN (STM national) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Old-S1 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|--------|--------------|-----------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 7 | state DA |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| M_MODE | 4 | 13 | SN (STM National) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S1 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EB1 (brake interface emergency and service brake status / availability to STM): ETCS BIU Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 136 | Brake Interface emergency and service brake status / availability to STM (STM-136) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_BIEB_STATUS | 2 | 2 | emergency brake released |
| M_BISB_STATUS | 2 | 2 | service brake released |
| Padding bits | COMPUTED | COMPUTED | |

| Message-ET1 (train interface inputs status / availability to STM): ETCS TIU Function → STM | | | |
|--|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 139 | Train Interface inputs status / availability to STM (STM-139) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_TITR_C_STATUS | 2 | 2 | no traction cut off |
| M_TIDIR_STATUS | 2 | 1 | forward |
| M_TICAB_STATUS | 2 | 1 | cab A opened |

| Message-ET1 (train interface inputs status / availability to STM): ETCS TIU Function → STM | | | |
|--|----------|----------|----------|
| VARIABLE | Length | VALUE | COMMENTS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-ED1 (driver language transmission): ETCS DMI Function → STM | | | |
|---|----------|--------------|---------------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 30 | Driver language transmission (STM-30) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_DRV_LANG | 2 | en | English |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S2 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 7 | state DA |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S3: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|--------------|--------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 7 | state DA |
| NID_PACKET | 8 | 32 | Button Request (STM-32) |
| L_PACKET | 13 | COMPUTED | packet length |
| N_ITER | 5 | 2 | request for 2 buttons |
| NID_STM(1) | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_BUTTON(1) | 8 | 1 | |
| NID_BUTPOS(1) | 4 | 1 | |

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| Message-S3: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_ICON(1) | 8 | 1 | |
| M_BUT_ATTRIB(1) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(1) | 5 | 9 | |
| X_CAPTION(1,1) | 8 | 'A' | |
| X_CAPTION(1,2) | 8 | 'T' | |
| X_CAPTION(1,3) | 8 | 'T' | |
| X_CAPTION(1,4) | 8 | 'E' | |
| X_CAPTION(1,5) | 8 | 'N' | |
| X_CAPTION(1,6) | 8 | 'T' | |
| X_CAPTION(1,7) | 8 | 'I' | |
| X_CAPTION(1,8) | 8 | 'O' | |
| X_CAPTION(1,9) | 8 | 'N' | |
| NID_STM(2) | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_BUTTON(2) | 8 | 2 | |
| NID_BUTPOS(2) | 4 | 3 | |
| NID_ICON(2) | 8 | 1 | |
| M_BUT_ATTRIB(2) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(2) | 5 | 4 | |
| X_CAPTION(2,1) | 8 | 'H' | |
| X_CAPTION(2,2) | 8 | 'E' | |
| X_CAPTION(2,3) | 8 | 'L' | |
| X_CAPTION(2,4) | 8 | 'P' | |
| NID_PACKET | 8 | 35 | Indicator Request (STM-35) |
| L_PACKET | 13 | COMPUTED | packet length |
| N_ITER | 5 | 3 | request for 3 indicators |
| NID_STM(1) | 8 | COMPUTED | any valid value for NID_STM |
| NID_INDICATOR(1) | 8 | 1 | |
| NID_INDPOS(1) | 4 | 1 | |
| NID_ICON(1) | 8 | 3 | |
| M_IND_ATTRIB(1) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(1) | 5 | 1 | |
| X_CAPTION(1,1) | 8 | 'A' | |
| NID_STM(2) | 8 | FINITE VALUE | any valid value for NID_STM |

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| Message-S3: STM → ETCS DMI Function | | | |
|-------------------------------------|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_INDICATOR(2) | 8 | 2 | |
| NID_INDPOS(2) | 4 | 2 | |
| NID_ICON(2) | 8 | 3 | |
| M_IND_ATTRIB(2) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(2) | 5 | 1 | |
| X_CAPTION(2,1) | 8 | 'B' | |
| NID_STM(3) | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_INDICATOR(3) | 8 | 3 | |
| NID_INDPOS(3) | 4 | 3 | |
| NID_ICON(3) | 8 | 1 | |
| M_IND_ATTRIB(3) | 10 | 1000000001B | white text on black background, not flashing |
| L_CAPTION(3) | 5 | 1 | |
| X_CAPTION(3,1) | 8 | 'C' | |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S4: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 7 | state DA |
| NID_PACKET | 8 | 38 | Text Message (STM-38) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_XMESSAGE | 8 | 1 | |
| M_XATTRIBUTE | 10 | 1000000001B | white text on black background, not flashing |
| Q_ACK | 1 | 0 | no acknowledgement required |
| L_TEXT | 8 | 39 | |
| X_TEXT(1) | 8 | 'P' | |
| X_TEXT(2) | 8 | 'a' | |
| X_TEXT(3) | 8 | 'c' | |
| X_TEXT(4) | 8 | 'k' | |
| X_TEXT(5) | 8 | ' ' | |

| Message-S4: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|-------|----------|
| VARIABLE | Length | VALUE | COMMENTS |
| X_TEXT(6) | 8 | 'm' | |
| X_TEXT(7) | 8 | 'y' | |
| X_TEXT(8) | 8 | ',' | |
| X_TEXT(9) | 8 | 'b' | |
| X_TEXT(10) | 8 | 'o' | |
| X_TEXT(11) | 8 | 'x' | |
| X_TEXT(12) | 8 | ',' | |
| X_TEXT(13) | 8 | 'w' | |
| X_TEXT(14) | 8 | 'i' | |
| X_TEXT(15) | 8 | 't' | |
| X_TEXT(16) | 8 | 'h' | |
| X_TEXT(17) | 8 | ',' | |
| X_TEXT(18) | 8 | 'f' | |
| X_TEXT(19) | 8 | 'i' | |
| X_TEXT(20) | 8 | 'v' | |
| X_TEXT(21) | 8 | 'e' | |
| X_TEXT(22) | 8 | ',' | |
| X_TEXT(23) | 8 | 'd' | |
| X_TEXT(24) | 8 | 'o' | |
| X_TEXT(25) | 8 | 'z' | |
| X_TEXT(26) | 8 | 'e' | |
| X_TEXT(27) | 8 | 'n' | |
| X_TEXT(28) | 8 | ',' | |
| X_TEXT(29) | 8 | 'l' | |
| X_TEXT(30) | 8 | 'i' | |
| X_TEXT(31) | 8 | 'q' | |
| X_TEXT(32) | 8 | 'u' | |
| X_TEXT(33) | 8 | 'o' | |
| X_TEXT(34) | 8 | 'r' | |
| X_TEXT(35) | 8 | ',' | |
| X_TEXT(36) | 8 | 'j' | |
| X_TEXT(37) | 8 | 'u' | |
| X_TEXT(38) | 8 | 'g' | |

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| Message-S4: STM → ETCS DMI Function | | | |
|-------------------------------------|----------|-------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| X_TEXT(39) | 8 | 's' | |
| NID_PACKET | 8 | 38 | Text Message (STM-38) |
| L_PACKET | 13 | RESERVED | packet length |
| NID_XMESSAGE | 8 | 2 | |
| M_XATTRIBUTE | 10 | 1000000001B | white text on black background, not flashing |
| Q_ACK | 1 | 1 | acknowledgement required |
| L_TEXT | 8 | 5 | |
| X_TEXT(1) | 8 | 'T' | |
| X_TEXT(2) | 8 | 'R' | |
| X_TEXT(3) | 8 | 'U' | |
| X_TEXT(4) | 8 | 'E' | |
| X_TEXT(5) | 8 | '?' | |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S5: STM → ETCS DMI Function | | | |
|-------------------------------------|--------|---------------|--------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 7 | state DA |
| NID_PACKET | 8 | 43 | National ETCS DMI (STM-43) |
| L_PACKET | 13 | COMPUTED | packet length |
| Q_SCALE | 2 | 1 | |
| Q_INDICATE | 12 | 000000000000B | no inhibition |
| Q_WARNINGLIMIT | 1 | 0 | |
| Q_INDICATIONLIMIT | 1 | 0 | |
| V_PERMIT | 10 | 100 | |
| V_TARGET | 7 | 0 | |
| V_RELEASE | 7 | 40 | |
| V_INTERV | 7 | 110 | |
| D_TARGET | 15 | 100 | |

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| Message-S5: STM → ETCS DMI Function | | | |
|-------------------------------------|----------|--------------|---------------------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| N_ITER | 5 | 0 | no customized supervision information |
| NID_PACKET | 8 | 46 | Sound Command (STM-46) |
| L_PACKET | 13 | COMPUTED | packet length |
| N_ITER | 5 | 1 | request for 1 sound |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| NID_SOUND | 8 | 1 | |
| Q_SOUND | 2 | 1 | |
| N_ITER | 5 | 1 | one frequency |
| M_FREQ | 8 | 4000 | |
| T_SOUND | 8 | 1 | |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---------------------------------|-------------|---|
| STM State | DA | Old STM in CS |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | established | may be not established for STM Test Case (STM implementation) |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | established | may be not established for STM Test Case (STM implementation) |
| BIU Connection | established | may be not established for STM Test Case (STM implementation) |
| JRU Connection | unchanged | may be changed for STM Test Case (STM implementation) |
| Other connections | unchanged | may be changed for STM Test Case (STM implementation) |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |

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| | | |
|---|-----------|--|
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5c.1.0.2.(5c1.0.0.3.0.0).0.2.1.2.0

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition ETCS -> STM (Level Transition Border) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition border (announced by balise group), when the ETCS On-board is in the ETCS technical mode SL (Sleeping) and the STM does not follow the state transition order to state DA in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.1.3, 7.4.1.1.4, 7.4.1.2.2-C9, 7.4.1.2.3-C9, 7.4.2.3.2 7.4.1.2.4.2, 7.4.1.2.3-A4b, 7.4.1.2.2-A4b, 7.3.3.1, 7.4.1.2.2-E16, 7.4.1.2.3-E16 |
| | SUBSET-026 5.10.1.4, 4.8.1.3 |
| STM Requirements Tested | SUBSET-035 7.3.2.1.0-9, 7.3.2.2.1-9, 7.3.4.4, 10.5.3.5 7.3.2.1.0-4b, 7.3.2.2.1-4b |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-5, STM-14, STM-15 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) orders the STM to the state DA when a level transition border to this STM is passed while the ETCS technical mode is SL and the STM does not follow the state transition order in due time. |

| Starting Conditions | Value | Comments |
|---------------------|--------|---------------------|
| STM State | HS | Old STM in state DA |
| ETCS Mode | SL | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |

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| Starting Conditions | | Value | Comments |
|---|------------|-----------------|----------|
| STM Control Function Connection | | established | |
| DMI Connection | | not established | |
| Odometry Data | | transmitted | |
| Reference Time Data | | transmitted | |
| TIU Connection | | established | |
| BIU Connection | | established | |
| JRU Connection | | not relevant | |
| Other connections | | not relevant | |
| TIU Regenerative Brake Command | | not relevant | |
| TIU Magnetic Shoes Command | | not relevant | |
| TIU Eddy Current Brake Command | | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | Sleeping | |
| TIU Traction Cut Off Status | | Inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU Status | | not relevant | |
| BIU Emergency Brake Command | | not relevant | |
| BIU Service Brake Command | | not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | | Value | Comments |
|---------------------|------------|--------------|----------|
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|---|
| 1 | Level Transition border for an ETCS -> STM transition: order announced STM to DA state | BTM | Telegram-B1 (41 - Level Transition Order) Telegram-B2 | ETCS | Prof | STM Control Connection: Message-Old-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 2 | Time: T0 | | STM Control Connection: Message-Old-S1 (STM-15 - state report from STM) | ETCS | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 3 | Time: T0 + 5 seconds STM does not report state DA in due time | - | - | ETCS | Prof | STM Control Connection: Message-EC2 (STM-14 - state order to STM) |

| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |

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| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 32767 | now (the level transition is performed upon receipt of the order) |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Telegram-B2: Balise-Information | | | |
|---------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-Old-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here : NID_STM of the old STM in DA state) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |

| Message-Old-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STMSTATEORDER | 4 | 5 | Conditional CS |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in DA state) |
| M_MODE | 4 | 13 | SN (STM national) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Old-S1 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 7 | state DA |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| M_MODE | 4 | 5 | SL (Sleeping) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC2 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|-----------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 8 | state FA |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---|-----------|----------------|
| STM State | FA | Old STM in CS. |
| ETCS Mode | SL | |
| ETCS Level | STM | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |

| | | |
|---|-----------|--|
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

Test case 5c.1.0.1.1.0.(5C1.0.0.3.0.0).0.2.1.1.0.0

| TEST CASE HEADER | |
|--------------------------|---|
| Test case Identification | Level Transition ETCS -> STM (Level Transition Border) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition border (announced by balise group), when the ETCS On-board is not in the ETCS technical mode NL (Non-Leading) or SL (Sleeping) and the STM does not follow the state transition order to state DA in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.1.3, 7.4.1.1.4, 7.4.1.2.2 (HS to DA), 7.4.1.2.3 (C9), 7.4.1.3.6, 7.4.1.4, 7.4.2.3.2 7.4.1.2.4.2, 7.4.1.2.3-A4b, 7.4.1.2.2-A4b, 7.3.3.1, 7.4.1.3.4 |
| | SUBSET-026 5.10.1.4, 4.8.1.3 |
| STM Requirements Tested | SUBSET-035 7.3.2.1 (HS to DA), 7.3.2.2 (9), 7.3.4.4, 10.5.3.5 7.3.2.1.0-4b, 7.3.2.2.1-4b, 7.3.4.4 |

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| | |
|--|---|
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-5, STM-14 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) orders the STM to the state DA when a level transition border to this STM is passed in case the STM does not follow the state transition order in due time. In this case the ETCS will also apply the safe action because the active STM does not report DA state. |

| Starting Conditions | Value | Comments |
|---|--------------|---------------------|
| STM State | HS | old STM in state DA |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | |
| DMI Connection | established | |
| Odometry Data | transmitted | |
| Reference Time Data | transmitted | |
| TIU Connection | established | |
| BIU Connection | established | |
| JRU Connection | not relevant | |
| Other connections | not relevant | |
| TIU Regenerative Brake Command | not relevant | |
| TIU Magnetic Shoes Command | not relevant | |
| TIU Eddy Current Brake Command | not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | 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 | |

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| Starting Conditions | | Value | Comments |
|--|------------|---------------|----------|
| TIU Sleeping Status | | not Sleeping | |
| TIU Traction Cut Off Status | | inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU Status | | not relevant | |
| BIU Emergency Brake Command | | not relevant | |
| BIU Service Brake Command | | not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|---|
| 1 | Level Transition border for an ETCS -> STM transition: order announced STM to DA state Time: T0 | BTM | Telegram-B1 (41 - Level Transition Order) Telegram-B2 | ETCS | Prof | STM Control Connection: Message-Old-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 2 | Time: T0 | | STM Control Connection: Message-Old-S1 (STM-15 - state report from STM) | ETCS | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 3 | Time: T0 + 5 seconds STM does not report state DA in due time | - | - | ETCS | Prof | STM Control Connection: Message-EC2 (STM-14 - state order to STM) |

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| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|----------------------|-----------|--------------|------|------------|--|
| | | - | - | ETCS | DMI | indication to the driver about the failed STM |
| | | - | - | ETCS | BIU / DMI | ETCS takes the safe action, i. e. command brake application. |

| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 32767 | now (the level transition is performed upon receipt of the order) |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Telegram-B2: Balise-Information | | | |
|---------------------------------|--------|--------------|-------------|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |

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| Telegram-B2: Balise-Information | | | |
|---------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-Old-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here : NID_STM of the old STM in DA state) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 5 | Conditional CS |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in DA state) |
| M_MODE | 4 | 13 | SN (STM national) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-Old-S1 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 7 | state DA |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| M_MODE | 4 | 13 | SN (STM National) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC2 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|-----------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 8 | state FA |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---------------------------------|-----------|----------------------|
| STM State | FA | Old STM in CS state. |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |

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| | | |
|---|-----------|--|
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5c1.0.0.2.2.0

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition ETCS -> STM (Level Transition Border) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition border (announced by balise group), when the ETCS On-board is in the ETCS technical mode SN and the old STM does not follow the state transition order to state CS in due time. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.2.4.2, 7.4.1.2.3-A4b, 7.4.1.2.2-A4b, 7.3.3.1, 7.4.1.2.2-E16, 7.4.1.2.3-E16, 7.4.1.3.6 |
| | SUBSET-026 none |
| STM Requirements Tested | SUBSET-035 7.3.2.1.0-4b, 7.3.2.2.1-4b |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-5, STM-14, STM-15 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) orders the old STM to the state CS when a level transition border to this STM is passed while the ETCS technical mode is SN and the STM does not follow the state transition order in due time. |

| Starting Conditions | Value | Comments |
|---------------------------------|-----------------|----------|
| STM State | DA | |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | |
| DMI Connection | Not established | |
| Odometry Data | transmitted | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| Reference Time Data | | transmitted | |
| TIU Connection | | established | |
| BIU Connection | | established | |
| JRU Connection | | Not relevant | |
| Other connections | | Not relevant | |
| TIU Regenerative Brake Command | | Not relevant | |
| TIU Magnetic Shoes Command | | Not relevant | |
| TIU Eddy Current Brake Command | | Not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | Sleeping | |
| TIU Traction Cut Off Status | | Inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU Status | | Not relevant | |
| BIU Emergency Brake Command | | Not relevant | |
| BIU Service Brake Command | | Not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |

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| Starting Conditions | Value | Comments |
|---------------------|--------------|----------|
| Track Adhesion | Not relevant | |

ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|--|------|------------|---|
| 1 | Level Transition border for an ETCS -> STM transition: order announced STM to DA state Time: T0 | BTM | Telegram-B1 (41 - Level Transition Order) Telegram-B2 | ETCS | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| 2 | Time: T0 + 10 seconds STM does not report state CS in due time | - | - | ETCS | Prof | STM Control Connection: Message-EC2 (STM-14 - state order to STM) |
| | | | | ETCS | DMI | indication to the driver about the failed STM |

| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 32767 | now (the level transition is performed upon receipt of the order) |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |

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| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Telegram-B2: Balise-Information | | | |
|---------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here : NID_STM of the old STM in DA state) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 5 | Conditional CS |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in DA state) |
| M_MODE | 4 | 13 | SN (STM national) |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|----------|----------|
| VARIABLE | Length | VALUE | COMMENTS |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC2 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|-----------------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM |
| L_MESSAGE | 8 | COMPUTED | Message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 8 | state FA |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|---------------------------------|-----------|----------|
| STM State | FA | |
| ETCS Mode | SL | |
| ETCS Level | STM | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |

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| | | |
|---|-----------|--|
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5c1.0.0.1.3.1.0.0

| TEST CASE HEADER | |
|-----------------------------------|--|
| Test case Identification | Level Transition ETCS -> STM (Level Transition Border) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition border (announced by balise group), when the ETCS On-board is in the ETCS technical mode SN and the old STM is in trip mode; The state transition order to state CS is performed only at the end of STM Trip. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.2.4.2, 7.4.1.2.3-A4b, 7.4.1.2.2-A4b, 7.3.3.1, 7.4.1.2.2-E16, 7.4.1.2.3-E16, 7.4.1.3.6 |
| | SUBSET-026 none |
| STM Requirements Tested | SUBSET-035 7.3.2.1.0-4b, 7.3.2.2.1-4b |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-5, STM-14, STM-15, STM-18 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) orders the old STM to the state CS when a level transition border to this STM is passed while the ETCS technical mode is SN and the STM is in trip |

| Starting Conditions | Value | Comments |
|---------------------------------|-----------------|----------|
| STM State | DA | |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | |
| DMI Connection | Not established | |
| Odometry Data | transmitted | |
| Reference Time Data | transmitted | |
| TIU Connection | established | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| BIU Connection | | established | |
| JRU Connection | | Not relevant | |
| Other connections | | Not relevant | |
| TIU Regenerative Brake Command | | Not relevant | |
| TIU Magnetic Shoes Command | | Not relevant | |
| TIU Eddy Current Brake Command | | Not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | Sleeping | |
| TIU Traction Cut Off Status | | Inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU Status | | Not relevant | |
| BIU Emergency Brake Command | | Not relevant | |
| BIU Service Brake Command | | Not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | Not relevant | |

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ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|---|
| 1 | Level Transition border for an ETCS -> STM transition: order announced STM to DA state | BTM | Telegram-B1 (41 - Level Transition Order) Telegram-B2 | ETCS | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| | Time: T0 | | STM Control Connection: Message-S1 (STM-18 – Trip message from STM) | ETCS | Prof | |
| | Time T0 + 5 seconds Time T1 | | STM Control Connection: Message-S1 (STM-18 – Trip message from STM) | ETCS | Prof | |
| 2 | Time: T1 + <10 seconds STM does report state CS in due time | - | STM Control Connection: Message-S2 (STM-15 – State report from STM) | ETCS | Prof | |

| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 32767 | now (the level transition is performed upon receipt of the order) |

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| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Telegram-B2: Balise-Information | | | |
|---------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here : NID_STM of the old STM in DA state) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 5 | Conditional CS |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in DA state) |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|----------|-------------------|
| VARIABLE | Length | VALUE | COMMENTS |
| M_MODE | 4 | 13 | SN (STM national) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S1 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 18 | State report from STM (STM-18) |
| L_PACKET | 13 | COMPUTED | packet length |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S2 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 15 | State report from STM (STM-15) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATE | 4 | 4 | state CS |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|-----------------|-----------|----------|
| STM State | CS | |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | unchanged | |
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |

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| | | |
|---|-----------|--|
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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Test case 5c1.0.0.1.3.2.2.0

| TEST CASE HEADER | |
|--|--|
| Test case Identification | Level Transition ETCS -> STM (Level Transition Border) |
| | Check the behaviour of the ETCS On-board and the STM at a level transition border (announced by balise group), when the ETCS On-board is in the ETCS technical mode SN and the old STM is in trip mode; The state transition order to state CS is failed at the end of STM Trip. |
| ETCS Requirements Tested | SUBSET-035 7.4.1.2.4.2, 7.4.1.2.3-A4b, 7.4.1.2.2-A4b, 7.3.3.1, 7.4.1.2.2-F16, 7.4.1.2.3-F16, 7.4.1.3.6 |
| | SUBSET-026 none |
| STM Requirements Tested | SUBSET-035 7.3.2.1.0-4b, 7.3.2.2.1-4b, 7.3.3.2 |
| | SUBSET-026 none |
| Packets Transmitted via FFFIS STM | Packet STM-5, STM-14, STM-15 |
| Comments and constraints | The objective of this test is to check that the ETCS On-board (STM Control Function) orders the old STM to the state CS when a level transition border to this STM is passed while the ETCS technical mode is SN and the STM is in trip then the STM failed. |

| Starting Conditions | Value | Comments |
|---------------------------------|-----------------|----------|
| STM State | DA | |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | moving | |
| Train Data | valid | |
| Additional Data | valid | |
| National Values | valid | |
| STM Control Function Connection | established | |
| DMI Connection | Not established | |
| Odometry Data | transmitted | |
| Reference Time Data | transmitted | |

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| Starting Conditions | | Value | Comments |
|---|------------|---------------|----------|
| TIU Connection | | established | |
| BIU Connection | | established | |
| JRU Connection | | Not relevant | |
| Other connections | | Not relevant | |
| TIU Regenerative Brake Command | | Not relevant | |
| TIU Magnetic Shoes Command | | Not relevant | |
| TIU Eddy Current Brake Command | | Not relevant | |
| TIU Inhibit Passenger Emergency Brake Command | | 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 Sleeping Status | | Sleeping | |
| TIU Traction Cut Off Status | | Inactive | |
| TIU Direction Controller Position Status | | forward | |
| TIU Cab Status (Desk Status) | | desk A opened | |
| BIU Status | | Not relevant | |
| BIU Emergency Brake Command | | Not relevant | |
| BIU Service Brake Command | | Not relevant | |
| BIU Emergency Brake Status | | release | |
| BIU Service Brake Status | | release | |
| STM Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| ETCS Version Number | Subset-026 | 1.0 | |
| | Subset-035 | 3.0.z | |
| | Subset-058 | 3.0.z | |
| | Subset-056 | 3.0.z | |
| | Subset-057 | 3.0.z | |
| Track Adhesion | | Not relevant | |

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ETCS Test Case

| Step | Description/Comments | Input I/F | Input Action | DUT | Output I/F | Output action |
|------|--|-----------|---|------|------------|---|
| 1 | Level Transition border for an ETCS -> STM transition: order announced STM to DA state | BTM | Telegram-B1 (41 - Level Transition Order) Telegram-B2 | ETCS | Prof | STM Control Connection: Message-EC1 (STM-14 - state order to STM, STM-5 - ETCS status data) |
| | Time: T0 | | STM Control Connection: Message-S1 (STM-18 – Trip message from STM) | ETCS | Prof | |
| | Time T0 + 5 seconds Time T1 | | STM Control Connection: Message-S1 (STM-18 – Trip message from STM) | ETCS | Prof | |
| 2 | Time: T1 + 10 seconds STM does not report state CS in due time | - | | ETCS | Prof | STM Control Connection: Message-EC2 (STM-14 - state order to STM) |
| | | | | ETCS | DMI | indication to the driver about the failed STM |

| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | Uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 0 | 1 st Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 41 | Packet 41 – Level Transition Order |
| Q_DIR | 2 | 1 | nominal direction |

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| Telegram-B1: Balise-Information (Level Transition Border) | | | |
|---|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| L_PACKET | 13 | COMPUTED | |
| Q_SCALE | 2 | 1 | 1 m |
| D_LEVELTR | 15 | 32767 | now (the level transition is performed upon receipt of the order) |
| M_LEVELTR | 3 | 1 | Level STM, specified by NID_STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in HS state) |
| L_ACKLEVELTR | 15 | 0 | acknowledgement area starts at the level transition border |
| N_ITER | 5 | 0 | no mixed level area |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Telegram-B2: Balise-Information | | | |
|---------------------------------|--------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| Q_UPDOWN | 1 | 1 | uplink |
| M_VERSION | 7 | FINITE VALUE | SRS version |
| Q_MEDIA | 1 | 0 | Balise |
| N_PIG | 3 | 1 | 2 nd Balise |
| N_TOTAL | 3 | 1 | 2 Balise in group |
| M_DUP | 2 | 0 | no duplicates |
| M_MCOUNT | 8 | 255 | identical Value for all balises of the group |
| NID_C | 10 | FINITE VALUE | ID of country / region |
| NID_BG | 14 | FINITE VALUE | ID of Balise Group |
| Q_LINK | 1 | 1 | linked |
| NID_PACKET | 8 | 11111111 | Packet 255 – End of information |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|--------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here : NID_STM of the old STM in DA state) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 5 | Conditional CS |
| NID_PACKET | 8 | 5 | ETCS status data (STM-5) |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| L_PACKET | 13 | COMPUTED | packet length |
| M_LEVEL | 3 | 1 | Level STM |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the STM in DA state) |
| M_MODE | 4 | 13 | SN (STM national) |
| Padding bits | COMPUTED | COMPUTED | |

| Message-S1 (state report from STM): STM → ETCS STM Control Function | | | |
|---|----------|--------------|--|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here: NID_STM of the old STM) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 18 | State report from STM (STM-18) |
| L_PACKET | 13 | COMPUTED | packet length |
| Padding bits | COMPUTED | COMPUTED | |

| Message-EC1 (state order to STM): ETCS STM Control Function → STM | | | |
|---|----------|--------------|---|
| VARIABLE | Length | VALUE | COMMENTS |
| NID_STM | 8 | FINITE VALUE | any valid value for NID_STM (here : NID_STM of the old STM in DA state) |
| L_MESSAGE | 8 | COMPUTED | message length |
| NID_PACKET | 8 | 14 | State order to STM (STM-14) |
| L_PACKET | 13 | COMPUTED | packet length |
| NID_STMSTATEORDER | 4 | 8 | FA |
| Padding bits | COMPUTED | COMPUTED | |

| End Conditions | Value | Comments |
|----------------|-----------|----------|
| STM State | FA | |
| ETCS Mode | SN | |
| ETCS Level | STM | |
| Train State | unchanged | |

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| | | |
|---|-----------|--|
| Train Data | unchanged | |
| Additional Data | unchanged | |
| National Values | unchanged | |
| STM Control Function Connection | unchanged | |
| DMI Connection | unchanged | |
| Odometry Data | unchanged | |
| Reference Time Data | unchanged | |
| TIU Connection | unchanged | |
| BIU Connection | unchanged | |
| JRU Connection | unchanged | |
| Other connections | unchanged | |
| TIU Regenerative Brake Command | unchanged | |
| TIU Magnetic Shoes Command | unchanged | |
| TIU Eddy Current Brake Command | unchanged | |
| TIU Inhibit Passenger Emergency Brake Command | unchanged | |
| TIU Pantograph Command | unchanged | |
| TIU Air Tightness Command | unchanged | |
| TIU Main Switch / Circuit Breaker Command | unchanged | |
| TIU Traction Cut Off Command | unchanged | |
| TIU Sleeping Status | unchanged | |
| TIU Traction Cut Off Status | unchanged | |
| TIU Direction Controller Position Status | unchanged | |
| TIU Cab Status (Desk Status) | unchanged | |
| BIU Status | unchanged | |
| BIU Emergency Brake Command | unchanged | |
| BIU Service Brake Command | unchanged | |
| BIU Emergency Brake Status | unchanged | |
| BIU Service Brake Status | unchanged | |
| STM Version Number | unchanged | |
| ETCS Version Number | unchanged | |
| Track Adhesion | unchanged | |

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