

**ERTMS/ETCS**

**System Requirements Specification**

**Chapter 4**

**Modes and Transitions**

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2.9.1 06/10/08	Including all enhancement CR's retained for 3.0.0 baseline and all other error CR's that are in state "Analysis completed" according to ERA CCM  For editorial reasons, the following CR's are also included: CR656, CR804, CR821	Hougardy A.
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## 4.3 Introduction

### 4.3.1 Presentation of the document

- 4.3.1.1 This document defines the modes of the ERTMS/ETCS on-board equipment (see chapter 4.4 “Definition of the modes” and chapter 4.5 “Modes and on-board functions”).
- 4.3.1.2 This document gives all transitions between modes (see chapter 4.6 “Transitions between modes”).
- 4.3.1.3 This document describes the possible exchanged information between the driver and the ERTMS/ETCS on-board equipment, respect to the mode (see chapter 4.7 “DMI depending on modes”).
- 4.3.1.4 This document describes how the received information is filtered, respect to several criteria such as the level, the mode, etc.. (see chapter 4.8 “Acceptance of received information”).
- 4.3.1.5 This document describes how the stored information is handled, respect to several criteria such as the level, the mode, etc. (see chapter 4.9 “What happens to accepted and stored information when entering a given level”, and chapter 4.10 “What happens to accepted and stored information when entering a given mode”).
- 4.3.1.6 All the tables that are included in this document shall be considered as mandatory requirements.
- 4.3.1.7 Some notes appear in this document. These notes are here to help the reader to understand the specifications, or to explain the reason(s) of a requirement.

### 4.3.2 Identification of the possible modes

- 4.3.2.1 List of the modes:

Full Supervision	(FS)
Limited Supervision	(LS)
On Sight	(OS)
Staff Responsible	(SR)
Shunting	(SH)
Unfitted	(UN)
Passive Shunting	(PS)
Sleeping	(SL)
Stand By	(SB)
Trip	(TR)

Post Trip	(PT)
System Failure	(SF)
Isolation	(IS)
No Power	(NP)
Non Leading	(NL)
National System	(SN)
Reversing	(RV)



## **4.4 Definition of the modes**

### **4.4.1 Introduction**

4.4.1.1 For each mode the following information is given:

- a) The context of utilisation of the mode and the functions that characterise the mode (chapter “Description”).
- b) The ERTMS/ETCS levels in which the mode can be used (chapter “Used in levels”).
- c) The related responsibility of the ERTMS/ETCS on-board equipment and of the driver, once the equipment is in this mode (chapter “Responsibilities”).

4.4.1.2 A complete list of transitions to and from each mode is given in the section 4.6.2 “Transitions Table” ).

### **4.4.2 General Requirements**

4.4.2.1 When the desk is open, a clear indication of the ERTMS/ETCS mode shall be shown to the driver.

4.4.2.2 Intentionally deleted.

### **4.4.3 ISOLATION**

#### **4.4.3.1 Description**

- 4.4.3.1.1 In Isolation mode, the ERTMS/ETCS on-board equipment shall be physically isolated from the brakes and can be isolated from other on-board equipments/systems depending on the specific on-board implementation.
- 4.4.3.1.2 There shall be a clear indication to the driver that the ERTMS/ETCS on-board equipment is isolated.
- 4.4.3.1.3 To leave Isolation mode, a special operating procedure is needed (no transition from Isolation is specified). This procedure shall ensure that the on-board equipment is only put back into service when it has been proven that this is safe for operation.
- 4.4.3.1.4 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.

#### **4.4.3.2 Used in levels**

- 4.4.3.2.1 Used in all levels: Level 0, level 1, level 2, level 3 and level NTC.

#### **4.4.3.3 Responsibilities**

- 4.4.3.3.1 Isolation of the ERTMS/ETCS on-board equipment is performed by the driver under his complete responsibility.
- 4.4.3.3.2 Once the ERTMS/ETCS on-board equipment is isolated, the ERTMS/ETCS on-board equipment has no more responsibility.

#### **4.4.4 NO POWER**

##### **4.4.4.1 Description**

4.4.4.1.1 When the ERTMS/ETCS on-board equipment is not powered, the equipment shall be in the No Power mode.

4.4.4.1.1.1 Note: in order to ensure cold movement detection function, some parts of the ERTMS/ETCS on-board equipment may be fed by an auxiliary power supply.

4.4.4.1.2 The ERTMS/ETCS on-board equipment shall permanently command the emergency brake.

4.4.4.1.3 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.

##### **4.4.4.2 Used in levels**

4.4.4.2.1 Used in all levels: Level 0, level 1, level 2, level 3 and level NTC.

##### **4.4.4.3 Responsibilities**

4.4.4.3.1 The ERTMS/ETCS on-board equipment has no responsibility in this mode, except commanding the emergency brake and (optionally) monitoring cold movements.

4.4.4.3.2 The notion of responsibility of the driver is not relevant for the No Power mode.

4.4.4.3.3 If it is required to move a loco in NP mode as a wagon, ETCS brake command must be overridden by external means.

## **4.4.5 SYSTEM FAILURE**

### **4.4.5.1 Description**

- 4.4.5.1.1 The ERTMS/ETCS on-board equipment shall switch to the System Failure mode in case of a fault, which affects safety.
- 4.4.5.1.2 The ERTMS/ETCS on-board equipment shall permanently command the Emergency Brakes.
- 4.4.5.1.3 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.

### **4.4.5.2 Used in levels**

- 4.4.5.2.1 Used in all levels: Level 0, level 1, level 2, level 3 and level NTC.

### **4.4.5.3 Responsibilities**

- 4.4.5.3.1 The ERTMS/ETCS on-board equipment is responsible for commanding the Emergency Brakes.
- 4.4.5.3.2 No responsibility of the driver.

## 4.4.6 SLEEPING

### 4.4.6.1 Description

- 4.4.6.1.1 The Sleeping mode is defined to manage the ERTMS/ETCS on-board equipment of a slave engine that is remote controlled.
- 4.4.6.1.2 The desk(s) of a sleeping engine must be closed (since there is no driver, no information shall be shown).
- 4.4.6.1.3 As the engine is remote controlled by the leading engine, its ERTMS/ETCS on-board equipment shall not perform any train movement supervision.
- 4.4.6.1.4 The ERTMS/ETCS on-board equipment shall perform the Train Position function; in particular, the front/rear end of the engine (i.e., not the train) shall be used to refer to train front/rear end.
- 4.4.6.1.5 Sleeping mode shall be automatically detected on-board via the train interface.
- 4.4.6.1.6 If possible, the train must not be stopped due to a safety critical fault in a sleeping engine. The ERTMS/ETCS on-board equipment shall therefore try to memorise the occurrence of such fault(s), which shall be handled when the engine leaves the Sleeping mode. The ERTMS/ETCS on-board equipment shall also try to send an error information to the RBC.
- 4.4.6.1.7 If a desk of the sleeping engine is opened while the train is running (this is an abnormal operation), the ERTMS/ETCS on-board equipment shall switch to Stand-By mode.
- 4.4.6.1.8 If the “sleeping input signal” is lost (no more detection of the remote control), the switch to Stand-By mode shall be made only if the train is at standstill.
- 4.4.6.1.9 Intentionally deleted.
- 4.4.6.1.10 The ERTMS/ETCS on-board equipment shall open a communication session with the RBC when at least one of the following events occurs:
  - a) in all levels, on receipt of the order to contact the RBC.
  - b) In level 2/3, when entering or exiting Sleeping mode (to report the change of mode to the RBC).
  - c) In level 2/3, when a safety critical fault of the ERTMS/ETCS on-board equipment occurs (to report the fault to the RBC).
- 4.4.6.1.11 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.
- 4.4.6.1.12 In case of balise group message consistency error (refer to 3.16.2.4.4 and 3.16.2.5.1), the ERTMS/ETCS onboard equipment shall not command the service brake.

- 4.4.6.1.13 When in levels 2 or 3, if no compatible version has been established between the on-board equipment in Sleeping mode and the RBC, the ERTMS/ETCS onboard equipment shall react as specified in 3.5.3.8 b) but no driver's indication shall be given.

#### **4.4.6.2 Used in levels**

- 4.4.6.2.1 Used in all levels: Level 0, level 1, level 2, level 3 and level NTC.

#### **4.4.6.3 Responsibilities**

- 4.4.6.3.1 The ERTMS/ETCS on-board equipment of an engine in Sleeping mode has no responsibility for the train protection.
- 4.4.6.3.2 The notion of responsibility of the driver is not relevant for the Sleeping mode.
- 4.4.6.3.2.1 Note: The leading engine is responsible for the movement of the train. It is then the ERTMS/ETCS on-board equipment of the leading engine that is fully/partially/not responsible for the train protection, with respect to its mode.

## **4.4.7 STAND BY**

### **4.4.7.1 Description**

- 4.4.7.1.1 The Stand-By mode is a default mode and cannot be selected by the driver.
- 4.4.7.1.2 It is in the Stand-By mode that the ERTMS/ETCS on-board equipment awakes.
- 4.4.7.1.3 Data for mission shall be collected in Stand-By (see SRS-chapter 5: “Start of Mission” procedure).
- 4.4.7.1.4 In Stand-By mode, the desk of the engine can be open or closed. No interaction with the driver shall be possible as long as the desk is closed, except isolation of the ERTMS/ETCS on-board equipment.
- 4.4.7.1.5 The ERTMS/ETCS on-board equipment shall perform the Standstill Supervision.
- 4.4.7.1.6 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.

### **4.4.7.2 Used in levels**

- 4.4.7.2.1 Used in all levels: Level 0, level 1, level 2, level 3 and level NTC.

### **4.4.7.3 Responsibilities**

- 4.4.7.3.1 The ERTMS/ETCS on-board equipment is responsible for maintaining the train at standstill.
- 4.4.7.3.2 The driver has no responsibility for train movements.

## 4.4.8 SHUNTING

### 4.4.8.1 Description

- 4.4.8.1.1 The purpose of the Shunting mode is to enable shunting movements. In Shunting mode, The ERTMS/ETCS on-board equipment supervises the train movements against:
- a) a ceiling speed: the shunting mode speed limit
  - b) a list of expected balise groups (if such list was sent by the trackside equipment). The train shall be tripped if a balise group, not contained in the list, is passed (When an empty list is sent, no balise group can be passed. When no list is sent, all balise groups can be passed)
  - c) “stop if in shunting mode” information. The train is tripped if such information is received from balise groups
  - d) Intentionally deleted
- 4.4.8.1.2 The Shunting mode shall not require Train Data.
- 4.4.8.1.3 The ERTMS/ETCS on-board equipment shall perform the Train Position function
- 4.4.8.1.4 Intentionally deleted.
- 4.4.8.1.5 When in Shunting mode, the ERTMS/ETCS on-board shall not manage level transitions. However, an immediate level transition order or a conditional level transition order shall be stored and evaluated only when another mode than Shunting or Passive Shunting has been entered (i.e. when the Shunting movement is terminated).
- 4.4.8.1.5.1 When receiving a communication session establishment order, the ERTMS/ETCS on-board in Shunting mode shall not establish the communication session, but shall store the RBC ID/phone number.
- 4.4.8.1.5.2 When in Shunting mode, the ERTMS/ETCS on-board shall not manage RBC-RBC hand-over, except for storing the RBC ID/phone number given at the RBC/RBC border.
- 4.4.8.1.6 Shunting mode can be selected by the driver, only accepted when the train is at standstill, or ordered by the trackside.
- 4.4.8.1.7 In case of selection of Shunting mode by the driver:
- in level 1 operations, the switch to shunting is always accepted by the on-board equipment
  - in level 2 and 3 areas, the on-board shall ask the trackside for an authorisation. The switch to shunting is possible only after receiving such authorisation. The trackside can send a list of balises, that the train is allowed to pass while in SH, together with the authorisation



- 4.4.8.1.8 In case of order to switch to Shunting mode from trackside, the order:
- in level 1 is given by a balise group. A list of balises, that the train is allowed to pass after the entry in Shunting, can be sent together with the order
  - in level 2 and 3 is sent via radio. A list of balises, that the train is allowed to pass after the entry in Shunting, can be sent together with the order
- 4.4.8.1.9 When the switch to shunting is ordered by trackside, a driver acknowledgement is requested.
- 4.4.8.1.9.1 Note: in Shunting mode the train is only partially supervised, therefore it is necessary that the driver takes the responsibility.
- 4.4.8.1.10 The ERTMS/ETCS on-board equipment shall display the train speed and, only on driver request, the permitted speed. The display of the permitted speed shall also be stopped on driver request.
- 4.4.8.1.11 Intentionally deleted.
- 4.4.8.1.12 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.

#### **4.4.8.2 Used in levels**

- 4.4.8.2.1 Used in level 0, NTC, 1, 2 and 3.

#### **4.4.8.3 Responsibilities**

- 4.4.8.3.1 The ERTMS/ETCS on-board equipment is responsible for the supervision of the shunting mode speed limit, and that the engine with the active antenna is tripped when passing the defined border of the shunting area (only if there is a defined border: balise group not in the list given by trackside, or balise group giving the information “stop if in shunting”).
- 4.4.8.3.2 The driver is responsible for:
- a) Remaining inside the shunting area defined by a procedure or an external system outside ERTMS/ETCS (also when the shunting area is protected by balises)
  - b) Train/engine movements and shunting operations

## **4.4.9 FULL SUPERVISION**

### **4.4.9.1 Description**

- 4.4.9.1.1 The ERTMS/ETCS on-board equipment shall be in the Full Supervision mode when all train and track data, which is required for a complete supervision of the train, is available on board.
- 4.4.9.1.2 Full supervision cannot be selected by the driver, but shall be entered automatically when all necessary conditions are fulfilled.
- 4.4.9.1.3 To be in Full Supervision mode, SSP and gradient are not required for the whole length of the train, but shall be at least available from the FRONT END of the train.
- 4.4.9.1.4 Once in Full Supervision mode, if SSP and gradient are not known for the whole length of the train, an indication "ENTRY IN FULL SUPERVISION" shall be clearly displayed to the driver until SSP and gradient are known for the whole length of the train.
- 4.4.9.1.4.1 Note: this indication may also be displayed in case the train length has been increased, see 3.18.3.8.
- 4.4.9.1.5 The ERTMS/ETCS on-board equipment shall supervise train movements against a dynamic speed profile.
- 4.4.9.1.6 The ERTMS/ETCS on-board equipment shall display the train speed, the permitted speed, the target distance and the target speed to the driver (this list is not exhaustive – refer to chapter 4.7 "DMI depending on modes").
- 4.4.9.1.7 Note: for the list of main functions related to this mode, refer to chapter 4.5 "Modes and on-board functions".

### **4.4.9.2 Used in levels**

- 4.4.9.2.1 Used in level 1, 2 and 3.

### **4.4.9.3 Responsibilities**

- 4.4.9.3.1 The ERTMS/ETCS on-board equipment is fully responsible for the train protection (except for the 2 situations described below).
- 4.4.9.3.2 The driver is responsible for respecting the EOA when approaching an EOA with a release speed.
- 4.4.9.3.3 When "ENTRY IN FULL SUPERVISION" is displayed to the driver, the driver is responsible for respecting speed restrictions that apply for the part of the train that is not covered by SSP and gradient data.

#### **4.4.10 UNFITTED**

##### **4.4.10.1 Description**

4.4.10.1.1 The Unfitted mode is used to allow train movements in either:

- a) Areas that are equipped neither with ERTMS/ETCS track-side equipment nor with national train control system
- b) Intentionally deleted
- c) Areas that are equipped with ERTMS/ETCS trackside equipment and/or national train control system(s), but operation under their supervision is currently not possible

4.4.10.1.2 The ERTMS/ETCS on-board equipment shall supervise train movements against a ceiling speed: the lowest of the maximum train speed and the Unfitted mode speed limit for unfitted area (national value).

4.4.10.1.2.1 Intentionally deleted.

4.4.10.1.3 The ERTMS/ETCS on-board equipment shall also supervise temporary speed restrictions.

4.4.10.1.4 The ERTMS/ETCS on-board equipment shall display the train speed to the driver.

4.4.10.1.5 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.

##### **4.4.10.2 Used in levels**

4.4.10.2.1 Used in level 0.

##### **4.4.10.3 Responsibilities**

4.4.10.3.1 The ERTMS/ETCS on-board equipment supervises a ceiling speed and (if available) temporary speed restrictions.

4.4.10.3.2 The driver must respect the existing line-side signals and is fully responsible for train movements.

#### 4.4.11 STAFF RESPONSIBLE

##### 4.4.11.1 Description

4.4.11.1.1 The Staff Responsible mode allows the driver to move the train under his own responsibility in an ERTMS/ETCS equipped area.

4.4.11.1.2 This mode is used when the system does not know the route. For example:

- a) After the ERTMS/ETCS on-board equipment starts-up (awakening of the train).
- b) To pass a signal at danger / override an EOA.
- c) After a trackside failure (for example: loss of radio contact).

4.4.11.1.3 The ERTMS/ETCS on-board equipment shall supervise train movements against:

- a) a ceiling speed: the staff responsible mode speed limit
- b) a given distance (regarding its origin location see 4.4.11.1.3.1). The ERTMS/ETCS on-board equipment shall supervise braking curves with a target speed of zero to the end of this distance. If the train overpasses this distance (see next note) the ERTMS/ETCS on-board equipment shall trip the train
- c) a list of expected balise groups, if this list has been sent by the RBC. The train shall be tripped if over-passing a balise group that is not in the list. (When an empty list is sent, no balise group can be passed. When no list is sent, all balise groups can be passed)
- d) balise groups giving the order 'stop if in SR'. This order shall immediately trip the train, unless the over-passed balise group is included in a list of expected balises as defined in item c)
- e) running in the direction opposite to the train orientation (reverse movement protection)

4.4.11.1.3.1 The ERTMS/ETCS on-board shall determine the start location of the SR distance as follows:

- a) If the National/Default value determines the max permitted distance to run in SR mode, the starting point of this distance shall refer to the estimated position of the train front when SR mode was entered, or, already in Staff Responsible mode, when Override was activated.
- b) If the max permitted distance to run in SR mode is determined by the value transmitted by the RBC, or entered by the driver, the start location of the distance shall refer to the estimated position of the train front when the distance information is received or entered.
- c) If the max permitted distance to run in SR mode is determined by the value transmitted by EUROLOOP, the distance information transmitted by EUROLOOP shall be referred to one or more reference balise groups. On-board shall evaluate

the distance to run in SR mode by matching the reference balise groups given with the LRBG.

In case the LRBG is, due to a change of orientation, in front of the train when the distance to run in SR mode is to be determined from the EUROLOOP information, the complete distance to run in SR mode shall be determined as the distance given by EUROLOOP plus the distance between the estimated train front end and the LRBG.

- 4.4.11.1.4 Note: Since the gradient is unknown, the supervision of the braking curves in Staff Responsible mode does not ensure that the train will not pass the given distance.
- 4.4.11.1.5 The ERTMS/ETCS on-board equipment shall give the possibility to the driver to modify the value of the SR mode speed limit and of the given distance. This shall be possible only at standstill.
  - 4.4.11.1.5.1 If a train movement is detected while the driver is entering the SR speed/distance limits, the ERTMS/ETCS on-board equipment shall trigger the brake command.
  - 4.4.11.1.5.2 The unit, range and resolution of the SR mode speed limit and distance entered by the driver shall be as specified in A.3.11.
- 4.4.11.1.6 In level 2/3, the driver shall have the possibility to request a new distance to run in Staff Responsible, by selecting "Start". This triggers an MA request.
  - 4.4.11.1.6.1 Note: Once the SR distance is covered, the driver may have to go further.
  - 4.4.11.1.6.2 When entering SR mode, the value applicable for SR mode speed limit and the value applicable for SR distance shall be the corresponding National/Default values. Exception for SR distance: SR mode is authorised by RBC giving an SR distance.
  - 4.4.11.1.6.3 While in SR mode, the value applicable for the SR mode speed limit shall be, if available, the last value entered by the driver.
  - 4.4.11.1.6.4 While in SR mode, the value applicable for the SR distance shall be, if available, the last value received by the ERTMS/ETCS on-board equipment amongst:
    - a) the distance to run in SR entered by the driver;
    - b) the distance to run in SR given by trackside.
  - 4.4.11.1.6.5 When "Override" is selected, the SR mode speed limit value and the SR distance value previously entered by driver or given by trackside, if any, shall be deleted. The corresponding National/Default values shall enter in force.
  - 4.4.11.1.6.6 If the train is in SR and receives a new distance to run in SR mode from the RBC, the stored list of expected balise groups, if any, shall be deleted or shall be replaced by the list of expected balise groups sent together with the distance to run in SR.

- 4.4.11.1.6.7 If an ERTMS/ETCS on-board equipment in SR mode, after having received from EUROLOOP max permitted distance to run in SR mode information, detects the main signal balise group being part of this information then it shall ignore any new max permitted distance to run in SR mode information from that loop.
- 4.4.11.1.7 The ERTMS/ETCS on-board equipment shall display the train speed and the (when active) override (permission to pass a signal at danger, trip inhibited). The permitted speed, target distance and the target speed shall be displayed only on driver request, until the driver requests to stop their display.
- 4.4.11.1.8 Intentionally deleted.
- 4.4.11.1.9 If receiving a "track ahead free" request from the RBC, the ERTMS/ETCS on-board equipment requests the driver to enter the "track ahead free" information.
- 4.4.11.1.10 Note: for the list of main functions related to this mode, refer to chapter 4.5 "Modes and on-board functions".
- 4.4.11.1.11 Intentionally deleted.

#### **4.4.11.2 Used in levels**

- 4.4.11.2.1 Level 1, 2 and 3.

#### **4.4.11.3 Responsibilities**

- 4.4.11.3.1 The ERTMS/ETCS on-board equipment supervises a ceiling speed and a SR distance if finite (and if level 2/3, might also supervise a list of balises).
- 4.4.11.3.2 The driver must check if the track is free, if points are correctly positioned, and must respect the existing line-side information (signals, speed boards etc.).
- 4.4.11.3.3 When using the possibility to modify the value of the SR mode speed limit and of the given distance, the driver is responsible for entering reasonable values.

## **4.4.12 ON SIGHT**

### **4.4.12.1 Description**

- 4.4.12.1.1 The On Sight mode enables the train to enter into a track section that could be already occupied by another train, or obstructed by any kind of obstacle.
- 4.4.12.1.2 On Sight mode cannot be selected by the driver, but shall be entered automatically when commanded by trackside and all necessary conditions are fulfilled.
- 4.4.12.1.3 The ERTMS/ETCS on-board equipment shall supervise train movements against a dynamic speed profile.
- 4.4.12.1.4 The ERTMS/ETCS on-board equipment shall display the train speed to the driver (this list is not exhaustive). The permitted speed, target distance, target speed and release speed (if any) shall be displayed only on driver request, until the driver requests to stop their display.
- 4.4.12.1.5 If receiving a "track ahead free" request from the RBC, the ERTMS/ETCS on-board equipment requests the driver to enter the "track ahead free" information.
- 4.4.12.1.6 To be in On Sight mode, SSP and gradient are not required for the whole length of the train, but shall be at least available from the FRONT END of the train.
- 4.4.12.1.7 Once in On Sight mode, if SSP and gradient are not known for the whole length of the train, an indication "ENTRY IN ON SIGHT" shall be clearly displayed to the driver until SSP and gradient are known for the whole length of the train.
- 4.4.12.1.7.1 Note: this indication may also be displayed in case the train length has been increased, see 3.18.3.8.
- 4.4.12.1.8 Deleted
- 4.4.12.1.9 Note: for the list of main functions related to this mode, refer to chapter 4.5 "Modes and on-board functions".

### **4.4.12.2 Used in levels**

- 4.4.12.2.1 Used in level 1, 2 and 3.

### **4.4.12.3 Responsibilities**

- 4.4.12.3.1 The ERTMS/ETCS on-board equipment is responsible for the supervision of the train movements.
- 4.4.12.3.2 The driver is responsible for checking the track occupancy when moving the train, because the track may be occupied.

## **4.4.13 TRIP**

### **4.4.13.1 Description**

4.4.13.1.1 Deleted

4.4.13.1.1.1 Note: Application of emergency brakes and train trip are two different things. For example, exceeding the permitted speed leads to application of the emergency brakes, but as long as the train does not pass the EOA, it is not a train trip.

4.4.13.1.2 The ERTMS/ETCS on-board equipment shall command the emergency brakes (no brake release is possible in Trip mode).

4.4.13.1.3 The ERTMS/ETCS on-board equipment shall indicate to the driver the reason of the train trip.

4.4.13.1.4 The ERTMS/ETCS on-board equipment shall request an acknowledgement from the driver once train is at standstill (to allow the driver to acknowledge the train trip).

4.4.13.1.4.1 Note: This acknowledgement is mandatory to exit from Trip mode.

4.4.13.1.5 Note: for the list of main functions related to this mode, refer to chapter 4.5 "Modes and on-board functions".

4.4.13.1.6 Closing the desk while being in Trip mode will not cause a mode change but no interaction with the driver shall be possible as long as the desk is closed, except isolation of the ERTMS/ETCS on-board equipment

### **4.4.13.2 Used in levels**

4.4.13.2.1 Used in level 0, NTC, 1, 2 and 3.

### **4.4.13.3 Responsibilities**

4.4.13.3.1 The ERTMS/ETCS on-board equipment is responsible for stopping the train and for maintaining the train at standstill.

4.4.13.3.2 The driver has no responsibility for train movements.



**4.4.14 POST TRIP****4.4.14.1 Description**

- 4.4.14.1.1 The Post Trip mode shall be entered immediately after the driver acknowledges the trip.
- 4.4.14.1.2 Once in post trip mode, the onboard equipment shall release the Command of the emergency brake.
- 4.4.14.1.3 The train shall only be authorised to move backwards a given distance (national value). The ERTMS/ETCS on-board equipment shall supervise this national distance for reverse movements, and shall command the service brakes if the distance is overpassed. The driver shall be informed about the reason for the brake application.
  - 4.4.14.1.3.1 Note: The ERTMS/ETCS onboard equipment performs the Reverse Movement Protection (as in PT mode, the "normally allowed movement" is backwards, then the Reverse Movement Protection avoids the train running in forward direction when in PT mode). This implies that the given distance to run backwards in PT is considered as a directional data, oriented backwards.
  - 4.4.14.1.3.2 After the release of a brake command initiated due to an overpassed distance allowed for moving backwards in Post Trip mode, the ERTMS/ETCS on-board equipment shall command the service brake for any further movement in the direction opposite to the train orientation.
- 4.4.14.1.4 When moving backwards in Post Trip mode, the train trip shall be inhibited.
- 4.4.14.1.5 Intentionally deleted.
- 4.4.14.1.6 When ERTMS/ETCS level is 1, if the driver selects "Start" the onboard equipment proposes Staff Responsible. When ERTMS/ETCS level is 2 or 3, the selection of Start leads to an MA Request to the RBC. It is the RBC responsibility to give an SR authorisation, or a Full Supervision MA or an On Sight/Shunting MA to an ERTMS/ETCS equipment that is in Post Trip mode.
- 4.4.14.1.7 Intentionally deleted.
- 4.4.14.1.8 Note: for the list of main functions related to this mode, refer to chapter 4.5 "Modes and on-board functions".
- 4.4.14.1.9 In case of balise group message consistency error (refer to 3.16.2.4.4 and 3.16.2.5.1), the ERTMS/ETCS onboard equipment shall not command the service brake.

**4.4.14.2 Used in levels**

- 4.4.14.2.1 Used in level 1, 2 and 3.

#### **4.4.14.3 Responsibilities**

- 4.4.14.3.1 The ERTMS/ETCS on-board equipment is responsible for supervising that the train moves only backwards and that the backward movement does not exceed the maximum permitted distance (national value).
- 4.4.14.3.2 The driver is responsible if moving the train backwards.

## **4.4.15 NON LEADING**

### **4.4.15.1 Description**

4.4.15.1.1 The Non-Leading mode is defined to manage the ERTMS/ETCS on-board equipment of a slave engine that is NOT electrically coupled to the leading engine (and so, not remote controlled) but has its own driver.

4.4.15.1.1.1 Note: This operating situation is called Tandem.

4.4.15.1.1.2 The ERTMS/ETCS on-board equipment shall use, as a necessary condition to enter in Non-Leading mode, a “non leading input signal” from the train interface.

4.4.15.1.1.3 If the “non leading input signal” is no longer present, the switch to Stand-By mode shall be made only if the train is at standstill.

4.4.15.1.2 The ERTMS/ETCS on-board equipment shall not perform any train movement supervision in Non-Leading mode.

4.4.15.1.3 The ERTMS/ETCS on-board equipment shall perform the Train Position function; in particular, the front/rear end of the engine (i.e., not the train) shall be used to refer to train front/rear end.

4.4.15.1.4 When level is 2 or 3, the ERTMS/ETCS on-board equipment shall report its position to the RBC, according to the previously received parameters.

4.4.15.1.5 If possible, the train must not be stopped due to a safety critical fault in a non-leading engine. The ERTMS/ETCS on-board equipment shall therefore try to memorise the occurrence of such fault(s), which shall be handled when the engine leaves Non Leading mode. The ERTMS/ETCS on-board equipment shall also try to send an error information to the RBC.

4.4.15.1.6 The ERTMS/ETCS on-board equipment shall display the train speed to the driver.

4.4.15.1.7 Intentionally deleted

4.4.15.1.8 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.

4.4.15.1.9 The supervision of linking consistency shall not be performed in Non Leading mode.

4.4.15.1.10 In case of balise group message consistency error (refer to 3.16.2.4.4 and 3.16.2.5.1), the ERTMS/ETCS onboard equipment shall not command the service brake..

### **4.4.15.2 Used in levels**

4.4.15.2.1 Used in all levels: Level 0, level 1, level 2, level 3 and level NTC.

#### **4.4.15.3 Responsibilities**

- 4.4.15.3.1 The ERTMS/ETCS on-board equipment shall perform NO protection functions, except forwarding track conditions associated orders through DMI or train interface.
- 4.4.15.3.2 The driver is responsible for obeying the orders associated to track conditions, when they are displayed by the DMI..

#### **4.4.16      Intentionally deleted**

#### **4.4.17 National System (SN) mode**

##### **4.4.17.1 Description**

- 4.4.17.1.1 In SN mode, according to the specific on-board implementation, the National System may access the following resources via the ERTMS/ETCS on-board equipment: DMI, Juridical Recording interface, odometer, train interface and brakes. This can be achieved through the STM interface.
- 4.4.17.1.2 A limited set of data coming from balises shall be used by the ERTMS/ETCS on-board equipment, refer to SRS chapter 4.8 “Use of received information”.
- 4.4.17.1.3 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.

##### **4.4.17.2 Used in levels**

- 4.4.17.2.1 Level NTC.

##### **4.4.17.3 Responsibilities of ERTMS/ETCS Onboard**

- 4.4.17.3.1 No train supervision functionality is provided by the ERTMS/ETCS on-board equipment. In case the ERTMS/ETCS on-board equipment is interfaced to the National System through an STM, refer to the FFFIS STM (Subset 035) for the functionality provided by ERTMS/ETCS on-board.
- 4.4.17.3.2 Intentionally deleted.

##### **4.4.17.4 Responsibilities of the National System**

- 4.4.17.4.1 The National System is responsible for all train supervision and protection functions.
- 4.4.17.4.2 The National System is responsible for issuing and revoking brake command.
- 4.4.17.4.3 The National System is responsible for maintaining national system behaviour and interact with national trackside equipment.
- 4.4.17.4.4 The National System is responsible for interaction with the driver.

##### **4.4.17.5 Responsibilities of the driver**

- 4.4.17.5.1 The responsibility of the driver depends on the National System in use.

**4.4.18 REVERSING****4.4.18.1 Description**

- 4.4.18.1.1 The Reversing mode allows the driver to change the direction of movement of the train and drive from the same cab, i.e. the train orientation remains unchanged. This shall be possible only in areas so marked by trackside. Reversing areas shall be announced in advance by trackside.
- 4.4.18.1.2 Note: This mode is used to allow the train to escape from a dangerous situation and to reach as fast as possible a "safer" location.
- 4.4.18.1.3 The ERTMS/ETCS on-board equipment shall supervise train movements against:
- a) a ceiling speed: the Reversing mode speed limit given from trackside
  - b) a distance to run in the direction opposite to the train orientation, given from trackside. The emergency brake shall be commanded if overpassing this distance
- 4.4.18.1.4 After the release of a brake command initiated due to an overpassed reversing distance, and while the reversing distance is still overpassed, the ERTMS/ETCS on-board equipment shall command the emergency brake for any further movement in the direction opposite to the train orientation.
- 4.4.18.1.5 The ERTMS/ETCS on-board equipment shall display the train speed, the permitted speed and the remaining distance to run.
- 4.4.18.1.6 In case the SBI supervision limit is exceeded (refer to chapter 3 table 5, triggering condition t4), the ERTMS/ETCS on-board equipment shall command the emergency brake instead of the service brake. For the revocation of the brake command, refer to 3.13.10.2.4.
- 4.4.18.1.7 The position reports sent when in reversing mode shall refer to the location of the driving cab (as before reversing).
- 4.4.18.1.8 Note: The ERTMS/ETCS onboard equipment performs the Reverse Movement Protection (as in RV mode, the "normally allowed movement" is backwards, then the Reverse Movement Protection avoids the train running in forward direction when in RV mode). This implies that the given distance to run in reversing is considered as a directional data, oriented backwards.
- 4.4.18.1.9 Note: for the list of main functions related to this mode, refer to chapter 4.5 "Modes and on-board functions".
- 4.4.18.1.10 In case of balise group message consistency error (refer to 3.16.2.4.4 and 3.16.2.5.1), the ERTMS/ETCS onboard equipment shall not command the service brake.
- 4.4.18.1.11 In case there is an alarm reporting a malfunction for the onboard balise transmission function, the ERTMS/ETCS onboard equipment shall ignore this alarm.

4.4.18.1.12 In case the ERTMS/ETCS system version number X transmitted by any balise is greater than the highest version X supported by the onboard equipment (refer to 3.17.3.5), the information from this balise shall be ignored, the train shall not be tripped and the driver shall not be informed.

#### **4.4.18.2 Used in levels**

4.4.18.2.1 Level 1, 2, 3.

#### **4.4.18.3 Responsibilities**

4.4.18.3.1 The ERTMS/ETCS on-board equipment supervises a ceiling speed and a distance to run in reverse direction.

4.4.18.3.2 The driver must keep the train movement inside the received distance to run.



## 4.4.19 LIMITED SUPERVISION

### 4.4.19.1 Description

- 4.4.19.1.1 The Limited Supervision mode enables the train to be operated in areas where trackside information can be supplied to realise background supervision of the train.
- 4.4.19.1.2 Limited supervision can not be selected by the driver, but shall be entered automatically when commanded by trackside and all necessary conditions are fulfilled.
- 4.4.19.1.3 The ERTMS/ETCS on-board equipment shall supervise train movements against a dynamic speed profile.
- 4.4.19.1.4 The ERTMS/ETCS on-board equipment shall display the train speed and the release speed, if any (this list is not exhaustive – refer to chapter 4.7 “DMI depending on modes”). Upon request by trackside (refer to clauses 4.4.19.1.4.2 to 4.4.19.1.4.6) if the generic LS function marker is stored on-board or if the conditions in clause 4.4.19.1.4.7 are fulfilled, the ERTMS/ETCS on-board equipment shall also display the lowest speed amongst:
- a) the lowest MRSP element between the minimum safe front end of the train and the EOA/LOA, AND
  - b) the target speed at the EOA/LOA
- 4.4.19.1.4.1 The speed resulting from 4.4.19.1.4 a) and b) is called the Lowest Supervised Speed within the Movement Authority (LSSMA)
- 4.4.19.1.4.2 Upon an order to toggle on the LSSMA display, the ERTMS/ETCS on-board equipment shall start a delay timer:
- a) For order received from RBC/RIU: at the value of the time stamp of the message including the order.
  - b) For order received from balise group: at the time of passage over the first encountered balise of the balise group giving the order.
  - c) Exception to a) and b): for order that has been stored in the level transition buffer (see section 4.8.3): at the time the level transition is performed.
- 4.4.19.1.4.3 When the delay timer value becomes greater than the time-out value given by trackside, the ERTMS/ETCS on-board equipment shall display the LSSMA.
- 4.4.19.1.4.4 On reception of an order to toggle (on or off) the LSSMA display, a toggle on order which has not been executed yet (because the on-board delay timer has not reached the delay time-out value) shall be deleted by the on-board equipment.
- 4.4.19.1.4.5 If the LSSMA display is already toggled on, the ERTMS/ETCS on-board equipment shall toggle off the LSSMA display in case:

- a) the clause 4.4.19.1.4.3 is not immediately fulfilled upon reception of a new order to toggle on the LSSMA display
  - b) an order to toggle off the LSSMA display is received.
- 4.4.19.1.4.6 When entering the Limited Supervision mode, the LSSMA display shall be toggled off by the ERTMS/ETCS on-board equipment, unless a toggle on order is received and leads immediately to the display of the LSSMA as per clauses 4.4.19.1.4.2 and 4.4.19.1.4.3.
- 4.4.19.1.4.7 If the generic LS function marker is not stored on-board, the clauses 4.4.19.1.4.2 to 4.4.19.1.4.6 shall not apply and the LSSMA shall be displayed if:
- a) the target speed at the EOA/LOA is lower than the Limited Supervision mode speed limit, AND
  - b) the LSSMA is lower than the maximum train speed.
- 4.4.19.1.4.8 The generic LS function marker shall be deleted by the ERTMS/ETCS on-board equipment as soon as a Limited Supervision mode profile is received without it in the same balise group message.
- 4.4.19.1.5 If receiving a "track ahead free" request from the RBC, the ERTMS/ETCS on-board equipment requests the driver to enter the "track ahead free" information.
- 4.4.19.1.6 To be in Limited Supervision mode, SSP and gradient are not required for the whole length of the train, but shall be at least available from the FRONT END of the train.
- 4.4.19.1.7 Note: for the list of main functions related to this mode, refer to 4.5 "Modes and on-board functions".
- 4.4.19.2 Used in levels**
- 4.4.19.2.1 Used in levels 1, 2 and 3.
- 4.4.19.3 Responsibilities**
- 4.4.19.3.1 The ERTMS/ETCS on-board equipment is responsible for the background supervision of the train movement to the extent permitted by the information provided by trackside.
- 4.4.19.3.1.1 Note: The Limited Supervision mode enables the train to be operated in areas equipped with lineside signals where ETCS does not have information regarding the status of some signals, i.e. not all signals are fitted with LEUs or connected to an RBC
- 4.4.19.3.2 The driver must always observe the existing line-side information (signals, speed boards etc.) and National operating rules.
- 4.4.19.3.2.1 Note: the indications given to the driver by the ERTMS/ETCS on-board equipment do not substitute the observance of the line-side information. In particular the display of the LSSMA, if deemed necessary by the trackside, only complements

the line-side information, e.g. in case there could be a discrepancy between this latter and the background supervision.

## 4.4.20 PASSIVE SHUNTING

### 4.4.20.1 Description

- 4.4.20.1.1 The Passive Shunting mode is defined to manage the ERTMS/ETCS on-board equipment of a slave engine (NOT remote controlled, but mechanically coupled to the leading engine), being part of a shunting consist. This mode can also be used to carry on a shunting movement with a single engine fitted with one on-board equipment and two cabs, when the driver has to change the driving cab.
- 4.4.20.1.2 The desk of a Passive Shunting engine must be closed (since there is no driver, no information shall be shown).
- 4.4.20.1.3 As the engine is coupled to a leading engine, its ERTMS/ETCS on-board equipment shall not perform any train movement supervision.
- 4.4.20.1.4 The ERTMS/ETCS on-board equipment shall perform Train Position function; in particular, the front/rear end of the engine (i.e., not the train) shall be used to refer to train front/rear end.
- 4.4.20.1.5 It shall only be possible to enter in Passive Shunting mode from the Shunting mode; while in Shunting mode, the driver shall have the possibility to enable the function "Continue Shunting on desk closure".
- 4.4.20.1.6 When the active desk is closed, the ERTMS/ETCS on-board equipment shall switch to Passive Shunting mode if the function "Continue Shunting on desk closure" is active and the "passive shunting input signal" is received from the train interface. If the function "Continue Shunting on desk closure" is not active or the "passive shunting input signal" is not present, the ERTMS/ETCS on-board equipment shall switch to Stand-By mode instead.
- 4.4.20.1.7 The special function "Continue Shunting on desk closure" shall allow one and only one transition from Shunting mode to Passive Shunting mode. The special function shall be inactive once the Shunting mode is left.
- 4.4.20.1.8 If a desk of the Passive Shunting engine is opened and no "Stop Shunting on desk opening" information previously received from balise group is stored onboard, the ERTMS/ETCS on-board equipment shall switch to Shunting mode.
- 4.4.20.1.9 If a desk of the Passive Shunting engine is opened and "Stop Shunting on desk opening" information previously received from balise group is stored onboard, the ERTMS/ETCS on-board equipment shall switch to Stand By mode.
- 4.4.20.1.10 If possible, the train must not be stopped due to a safety critical fault in a Passive Shunting engine. The ERTMS/ETCS on-board equipment shall therefore try to memorise the occurrence of such fault(s), which shall be handled when the engine leaves the Passive Shunting mode.

- 4.4.20.1.11 When in Passive Shunting mode, the ERTMS/ETCS on-board shall not manage level transitions. However, an immediate level transition order or a conditional level transition order shall be stored and shall be evaluated only when another mode than Shunting or Passive Shunting has been entered (i.e. when the Shunting movement is terminated).
- 4.4.20.1.12 When receiving a communication session establishment order, the ERTMS/ETCS on-board in Passive Shunting mode shall not establish the communication session, but shall store the RBC ID/phone number information.
- 4.4.20.1.13 When in Passive Shunting mode, the ERTMS/ETCS on-board shall not manage RBC-RBC hand-over, except for storing the RBC ID/phone number information given at the RBC/RBC border.
- 4.4.20.1.14 Note: for the list of main functions related to this mode, refer to chapter 4.5 “Modes and on-board functions”.
- 4.4.20.1.15 In case of balise group message consistency error (refer to 3.16.2.4.4 and 3.16.2.5.1), the ERTMS/ETCS onboard equipment shall not command the service brake.

#### **4.4.20.2 Used in levels**

- 4.4.20.2.1 Used in all levels: Level 0, level 1, level 2, level 3 and level NTC

#### **4.4.20.3 Responsibilities**

- 4.4.20.3.1 The ERTMS/ETCS on-board equipment of an engine in Passive Shunting mode has no responsibility for the train protection.
- 4.4.20.3.2 The notion of responsibility of the driver is not relevant for the Passive Shunting mode.
- 4.4.20.3.3 Note: The leading engine is responsible for the movement of the train. It is then the ERTMS/ETCS on-board equipment of the leading engine that is fully/partially/not responsible for the train protection, with respect to its mode.

## 4.5 Modes and on-board functions

### 4.5.1 Introduction

4.5.1.1 The following table specifies in which modes the on-board functions are active or not. The functions are described in the “Related SRS §” (second column of the table).

4.5.1.2 Note: Modes are not the only thing that can influence an onboard function. This is why this Table is not enough in itself to understand all the ERTMS/ETCS onboard behaviour. It must be understood as a complement to all other SRS chapters (especially §4.7, 4.8, 4.9 and 4.10).

4.5.1.3 Note: for DMI depending on modes, refer to §4.7.

### 4.5.2 Active Functions Table

4.5.2.1 X = functions shall be active

Empty case = function shall be inactive

O = Optional (function is not required for interoperability, but is not forbidden)

ONBOARD-FUNCTIONS	RELATED SRS §	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
<b>Data Consistency</b>																		
Check linking consistency	3.16.2.3 3.4.4					X	X		X									
Check Balise Group Message Consistency if linking consistency is checked	3.16.2.4.1 3.16.2.4.3					X	X		X									
Check Balise Group Message Consistency if no linking consistency is checked (because no linking information is available and/or because the function “check linking consistency is not active)	3.16.2.4.4		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Check Unlinked Balise Group Message Consistency	3.16.2.5		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Check correctness of radio messages	3.16.3.1.1		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Check radio sequence	3.16.3.3		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Check safe radio connection (only level 2/3)	3.16.3.4					X	X		X									
<b>Determine Train Speed and Position:</b>																		

ONBOARD-FUNCTIONS	RELATED SRS §	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
Determine train position referenced to LRBG	3.6.1 3.6.4		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Determine train speed, train acceleration, train standstill	None		X	X	X	X	X	X	X	X	X	X	X	X		O	X	X
Determine Geographical Position	3.6.6		X			X	X	X	X		X	X	X	X				
Report train position when train reaches standstill	3.6.5.1.4 a)					X	X	X	X							O		X
Report train position when mode changes to... <sup>1</sup>	3.6.5.1.4 b)		X		X <sup>2</sup>	X	X	X	X	X	X	X	X	X	X	O	X	X
Report train position when train integrity confirmed by driver	3.6.5.1.4 c)		X			X	X	X	X					X				
Report train position when loss of train integrity is detected	3.6.5.1.4 d)		X			X	X	X	X				X	X				X
Report train position when train front/rear passes a RBC/RBC border	3.6.5.1.4 e) 3.6.5.1.4 k)					X	X	X	X				X					
Report train position when train rear passes a level transition border (from level 2/3 to 0, NTC, 1)	3.6.5.1.4 f)					X	X	X	X			X	X				X	
Report train position when change of level due to trackside order	3.6.5.1.4 g)					X	X	X	X		X		X					
Report train position when change of level due to driver request	3.6.5.1.4 g)		X			X	X	X	X		X							
Report train position when establishing a session with RBC	3.6.5.1.4 h)		X		X	X	X	X	X	X	X	X	X	X			X	X
Report train position as requested by RBC...	3.6.5.1.4		X			X	X	X	X		X	X	X	X			X	X
... or Report train position at every balise group passage	3.6.5.1.4 j)					X	X	X	X		X	X	X	X			X	X
<b>Manage MA</b>																		
Request MA Cyclically respect to approach of target indication point (T_MAR) or MA timer elapsing (T_TIMEOUTRQST) (only level 2/3)	3.8.2.3 a) and b)					X	X		X									
Request MA Cyclically when "Start" is selected (only level 2/3)	4.4.11 5.4, 5.11		X					X						X				

<sup>1</sup> For ETCS level 2 and 3 this may imply establishing a radio communication session if none is established.

<sup>2</sup> Exception: the transition PS => SH shall not be reported

ONBOARD-FUNCTIONS	RELATED SRS §	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
Request MA on reception of "track ahead free up to the level 2/3 transition location" (only level 0,1,NTC)	3.8.2.7.1		X			X	X	X	X			X	X	X			X	
Request MA on track description deletion	3.8.2.7.3					X	X		X									
Determine EOA/LOA, SvL, Danger Point, etc...	3.8.4 3.8.5					X	X		X									
Handle Co-operative MA revocation	3.8.6					X	X		X									
Manage Unconditional Emergency Stop	3.10		X			X	X	X	X					X				
Manage Conditional Emergency Stop	3.10					X	X		X					X				
<b>Determine Most Restrictive Speed Profile, based on :</b>																		
SSP	3.11.3					X	X		X									
ASP	3.11.4					X	X		X									
TSR	3.11.5					X	X	X	X			X						
Signalling related speed restriction when evaluated as a speed limit	3.11.6					X	X		X									
Mode related speed restriction	3.11.7				X		X	X	X			X						X
Train related speed restriction	3.11.8					X	X	X	X			X						X
STM max speed	3.11.2.2 g)					X	X	X	X			X					X	
STM system speed	3.11.2.2 h)					X	X	X	X			X						
LX speed	3.12.5.6					X	X		X									
Speed restriction to ensure a given permitted braking distance	3.11.11					X	X		X									
Override related speed restriction	5.8.3.6				X			X				X						
<b>Supervise Train Speed</b>																		
Speed and Distance Monitoring based on MRSP, MA, release speed, gradient, mode profile, non protected LX start location, and route unsuitability location	3.13 5.9.3.5 5.7.3.4 3.12.2.8 3.12.5.4					X	X		X									
Speed and Distance Monitoring based on MRSP	4.4.10.1											X						
Speed and Distance Monitoring based on MRSP, allowed distance to run in Staff Resp. mode	4.4.11							X										



ONBOARD-FUNCTIONS	RELATED SRS §	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
Ceiling Speed Monitoring only (no braking curve) based on MRSP	4.4.8.1.1 a) 4.4.18.1.3 a)				X												X <sub>3</sub>	X
<b>Supervise Train Movements</b>																		
Backwards Distance Monitoring	4.4													X				X
Roll Away Protection	3.14.2				X	X	X	X	X			X		X				X
Reverse Movement Protection	3.14.3					X	X	X	X					X				X
Standstill Supervision	3.14.4 4.4.7.1.5		X															
Supervise “danger for shunting” information and list of expected balises for shunting	4.4.8.1.1 b) and c)				X													
Supervise “Stop if in SR” information and list of expected balises for Staff Responsible	4.4.11.1.3 c) and d)							X										
Supervise signalling related speed restriction when evaluated as a trip order	3.11.6.4					X	X	X	X									
Command Emergency Brake	4	X											X		X			
<b>Determine Mode and Level</b>																		
Determine ERTMS/ETCS Mode	3.12.4, 4.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Determine ERTMS/ETCS level	5.10		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
<b>Other functions</b>																		
System Version Management	3.17		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Manage Communication Session	3.5		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Delete Revoked TSR	3.11.5.5		X			X	X	X	X			X	X	X				
Override (Trip inhibition) <sup>4</sup>	5.8				X			X				X					X	
Manage Track Conditions excluding Sound Horn, Non Stopping Areas, Tunnel Stopping Areas and Big Metal Masses	3.12.1					X	X		X		X		X	X				
Manage Track Conditions Sound Horn, Non Stopping Areas, Tunnel Stopping Areas	3.12.1					X	X		X									
Manage Track Condition Big Metal Masses	3.12.1		X	X	X	X	X	X	X	X	X	X	X	X	O		X	

<sup>3</sup> In case the ERTMS on-board equipment is interfaced to the National System through an STM, refer to SUBSET-035 for details

<sup>4</sup> For UN and SN mode, conditions for re-activation of transition to Trip mode (see § 5.8.4.1a) & b)) shall be supervised.

ONBOARD-FUNCTIONS	RELATED SRS §	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
Manage Route Suitability	3.12.2					X	X		X									
Manage Text Display to the driver	3.12.3		X			X	X	X	X		X	X	X	X				X
Manage LSSMA display to the driver	4.4.19.1						X											
Manage RBC/RBC Handover	3.15.1, 5.15					X	X	X	X	X	X		X					
Manage Track Ahead Free Request	3.15.5		X				X	X	X					X				
Provide Fixed Values, and Default/National Values	3.18.1 3.18.2		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Manage change of Train Data from external sources	5.17		X			X	X	X	X			X	X	X			X	
Provide Date and Time	3.18.5		X	X	X	X	X	X	X	X	X	X	X	X			X	X
Provide Juridical Data	3.20		X	X	X	X	X	X	X	X	X	X	X	X	O	O	X	X
Inhibition of revocable TSRs from balises(only level 2/3)	3.11.5.12 3.11.5.13 3.11.5.14 3.11.5.15					X	X		X				X	X				
Cold Movement Detection	3.15.8	O																
Continue Shunting on desk closure (Enabling transition to Passive Shunting mode)	5.12.4				X													
Manage “Stop Shunting on desk opening” information	4.4.20.1.8 4.4.20.1.9			X														
Manage Virtual Balise Covers	3.15.9		X	X	X	X	X	X	X	X	X	X	X	X	O	O	X	X
Advance display of route related information	3.15.10					O												

Figure 1: Active Functions table

## 4.6 Transitions between modes

### 4.6.1 Symbols

- 4.6.1.1 The indication “**4>**” means: The condition n°4 must be fulfilled to trigger the transition
- 4.6.1.2 From the mode located in the column
- 4.6.1.3 To the mode that is indicated by the arrow “**>**”.
- 4.6.1.4 Each transition from a given mode receives a priority order (indicated by “**-px-**”, x is the priority order) to avoid a conflict between the different transitions when they occur at the same time (i.e. in the same clock cycle). P1 has a higher priority than P2.
- 4.6.1.5 Some transitions have received the same priority order. This has been decided when it is obvious that these transitions cannot occur at the same time, and so can never lead to a conflicting situation (for example, the RBC cannot give in the same time a MA for FS and a MA for OS to a given engine, this is why the transition “from SR to FS” and the transition “from SR to OS” have the same priority order).
- 4.6.1.6 “16, 17, 18” means “16 or 17 or 18”.

## 4.6.2 Transitions Table

NP	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-	<29 -p2-		<29 -p2-	<29 -p2-
4> -p2-	SB	<22 -p4-	<19, 27, 30 -p5-	<28 -p5-	<28 -p5-	<28, -p5-	<28, -p5-	<2, 3 -p3-	<28, 47 -p3-	<28, -p6-		<28, -p4			<28 -p6-	<28 -p4-
		PS	<26 -p5-													
	5, 6, 50> -p7-	23> -p4	SH	<5,6, 50,51 -p6-	<5,6, 50,51 -p6-	<5,6, 51 -p6-	<5,6 50,51 -p6-			<5,61 -p7-	<68 -p4	<5,6, 50 -p5-			<5,61 -p7	
	10> -p7-			FS	<31,32 -p6-	<31,32 -p6-	<31,32 -p6-			<25 -p7-		<31 -p5-			<25 -p7-	
	70> -p7-			70,72> -p6-	LS	<72 -p6-	<70,74 -p6-			<71 -p7-		<70 -p5-			<71 -p7-	
	8,37> -p7-			37> -p6-	37> -p6-	SR	<37 -p6-			<44,45 -p4-		<8,37 -p5-			<44,45 -p4-	
	15> -p7-			15,40> -p6-	15,73> -p6-	40> -p6-	OS			<34 -p7-		<15 -p5-			<34 -p7-	
	14> -p5-	14> -p4						SL								
	46> -p6-		46> -p5-	46> -p6-	46> -p6-	46> -p6-	46> -p6-		NL							
	60> -p7-			21> -p6-	21> -p6-	21> -p6-	21> -p6-			UN	<62 -p4-				<21 -p7-	
	20> -p4-		49,52, 65> -p4-	12,16, 17,18, 20,41, 65,66, 69> -p4-	12,16, 17,18, 20,41, 65,66, 69> -p4-	18,20, 42, 43, 36, 54,65> -p4-	12,16, 17,18, 20,41, 65,66, 69> -p4-			67,39, 20> -p5-	TR				<67, 39,38, 35,20 -p5-	
											7> -p4-	PT				
	13> -p3-	13> -p3-	13> -p3-	13> -p3-	13> -p3-	13> -p3-	13> -p3-			13> -p3-	13> -p3-	13> -p3-	SF		<13 -p3-	<13 -p3-
1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	1> -p1-	IS	<1 -p1-	<1 -p1-
	58> -p7-			56> -p6-	56> -p6-	56> -p6-	56> -p6-			56> -p7-	63> -p4-				SN	
				59> -p6-	59> -p6-		59> -p6-									RV

Figure 2: Transition table.

### 4.6.3 Transitions Conditions Table

Condition Id	Content of the conditions
[1]	The driver isolates the ERTMS/ETCS on-board equipment.
[2]	(a desk is open)
[3]	(no “go sleeping” input signal is received any more) AND (train is at standstill)
[4]	The ERTMS/ETCS on-board equipment is powered.
[5]	(train is at standstill) AND (ERTMS/ETCS level is 0 or NTC or 1) AND (driver selects Shunting mode)
[6]	(train is at standstill) AND (ERTMS/ETCS level is 2 or 3) AND (reception of the information “Shunting granted by RBC”, due to a Shunting request from the driver)
[7]	(the driver acknowledges the train trip) AND (the train is at standstill) AND (the ERTMS/ETCS level is different from 0, NTC)
[8]	(Staff Responsible mode is proposed to the driver) AND (driver acknowledges) <b>{4}</b>
[9]	<i>Empty</i>
[10]	(valid Train Data is stored on board) AND (MA + SSP +gradient are on-board) AND (no specific mode is required by a Mode Profile)
[11]	<i>Empty</i>
[12]	(The train/engine overpasses the EOA/LOA with its min safe antenna position) AND (ERTMS/ETCS level is 1)
[13]	The ERTMS/ETCS on-board equipment detects a fault that affects safety
[14]	(The “sleeping” input signal is received) AND (train is at standstill) AND (all desks connected to the ERTMS/ETCS on-board equipment are closed)
[15]	(An ackn. request for On Sight is displayed to the driver) AND (the driver acknowledges) <b>see {1} here under</b>
[16]	(The train/engine overpasses the EOA/LOA with its min safe front end) AND (ERTMS/ETCS level is 2 or 3).
[17]	The onboard reacts according to a linking reaction set to “trip”.
[18]	(the train/engine receives and uses a trip order given by balise) AND (override is not active)
[19]	(driver selects “exit Shunting”) AND (train is at standstill).
[20]	(unconditional emergency stop message is accepted)
[21]	(ERTMS/ETCS level switches to 0) <b>see {2} here under</b>
[22]	(a desk is open) AND (“Stop Shunting on desk opening” information is stored onboard)
[23]	(a desk is open) AND (no “Stop Shunting on desk opening” information is stored

	onboard)
[24]	<i>Empty</i>
[25]	(ERTMS/ETCS level switches to 1,2 or 3) AND (MA+SSP+gradient are on-board) AND (no specific mode is required by a Mode Profile)
[26]	(desks are closed) AND ("Continue Shunting on desk closure" function is active) AND (the "passive shunting" input signal is received)
[27]	(desks are closed) AND ("Continue Shunting on desk closure" function is not active)
[28]	(desks are closed)
[29]	the ERTMS/ETCS on-board equipment is NOT powered
[30]	(desks are closed) AND (no "passive shunting" input signal is received)
[31]	(MA+SSP+gradient are on-board) AND (no specific mode is required by a Mode Profile) AND (ERTMS/ETCS level is 2 or 3)
[32]	(MA+SSP+gradient are on-board) AND (no specific mode is required by a Mode Profile) AND (ERTMS/ETCS level is 1) AND (no trip order is given by balise)
[33]	<i>Empty</i>
[34]	(A Mode Profile defining an On Sight area is on-board) AND (The max safe front end of the train is inside the On Sight area) AND (The ERTMS/ETCS level switches to 1,2 or 3)
[35]	(driver selects Shunting mode) AND (The ERTMS/ETCS on-board equipment is interfaced to the National System through an STM) AND (a National Trip Procedure is active, <b>see {8} here under</b> )
[36]	(the identity of the over-passed balise group is not in the list of expected balises related to SR mode) AND (override is not active).
[37]	(driver selects "override") AND (train speed is under or equal to the speed limit for triggering the "override" function) <b>see {3} here under</b>
[38]	(The ERTMS/ETCS on-board equipment is interfaced to the National System through an STM) AND (The ERTMS/ETCS level switches to 0,1,2 or 3) AND (a National Trip Procedure is active) <b>see {8} here under</b>
[39]	(The ERTMS/ETCS level switches to 1,2 or 3) AND (no MA has been accepted)
[40]	(A Mode Profile defining an On Sight area is on-board) AND (The max safe front end of the train is inside the On Sight area)
[41]	(T_NVCONTACT is passed) AND (associated reaction is "train trip")
[42]	(The train/engine overpasses the SR distance with its estimated front end) AND (override is not active)
[43]	(The train/engine overpasses the former EOA (when Override was activated) with the min safe antenna position) AND (override is not active), <b>see {3} here under</b>
[44]	("override" function is active) AND (ERTMS/ETCS level switches to 1) <b>see {3} here under</b>
[45]	("override" function is active) AND (no unconditional emergency stop message has

	been received) AND (ERTMS/ETCS level switches to 2 or 3) <b>see {3} here under</b>
[46]	(Driver selects NON LEADING) AND (train is at standstill) AND (The “non leading” input signal is received)
[47]	(no “non leading” input signal is received any more) AND (train is at standstill)
[48]	<i>Empty</i>
[49]	(reception of information “stop if in shunting”) AND (override is not active)
[50]	(An ackn. request for Shunting is displayed to the driver) AND (the driver acknowledges) <b>see {5} here under</b>
[51]	(A Mode Profile defining the entry of a Shunting area is used on-board) AND (The max safe front end of the train is inside the Shunting area)
[52]	(the identity of the over-passed balise group is not in the list of expected balise groups related to SH mode) AND (override is not active).
[53]	<i>Empty</i>
[54]	(reception of information “stop if in Staff Responsible”) AND (no list of expected balise groups related to SR mode has been received or the list of expected balise groups related to SR mode does not include the identity of the over-passed balise group) AND (override is not active)
[56]	(the ERTMS/ETCS level switches to “NTC”)
[58]	(the ERTMS/ETCS level is “NTC”) AND (an acknowledgement request for SN mode is displayed to the driver) AND (the driver acknowledges)
[59]	(train is at standstill) AND (driver has acknowledged the reversing) <b>see {6} here under</b>
[60]	(an acknowledgement request for UN mode is displayed to the driver) AND (the driver acknowledges)
[61]	(A Mode Profile defining a Shunting area is on-board) AND (The max safe front end of the train is inside the Shunting area) AND (The ERTMS/ETCS level switches to 1,2 or 3)
[62]	(the driver acknowledges the train trip) AND (the train is at standstill) AND (the ERTMS/ETCS level is 0) AND (valid Train Data is on-board)
[63]	(the driver acknowledges the train trip) AND (the train is at standstill) AND (the ERTMS/ETCS level is NTC) AND (valid Train Data is on-board)
[65]	(The system version number X of a received balise telegram is greater than the highest version number X supported by the on-board equipment) AND (ERTMS/ETCS level is 1, 2 or 3)
[66]	A balise group contained in the linking information is passed in the unexpected direction
[67]	(The ERTMS/ETCS level switches to level 1) AND (a trip order has been received) AND (override is not active)
[68]	(the driver acknowledges the train trip) AND (the train is at standstill) AND (the

	ERTMS/ETCS level is 0 or NTC) AND (no valid Train Data is on-board)
[69]	Estimated train front end is in rear of the start location of either SSP or gradient profile stored on-board
[70]	(An ackn. request for Limited Supervision is displayed to the driver) AND (the driver acknowledges) <b>see {7} here under</b>
[71]	(A Mode Profile defining a Limited Supervision area is on-board) AND (The max safe front end of the train is inside the Limited Supervision area) AND (The ERTMS/ETCS level switches to 1,2 or 3)
[72]	(A Mode Profile defining a Limited Supervision area is on-board) AND (The max safe front end of the train is inside the Limited Supervision area).
[73]	(A Mode Profile defining an On Sight area is on-board) AND (The max safe front end of the train is inside the On Sight area) AND (The estimated front end of the train is not inside an LS acknowledgement area)
[74]	(A Mode Profile defining a Limited Supervision area is on-board) AND (The max safe front end of the train is inside the Limited Supervision area) AND (The estimated front end of the train is not inside an OS acknowledgement area)

{1} The request to acknowledge On Sight is displayed to the driver only if certain conditions are fulfilled. These conditions are not specified here. See the "On Sight" procedure" in 5.9.

{2} This transition to the Unfitted mode is also a transition of level. For further information, See the "Level Transition" procedure in 5.10 and the "Start Of Mission" procedure in 5.4.

{3} See the "Override" procedure" of SRS-§5.

{4} The Staff Responsible mode is proposed to the driver only if certain conditions are fulfilled. These conditions are not specified here. See the "Start Of Mission" procedure and the "Train Trip" procedure of SRS-§5.

{5} The request to acknowledge Shunting is displayed to the driver only if certain conditions are fulfilled. These conditions are not specified here. See the "Entry in Shunting" procedure and the "Start Of Mission" procedure of SRS-§5.

{6} The request to acknowledge Reversing is displayed to the driver when certain conditions are fulfilled. These conditions are not specified here. See the "reversing" procedure of SRS-§5.

{7} The request to acknowledge Limited Supervision is displayed to the driver only if certain conditions are fulfilled. These conditions are not specified here. See the "Limited Supervision" procedure" of SRS-§5 (for transitions from FS/OS/UN to LS) and the "Start of mission" procedure (for transition from SB to LS).

{8} Refer to Subset-035 for details.



## 4.7 DMI depending on modes

### 4.7.1 Introduction

- 4.7.1.1 The DMI is an interface that allows the direct exchange of information between the driver and the ERTMS/ETCS onboard equipment. The indirect exchange of information done via the train interface (e.g. a driver's action on the service brake used for the service brake feedback, opening/closing the desk) is not part of the DMI.
- 4.7.1.2 The device(s) used to select "ERTMS/ETCS onboard equipment powered/unpowered" is (are) not part of the DMI.
- 4.7.1.3 The device(s) used to select/indicate "ERTMS/ETCS onboard equipment isolated/not isolated" is (are) part of the DMI.
- 4.7.1.4 Intentionally deleted.
- 4.7.1.5 Information (input or output) only relevant for National System and not originated by the ERTMS/ETCS on-board is not included in the following section.

### 4.7.2 DMI versus Mode Table

- 4.7.2.1.1 X = active: For a DMI output, this means that the output information shall be shown to the driver when the ERTMS/ETCS onboard equipment is in the mode indicated in the column. For a DMI input, this means that it shall be possible for the driver to enter this information when the ERTMS/ETCS onboard equipment is in the mode indicated in the column).
- 4.7.2.1.2 A = available: This means that the input/output shall become active ONLY if another condition(s) is (are) fulfilled. This condition(s) are not described here.
- 4.7.2.1.3 Grey cells: availability and meaning defined by national system.
- 4.7.2.1.4 NA = Not Applicable: This concerns the modes SF and IS in which the DMI inputs and outputs cannot be determined.

Input information	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
Train Data (refer to 3.18.3.2)		A			A	A	A	A			A			NA	NA	A	
Selection of language		A		A	A	A	A	A		A	A	A	A	NA	NA	A	A
Driver id		A		A	A	A	A	A		A	A			NA	NA	A	
Train running number		A			A	A	A	A		A	A			NA	NA	A	
ERTMS/ETCS level		A			A	A	A	A		A	A			NA	NA	A	
Track Adhesion factor		A			A	A	A	A			A			NA	NA	A	

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<b>Input information</b>	<b>N P</b>	<b>S B</b>	<b>P S</b>	<b>S H</b>	<b>F S</b>	<b>L S</b>	<b>S R</b>	<b>O S</b>	<b>S L</b>	<b>N L</b>	<b>U N</b>	<b>T R</b>	<b>P T</b>	<b>S F</b>	<b>I S</b>	<b>S N</b>	<b>R V</b>
RBC contact information - Radio network-id - RBC-id - RBC phone number		A			A	A	A	A		A			A	NA	NA		
Train integrity confirmation		A			A	A	A	A					A	NA	NA		
Start		A					A						A	NA	NA		
Override request		A		A	A	A	A	A			A		A	NA	NA	A	
Shunting request		A			A	A	A	A			A		A	NA	NA	A	
"Continue Shunting on desk closure" request				A										NA	NA		
"Exit of Shunting" request				X										NA	NA		
Non Leading request		A		A	A	A	A	A						NA	NA		
Ackn of fixed text information		A			A	A	A	A		A	A	A	A	NA	NA		A
Ackn of plain text information		A			A	A	A	A		A	A	A	A	NA	NA		A
Ackn of level transition		A			A	A	A	A			A	A		NA	NA	A	
Ackn of Limited Supervision mode		A			A	A		A					A	NA	NA		
Ackn of On Sight mode		A			A	A		A					A	NA	NA		
Ackn of Shunting mode		A		A	A	A		A					A	NA	NA		
Ackn of Staff Resp. mode		A											A	NA	NA		
Ackn of Unfitted mode		A												NA	NA		
Ackn of Reversing mode					A	A		A						NA	NA		
Ackn of SN mode		A												NA	NA		
Ackn of Train Trip												A		NA	NA		
Ackn for Roll Away Protection				A	A	A	A	A			A		A	NA	NA		A
Ackn for Reverse Movement Protection					A	A	A	A					A	NA	NA		A
Ackn for Standstill Supervision		A												NA	NA		
Ackn for Post Trip distance exceeded													A	NA	NA		
Ackn of Train Data change from source different from the driver					A	A	A	A			A	A		NA	NA	A	
Ackn for reversing distance exceeded														NA	NA		A
Track Ahead Free		A				A	A	A					A	NA	NA		
SR mode speed limit and distance							A							NA	NA		
Virtual Balise Cover		A												NA	NA		

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Input information	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
Isolation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Output information	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
ERTMS/ETCS Mode		A		X	X	X	X	X		X	X	A	X	A	X	X	X
Current ERTMS/ETCS level		A		X	X	X	X	X		X	X	A	X	NA	NA	X	X
Train Speed		A		X	X	X	X	X		X	X	A	X	NA	NA	A	X
Permitted Speed				A	X		A	A						NA	NA		X
SBI Speed					A									NA	NA		
Target Speed					A		A	A						NA	NA		
Target distance					A		A	A						NA	NA		X
Release speed					A	A		A						NA	NA		
Speed and distance monitoring supervision status				A	A	A	A	A			A		A	NA	NA		A
LSSMA						A								NA	NA		
Trip reason												A		NA	NA		
Train Data (refer to 3.18.3.2)		A			A	A	A	A			A	A	A	NA	NA	A	A
Driver id		A		A	A	A	A	A		A	A	A	A	NA	NA	A	A
Train running number		A		A	A	A	A	A		A	A	A	A	NA	NA	A	A
RBC contact information - Radio network-id - RBC-id - RBC phone number		A		A	A	A	A	A		A	A	A	A	NA	NA	A	A
Virtual Balise Covers		A		A	A	A	A	A		A	A	A	A	NA	NA	A	A
Brake indication		A		A	A	A	A	A			A	A	A	NA	NA	A	A
Fixed text information		A			A	A	A	A		A	A	A	A	NA	NA		A
Plain text information		A			A	A	A	A		A	A	A	A	NA	NA		A
Reversing allowed					A	A		A						NA	NA		

Output information	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
Track condition excluding sound horn, non stopping areas, tunnel stopping areas and big metal masses - Power control - Pantograph control - Air tightness control - Radio hole, supervision of safe radio connection stopped - Brakes control					A	A		A		A		A	A	NA	NA		
Track conditions sound horn, non stopping areas, tunnel stopping areas					A	A		A						NA	NA		
Geographical position		A			A	A	A	A		A	A	A	A	NA	NA		
Override status				A			A				A			NA	NA	A	
LX status "not protected"					A	A		A						NA	NA		
Shunting refused by RBC		A			A	A	A	A					A	NA	NA		
Shunting request not answered by RBC		A			A	A	A	A					A	NA	NA		
Accepted Emergency Stop(s)					A	A		A				A	A	NA	NA		
Entry in FS/OS					A			A						NA	NA		
Level transition announcement					A	A	A	A		A	A	A	A	NA	NA	A	
Track Ahead Free request		A				A	A	A					A	NA	NA		
Adhesion factor "slippery rail"		A			A	A	A	A			A	A	A	NA	NA	A	A
Trackside malfunction		A		A	A	A	A	A			A	A	A	NA	NA	A	A
Notification of Train Data change from source different from the driver		A			A	A	A	A			A	A	A	NA	NA	A	
Operated System Version		A		A	A	A	A	A		A	A	A	A	NA	NA	A	A
Radio Network registration failed		A			A	A	A	A		A			A	NA	NA		
Safe radio connection indication		A		A	A	A	A	A		A	A	A	A	NA	NA	A	A
Local time		A		X	X	X	X	X		X	X	A	X	NA	NA	A	X
Gradient					A									NA	NA		
MRSP					A									NA	NA		
Indication location at MRSP speed (see 3.13.10.4.11)					A									NA	NA		
First target at zero speed					A									NA	NA		

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Output information	N P	S B	P S	S H	F S	L S	S R	O S	S L	N L	U N	T R	P T	S F	I S	S N	R V
Brake reason		A		A	A	A	A	A			A		A	NA	NA	A	A
Trackside not compatible		A		A	A	A	A	A		A	A	A	A	NA	NA	A	A
Train is rejected		A												NA	NA		
Route unsuitability(ies)					A	A		A						NA	NA		

## 4.8 Acceptance of received information

### 4.8.1 Introduction

- 4.8.1.1 The aim of this chapter is to give an overview of which information is accepted or rejected depending on the state of the on-board (level, mode) and the nature of the received information (transmission medium, type of information: infill or non-infill).
- 4.8.1.2 The following sections have to be interpreted by applying the filters as shown in Figure 3. The first filter is detailed in section 4.8.3 “Accepted information depending on the level and transmission media”, the third filter in section 4.8.4 “Accepted information depending on the modes”.
- 4.8.1.3 If a message contains level transition information, any other information in that message shall be evaluated considering the level transition information.
- 4.8.1.3.1 Information received in the same message as an immediate level transition order or a conditional level transition order that causes a level transition shall be evaluated first considering the on-board currently operated level, as if a level transition order for further location had been received (i.e. conditions [1], [2] or [6] of Figure 3, if applied, shall be automatically fulfilled). Then, if relevant, it shall be immediately extracted from the buffer and re-evaluated according to the new selected level.
- 4.8.1.4 Note: As shown in Figure 3, information stored following an announcement of a change of level, is re-checked for acceptance when the level has changed. This implies that, when the level changes, the mode is - for a short moment – still unchanged, until the stored information has been processed. The consequence for the Third Filter is that information needs to be accepted for this short period also in modes in which this information is otherwise useless.
- 4.8.1.5 If a message contains infill information, this latter shall be evaluated considering all other non-infill information in that message.
- 4.8.1.6 When evaluating trackside information received by radio or when re-evaluating a set of information released from the transition buffer, linking information, if any, shall be evaluated prior to any other location related information.

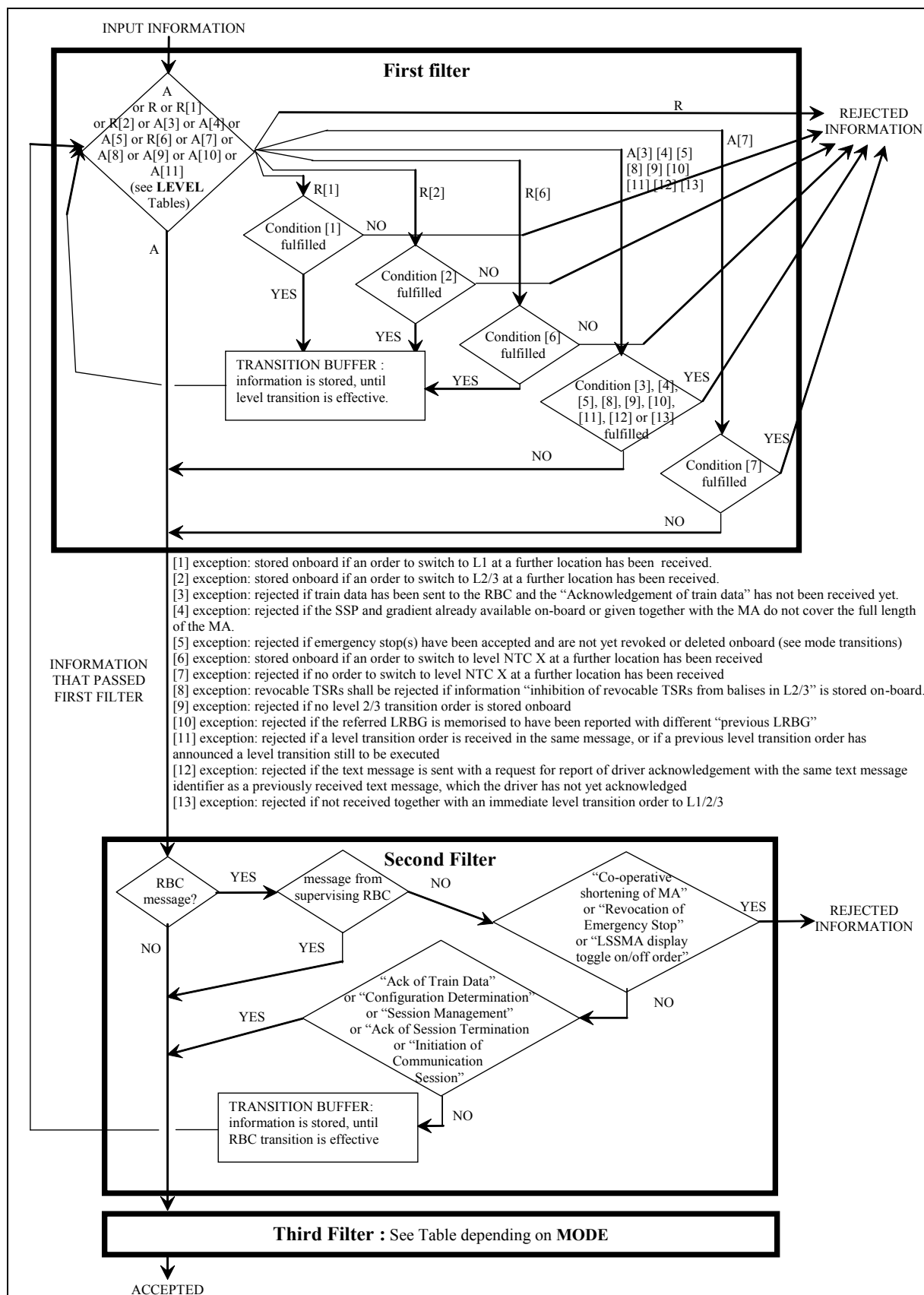


Figure 3: schematic representation of the filtering of received information:

## 4.8.2 Assumptions

4.8.2.1 The following tables shall be applied assuming that:

- a) the information complies with the system version checks (see section 3.17.3) and with the data consistency checks.(see section 3.16)
- b) the direction for which the information is valid matches the current train orientation, or the balise group crossing direction (for SL, PS and SH engines).(see section 3.6.3)
- c) In levels 2/3, it is assumed that the “RBC” information which is marked “A” (Accepted) comes from the supervising RBC (see RBC/RBC handover). If this information is received from the “Accepting” RBC while the “Handing Over” RBC is still responsible, it is stored onboard until the RBC transition is performed  
exception1: the information “Acknowledgement of Train Data”, “Trackside constituent system version”, “Initiation of Communication Session”, “Session Management” and “Acknowledgement of Session Termination” shall be immediately accepted.  
exception2: the information “Co-operative shortening of MA”, “Revocation of Emergency Stop” and “LSSMA display toggle on/off order” shall be rejected.
- d) to check exception [4] in 4.8.3, the track description is referred to the LRBG.
- e) the information from balise is received while no reverse movement is performed (see clause 3.14.3.6)

4.8.2.2 Regarding 4.8.2.1 a): In case a balise is missed or a balise telegram cannot be decoded, the information “Inhibition of balise group message consistency reaction” is only used by the on-board equipment to inhibit the service brake reaction, while the balise group message is rejected. If all the telegrams from a balise group are correctly read, the information “Inhibition of balise group message consistency reaction”, if received, shall be ignored by the on-board equipment. Therefore this information need not to be referred to in the following tables.

4.8.2.3 In case a balise telegram contains the information VBC marker and a country/region identity that both match a stored VBC, the whole balise telegram is ignored and any further check in relation to this balise telegram is irrelevant (refer to 3.15.9.3 b)). Otherwise the information VBC marker, if included in a consistent balise group message, shall always be ignored by the ERTMS/ETCS on-board equipment and need not to be referred to in the following tables.

4.8.2.4 Note: with the exception of the data that is forwarded to a National System through the STM interface (see 3.15.6 and SUBSET-035), what will happen to the data to be used by applications outside ERTMS/ETCS (e.g. whether it is discarded, forwarded to an external application, processed by a national function...) is outside the scope of this specification and is assumed as not being part of the ERTMS/ETCS on-board functionality.



**4.8.3 Accepted information depending on the level and transmission media****4.8.3.1 From RBC or not**

4.8.3.1.1 Note: “No” in column “From RBC” has to be understood as any information (type: infill or non-infill) received from a balise group, loop or RIU; this does not include information received from the STM interface.

A = Accepted R = Rejected

Information	From RBC	Onboard operating level				
		0	NTC	1	2	3
National Values	No	A	A	A	A	A
	Yes	R [2]	R [2]	R [2]	A	A
Linking	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Signalling Related Speed Restriction	No	R [1]	R [1]	A	R [1]	R [1]
	Yes					
Movement Authority + (optional) Mode Profile + (optional) List of Balises for SH area	No	R [1]	R [1]	A [4]	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3] [4] [5]	A [3] [4] [5]
Repositioning Information	No	R	R	A	R	R
	Yes					
Gradient Profile	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
International SSP	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Axle Load speed profile	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Level Transition Order	No	A	A	A	A	A
	Yes	A	A	A	A	A
Conditional Level Transition Order	No	A [11]	A [11]	A [11]	A [11]	A [11]
	Yes					
Session Management	No	A	A	A	A	A
	Yes	A	A	A	A	A
Radio Network registration	No	A	A	A	A	A
	Yes	A	A	A	A	A
MA Request Parameters	No					
	Yes	A	A	A	A	A

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Information	From RBC	Onboard operating level				
		0	NTC	1	2	3
Position Report parameters	No					
	Yes	A	A	A	A	A
SR Authorisation + (optional) List of Balises in SR mode	No					
	Yes	R	R	R	A [3]	A [3]
Stop if in SR mode	No	R	R	A	A	A
	Yes					
SR distance information from loop	No	R	R	A	R	R
	Yes					
Temporary Speed Restriction	No	A	R [1] [2]	A	A [8]	A [8]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Temporary Speed Restriction Revocation	No	A	R [1] [2]	A	A	A
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Inhibition of revocable TSRs from balises in L2/3	No					
	Yes	R [2]	R [2]	R [2]	A	A
Default Gradient for TSR	No	A	R [1] [2]	A	A	A
	Yes					
Route Suitability Data	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Adhesion Factor	No	R[1]	R[1]	A	R	R
	Yes	R[2]	R[2]	R[2]	A	A
Plain Text Information	No	A	R [1] [2]	A	A	A
	Yes	R [2]	R [2]	R [2]	A [12]	A [12]
Fixed Text Information	No	A	R [1] [2]	A	A	A
	Yes	R [2]	R [2]	R [2]	A [12]	A [12]
Geographical Position	No	A	R [1] [2]	A	A	A
	Yes	R [2]	R [2]	R [2]	A	A
RBC Transition Order	No	R	R	R	A	A
	Yes	R	R	R	A [3]	A [3]
Danger for SH information	No	A [13]	A [13]	A	A	A
	Yes					
Stop Shunting on desk opening	No	A	A	A	A	A
	Yes					
Radio Infill Area information	No	R	R	A	R [1]	R [1]

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Information	From RBC	Onboard operating level				
		0	NTC	1	2	3
	Yes					
Session Management with neighbouring RIU	No	R	R	A	R	R
	Yes					
EOLM information	No	A	A	A	A	A
	Yes					
Assignment of Co-ordinate system	No					
	Yes	A [10]	A [10]	A [10]	A [10]	A [10]
Infill Location Reference	No	R	R	A	R [1]	R [1]
	Yes					
Track Conditions excluding big metal masses	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Track condition big metal masses	No	A	A	A	A	A
	Yes					
Location Identity (NID_C + NID_BG transmitted in the balise telegram)	No	A	A	A	A	A
	Yes					
Recognition of exit from TRIP mode	No					
	Yes	R	R	R	A	A
Acknowledgement of Train Data	No					
	Yes	A	A	A	A	A
Co-operative shortening of MA + (optional) Mode Profile + (optional) List of Balises for SH area	No					
	Yes	R	R	R	A [3] [4] [5]	A [3] [4] [5]
Unconditional Emergency Stop	No					
	Yes	R [2]	R [2]	R [2]	A	A
Conditional Emergency Stop	No					
	Yes	R [2]	R [2]	R [2]	A	A
Revocation of Emergency Stop (Conditional or Unconditional)	No					
	Yes	R	R	R	A	A
SH refused	No					
	Yes	R	R	R	A [3]	A [3]
SH authorised + (optional) List of Balises for SH area	No					
	Yes	R	R	R	A [3]	A [3]

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Information	From RBC	Onboard operating level				
		0	NTC	1	2	3
Trackside constituent System Version	No	A	A	A	A	A
	Yes	A	A	A	A	A
System Version order	No	A	A	A	A	A
	Yes					
Track Ahead Free Request	No					
	Yes	R	R	R	A [3]	A [3]
Train Running Number	No					
	Yes	R	R	R	A	A
Initiation of session	No					
	Yes	R	R	R	A	A
Acknowledgement of session termination	No	A	A	A	A	A
	Yes	A	A	A	A	A
Train Rejected	No					
	Yes	R	R	R	A	A
Train Accepted	No					
	Yes	R	R	R	A	A
SoM Position Report Confirmed by RBC	No					
	Yes	R	R	R	A	A
Reversing Area Information	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Reversing Supervision Information	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Default Balise/Loop/RIU Information	No	A	A	A	A	A
	Yes					
Track Ahead Free up to level 2/3 transition location	No	A [9]	A [9]	A [9]	R	R
	Yes					
Permitted Braking Distance Information	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Level Crossing information	No	R [1] [2]	R [1] [2]	A	A	A
	Yes	R [2]	R [2]	R [2]	A [3]	A [3]
Virtual Balise Cover order	No	A	A	A	A	A
	Yes					

Information	From RBC	Onboard operating level				
		0	NTC	1	2	3
Generic LS function marker	No	A	A	A	A	A
	Yes					
LSSMA display toggle on order	No	R [1]	R [1]	A	R [1]	R [1]
	Yes	R [2]	R [2]	R [2]	A [3] [5]	A [3] [5]
LSSMA display toggle off order	No	R	R	A	R	R
	Yes	R	R	R	A	A
Data to be used by applications outside ERTMS/ETCS	No	A	A	A	A	A
	Yes	A	A	A	A	A

[1] exception: stored onboard if an order to switch to L1 at a further location has been received.

[2] exception: stored onboard if an order to switch to L2/3 at a further location has been received.

[3] exception: rejected if Train Data has been sent to the RBC and the “Acknowledgement of Train Data” has not been received yet.

[4] exception: rejected if the SSP and gradient already available on-board or given together with the MA do not cover the full length of the MA.

[5] exception: rejected if emergency stop(s) have been accepted and are not yet revoked or deleted onboard (see mode transitions).

[8] exception: revocable TSRs shall be rejected if information “inhibition of revocable TSRs from balises in L2/3” is stored on-board.

[9] exception: rejected if no level 2/3 transition order is stored onboard.

[10] exception: rejected if the referred LRBG is memorised to have been reported with different “previous LRBG”

[11] exception: rejected if a level transition order is received in the same message, or if a previous level transition order has announced a level transition still to be executed

[12] exception: rejected if the text message is sent with a request for report of driver acknowledgement with the same text message identifier as a previously received text message, which the driver has not yet acknowledged

[13] exception: rejected if not received together with an immediate level transition order to L1/2/3

#### 4.8.3.2 From National System X (through STM interface)

Information from National System X through STM interface	Onboard operating level					
	0	NTC X	NTC Y	1	2	3
STM max speed	A [7]	R	R [6]	A [7]	A [7]	A [7]
STM system speed/distance	A [7]	R	R	A [7]	A [7]	A [7]

[6] exception: stored by ETCS onboard if an order to switch to level NTC X at a further location has been received.

[7] exception: rejected by ETCS onboard if no order to switch to level NTC X at a further location has been received.

4.8.3.3 Intentionally deleted.

4.8.3.4 Intentionally deleted.

**4.8.4 Accepted Information depending on the modes****4.8.4.1 Assumptions**

4.8.4.1.1 For infill information, only the columns FS and LS apply. In all other modes, infill information is rejected.

4.8.4.1.2 Intentionally deleted.

4.8.4.2 Intentionally deleted.

NR = Not Relevant    A = Accepted    R = Rejected

Information	Modes																
	N P	SB	P S	S H	F S	L S	SR	OS	SL	N L	U N	TR	PT	SF	IS	SN	RV
National Values	NR	A [2]	A	A	A	A	A	A	A	A	A	A	A [1]	NR	NR	A	A
Linking	NR	A[2][4]	R	R	A	A	A	A	R	A	A	R	A [1]	NR	NR	A	R
Signalling Related Speed Restriction	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Movement Authority + (optional) Mode Profile + (optional) List of Balises for SH area	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Repositioning Information	NR	R	R	R	A	A	R	A	R	R	R	R	R	NR	NR	R	R
Gradient Profile	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
International SSP	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Axle load speed profile	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
STM max speed	NR	A [2]	R	R	A	A	A	A	R	R	A	A	A [1]	NR	NR	A	R
STM system speed/distance	NR	A [2]	R	R	A	A	A	A	R	R	A	A	A [1]	NR	NR	R	R
Level Transition Order and Conditional Level Transition Order	NR	A [2]	A [7]	A [7]	A	A	A	A	A	A	A	A	A [1] [5]	NR	NR	A	R
Session Management	NR	A	A [3]	A [3]	A	A	A	A	A	A	A	A	A [1]	NR	NR	A	A
Radio Network registration	NR	A [2]	A	A	A	A	A	A	A	A	A	A	A [1]	NR	NR	A	A
MA Request Parameters	NR	A [2]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Position Report parameters	NR	A [2]	R	R	A	A	A	A	R	A	A	R	A [1]	NR	NR	A	A

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Information	Modes																
	N P	SB	P S	S H	F S	L S	SR	OS	SL	N L	U N	TR	PT	SF	IS	SN	RV
SR Authorisation+ (optional) List of Balises in SR mode	NR	A[2][ 4]	R	R	R	R	A	R	R	R	R	R	A [1]	NR	NR	R	R
Stop if in SR mode	NR	R	R	R	R	R	A	R	R	R	R	R	R	NR	NR	R	R
SR distance information from loop	NR	R	R	R	R	R	A [6]	R	R	R	R	R	R	NR	NR	R	R
Temporary Speed Restriction	NR	A [2][4]	R	R	A	A	A	A	R	R	A	A	A [1]	NR	NR	A	R
Temporary Speed Restriction Revocation	NR	A[2][ 4]	R	R	A	A	A	A	R	R	A	A	A [1]	NR	NR	A	R
Inhibition of revocable TSRs from balises in L2/3	NR	A [2]	R	R	A	A	A	A	R	R	A	A	A [1]	NR	NR	A	R
Default Gradient for TSR	NR	A[2][ 4]	R	R	A	A	A	A	R	R	A	A	A [1]	NR	NR	A	R
Route Suitability Data	NR	A[2][ 4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Adhesion Factor	NR	A[2][ 4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Plain Text Information	NR	A [2]	R	R	A	A	A	A	R	A	A	A	A [1]	NR	NR	A	A
Fixed Text Information	NR	A [2]	R	R	A	A	A	A	R	A	A	A	A [1]	NR	NR	A	A
Geographical Position	NR	A [2]	R	R	A	A	A	A	R	A	A	A	A [1]	NR	NR	A	R
RBC Transition Order	NR	A[2][ 4]	A [8]	A [8]	A	A	A	A	A	A	R	A	A [1]	NR	NR	R	R
Danger for SH information	NR	R	R	A	R	R	R	R	R	R	R	R	R	NR	NR	R	R
Stop Shunting on desk opening	NR	R	A	R	R	R	R	R	R	R	R	R	R	NR	NR	R	R
Radio Infill Area information	NR	R	R	R	A	A	A	A	R	R	R	R	R	NR	NR	R	R
Session Management with neighbouring RIU	NR	R	R	R	A	A	A	A	R	R	R	R	R	NR	NR	R	R
EOLM information	NR	R	R	A	A	A	A	A	A	A	A	A	R	NR	NR	A	A
Assignment of Co-ordinate system	NR	A [2]	R	R	R	R	A	R	R	A	A	R	A [1]	NR	NR	A	R
Infill Location Reference	NR	R	R	R	A	A	R	R	R	R	R	R	R	NR	NR	R	R
Track Conditions excluding sound horn, non stopping areas, tunnel stopping areas and big metal masses	NR	A[2][ 4]	R	R	A	A	A	A	R	A	A	A	A [1]	NR	NR	A	R



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Information	Modes																
	N P	SB	P S	S H	F S	L S	SR	OS	SL	N L	U N	TR	PT	SF	IS	SN	RV
Track conditions sound horn, non stopping areas, tunnel stopping areas	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Track condition big metal masses	NR	A[2][4]	A	A	A	A	A	A	A	A	A	A	A [1]	NR	NR	A	R
Location Identity (NID_C + NID_BG)	NR	A [2]	A	A	A	A	A	A	A	A	A	A	A	NR	NR	A	A
Recognition of exit from TRIP mode	NR	R	R	R	R	R	R	R	R	R	R	R	A	NR	NR	R	R
Acknowledgement of Train Data	NR	A [2]	R	R	A	A	A	A	R	R	A	A	A	NR	NR	A	A
Co-operative shortening of MA + (optional) Mode Profile + (optional) List of Balises for SH area	NR	R	R	R	A	A	R	A	R	R	R	R	R	NR	NR	R	R
Unconditional Emergency Stop	NR	A [2]	R	R	A	A	A	A	R	R	A	R	R	NR	NR	A	R
Conditional Emergency Stop	NR	R	R	R	A	A	R	A	R	R	A	R	R	NR	NR	A	R
Revocation of Emergency Stop (Conditional or Unconditional)	NR	R	R	R	A	A	R	A	R	R	R	R	A [1]	NR	NR	R	R
SH refused	NR	A [2]	R	R	A	A	A	A	R	R	R	R	A [1]	NR	NR	R	R
SH authorised + (optional) List of Balises for SH area	NR	A [2]	R	R	A	A	A	A	R	R	R	R	A [1]	NR	NR	R	R
Trackside constituent System Version	NR	A	A	A	A	A	A	A	A	A	A	A	A	NR	NR	A	A
System Version order	NR	A	A	A	A	A	A	A	A	A	A	A	A	NR	NR	A	A
Track Ahead Free Request	NR	A [2]	R	R	R	A	A	A	R	R	R	R	A[1]	NR	NR	R	R
Train Running Number	NR	A [2]	R	R	A	A	A	A	R	A	R	A	A	NR	NR	R	A
Initiation of session	NR	A	R	R	A	A	A	A	A	A	R	A	A	NR	NR	R	A
Acknowledgement of session termination	NR	A	A	A	A	A	A	A	A	A	A	A	A	NR	NR	A	A
Train Rejected	NR	A [2]	R	R	R	R	R	R	R	R	R	R	R	NR	NR	R	R
Train Accepted	NR	A [2]	R	R	R	R	R	R	R	R	R	R	R	NR	NR	R	R
SoM Position Report Confirmed by RBC	NR	A [2]	R	R	R	R	R	R	R	R	R	R	R	NR	NR	R	R

Information	Modes																
	N P	SB	P S	S H	F S	L S	SR	OS	SL	N L	U N	TR	PT	SF	IS	SN	RV
Reversing Area Information	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	A
Reversing Supervision Information	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	A
Default Balise/Loop/RIU Information	NR	A [2]	A	A	A	A	A	A	A	A	A	A	A	NR	NR	A	A
Track Ahead Free up to level 2/3 transition location	NR	A [2]	R	R	A	A	A	A	R	R	A	A	A	NR	NR	A	R
Permitted Braking Distance Information	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Level Crossing information	NR	A[2][4]	R	R	A	A	A	A	R	R	A	R	A [1]	NR	NR	A	R
Virtual Balise Cover order	NR	A	A	A	A	A	A	A	A	A	A	A	A	NR	NR	A	A
Generic LS function marker	NR	A	A	A	A	A	A	A	A	A	A	A	A	NR	NR	A	A
LSSMA display toggle on order	NR	R	R	R	A [9]	A	A [9]	A [9]	R	R	A [9]	R	R	NR	NR	A [9]	R
LSSMA display toggle off order	NR	R	R	R	R	A	R	R	R	R	R	R	R	NR	NR	R	R
Data to be used by applications outside ERTMS/ETCS	NR	A	A	A	A	A	A	A	A	A	A	A	A	NR	NR	A	A

[1]: for level 2/3: only if following the reception of the information "Recognition of Exit from TR mode" with a more recent time stamp; for level 1: rejected

[2]: only if a cab is active

[3]: for order to establish a communication session: RBC ID/phone number is stored without establishing the communication session

[4]: only if valid Train Data are stored on-board

[5]: only level transition announcement (i.e., immediate level transition order and conditional level transition order shall be rejected)

[6]: rejected if override is active

[7]: only immediate level transition order and conditional level transition order shall be accepted (i.e., level transition announcement shall be rejected) and stored for later evaluation (see 4.4.8.1.5)

[8]: only RBC transition order with null distance to execution shall be accepted (i.e., RBC transition announcement shall be rejected) for storing the RBC ID/phone number (see 4.4.8.1.5.2)

[9]: only if the max safe front end of the train is inside the Limited Supervision area of a mode profile received in the same message

#### **4.8.5 Handling of transition buffer in case of level transition announcement or RBC/RBC handover**

- 4.8.5.1 If an order to switch to level NTC, 1, 2 or 3 at a further location has been received, the ERTMS/ETCS onboard equipment shall be able to store in a transition buffer (see figure 3, first filter) three sets of information obtained from three filtered messages.
- 4.8.5.2 If a RBC transition order has been received and the Handing Over RBC is still the supervising one, the ERTMS/ETCS onboard equipment shall be able to store in a transition buffer (see figure 3, second filter) three sets of information obtained from three filtered messages from the Accepting RBC.
- 4.8.5.2.1 Note: the term “set of information” refers to the part of a message being stored in the transition buffer (i.e. information which is neither accepted nor rejected immediately) according to the conditions stated in 4.8.3.1 [1] and [2] (for level transition) or according to 4.8.2.1c (for RBC/RBC handover).
- 4.8.5.3 In case three sets of information are already stored in the transition buffer, any new set to be stored shall replace the oldest one currently stored.
- 4.8.5.4 The sets of information stored in the transition buffer shall be deleted:
- a) in case the level transition order is deleted or overwritten by another level transition order for a different level, OR
  - b) in case the RBC transition order is deleted or overwritten by an order to switch to another Accepting RBC, OR
  - c) in case the communication session with the RBC that provided the stored information is terminated
- 4.8.5.5 At the same time the level transition is performed or at the same time the Accepting RBC becomes the supervising one, the sets of information stored in the transition buffer shall be released and re-evaluated in the sequence they have been received.
- 4.8.5.6 This sequential re-evaluation of all the released information shall be a prerequisite to any use by the on-board equipment (e.g. it will lead neither to an intermediate change of mode nor to a change of information displayed to the driver) and shall obey the following principles:
- a) Starting from the information currently used by on-board at the moment the level/RBC transition is effective, the ERTMS/ETCS on-board equipment shall determine the new information for train supervision, by performing sequential updates from the information released from the transition buffer, if accepted.
  - b) For each information update related to a re-evaluated set of information, the same rules shall apply as to information update related to new information accepted outside a level/RBC transition context.

- c) The information resulting from this sequential update shall then be used by the ERTMS/ETCS on-board equipment.
- 4.8.5.7 Accepting re-evaluated Conditional Emergency Stop information according to table 4.8.3 implies that the accepted Conditional Emergency Stop information may be accepted or rejected in a further step (see clause 3.10.2.2) depending on the given stop location. This decision, based on the comparison between the min safe front end position of the train at the time the message was received and the given stop location, shall be considered part of the evaluation process as it affects the further re-evaluation of information stored in the transition buffer (see clause 3.10.2.4).
- 4.8.5.7.1 Note: For the case of the Unconditional Emergency Stop information accepting the information according to table 4.8.3 will always lead to the train being tripped (see clause 3.10.2.3) when re-evaluation of the transition buffer is completed. Information accepted during re-evaluation of information stored in the transition buffer can then be affected on transition to TR mode according to conditions in Table 4.10.
- 4.8.5.8 Note: The requirement to acknowledge an Emergency Stop information according to clause 3.10.1.4, i.e., communicating to the RBC if the information has been accepted (Conditional or Unconditional Emergency Stop) or rejected because the train has passed the stop location (Conditional Emergency Stop only), applies to the time when the information is used, immediately after the sequential update has been completed. Regards acknowledging the reception of an emergency stop message, as for any other information received from trackside, see clause 3.16.3.5.

## **4.9 What happens to accepted and stored information when entering a given level**

### **4.9.1 Introduction**

- 4.9.1.1 Every data that can be stored onboard after being accepted may be influenced by a level transition.
- 4.9.1.2 A level transition acts on the “status” of stored information.
- 4.9.1.3 In case of entering level 1, MA Request Parameters, Position Report Parameters and Track Ahead Free Request shall be deleted.
- 4.9.1.3.1 In case of entering level 0, NTC or 1, the information “Inhibition of revocable TSRs from balises in L2/3” shall be deleted.
- 4.9.1.4 For all other stored data, a level transition has no effect (void).

## 4.10 What happens to accepted and stored information when entering a given mode

### 4.10.1 Introduction

4.10.1.1 Every data that can be stored onboard after being accepted may be influenced by a mode transition.

4.10.1.2 A mode transition acts on the “status” of stored information.

4.10.1.3 Depending on which mode is entered, the action shall be one of the following:

- a) data is deleted,
- b) data is to be revalidated,
- c) data is reset (set to default values)
- d) data status is unchanged,
- e) not relevant (the action on the data cannot be determined. This concerns the entry in SF and IS modes)

D = Deleted   TBR = To Be Revalidated   U = Unchanged   NR = Not relevant   R = Reset

Data Stored on-board	Entered Mode																
	NP	SB	PS	SH	FS	LS	SR	OS	SL	NL	UN	TR	PT	SF	IS	SN	RV
National Values	U	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Not yet applicable National Values	D	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Linking	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
Movement Authority	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
Gradient Profile	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
International SSP	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
Axle load speed profile	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
STM max speed	D	D	D	D	U	U	D	U	D	D	U	U	U	NR	NR	U	D
STM system speed/distance	D	D	D	D	U	U	D	U	D	D	U	U	U	NR	NR	U	D
Level Transition Order	D	D [1] [2]	U	D [2]	U	U	D	U	D [2]	D [1]	D	U	U	NR	NR	D	D
Stop Shunting on desk opening	D	D	U	U	U	U	U	U	D	U	U	U	U	NR	NR	U	U

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Data Stored on-board	Entered Mode																
	NP	SB	PS	SH	FS	LS	SR	OS	SL	NL	UN	TR	PT	SF	IS	SN	RV
List of balises for SH area	D	D	U	U	U	U	D	U	D	D	D	D	U	NR	NR	D	D
MA Request Parameters	D	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Position Report parameters	D	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
List of Balises in SR Authority + SR mode speed limit and distance	D	D	D	D	D	D	U	D	D	D	D	D	U	NR	NR	D	D
Temporary Speed Restriction	D	D	D	D	U	U	U	U	D	D	U	U	U	NR	NR	D	D
Inhibition of revocable TSRs from balises in L2/3	D	D	D	D	U	U	D	U	D	D	D	U	U	NR	NR	D	D
Default Gradient for TSR	D	D	D	D	U	U	U	U	D	D	U	U	U	NR	NR	D	D
Signalling related Speed Restriction	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
Route Suitability Data	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
Adhesion Factor (from trackside)	R	R	R	R	U	U	U	U	R	R	U	U	U	NR	NR	R	U
Adhesion Factor (from driver)	R	R	R	R	U	U	U	U	R	R	U	U	U	NR	NR	U	U
Plain Text Information	D	D	D	D	U	U	U	U	D	U	U	U	U	NR	NR	D	U
Fixed Text Information	D	D	D	D	U	U	U	U	D	U	U	U	U	NR	NR	D	U
Geographical Position	D	U	D	D	U	U	U	U	D	U	U	U	U	NR	NR	D	D
Mode Profile	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
RBC Transition Order	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
Radio Infill Area information	D	D	D	D	U	U	D	D	D	D	D	D	U	NR	NR	D	D
EOLM information	TBR	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Track Conditions excluding sound horn, non stopping areas, tunnel stopping areas and big metal masses	R	R	R	R	U	U	R	U	R	U	R	U	U	NR	NR	R	R
Track conditions sound horn, non stopping areas, tunnel stopping areas	R	R	R	R	U	U	R	U	R	R	R	R	R	NR	NR	R	R
Track condition big metal masses	R	R	R	R	U	U	R	U	R	U	U	U	U	NR	NR	U	R
Unconditional Emergency Stops	D	D	D	D	U	U	D	U	D	D	D	U	U	NR	NR	D	D
Conditional Emergency Stops	D	D	D	D	U	U	D	U	D	D	D	U	U	NR	NR	D	D
Train Position	TBR	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U

Data Stored on-board	Entered Mode																
	NP	SB	PS	SH	FS	LS	SR	OS	SL	NL	UN	TR	PT	SF	IS	SN	RV
Train Data	D	TBR	U	TBR	U	U	U	U	U	U	U	U	U	NR	NR	U	U
ERTMS/ETCS level	TBR	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Table of priority of trackside supported levels	TBR	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Driver ID	D	TBR	U	U	U	U	U	U	D	U	U	U	U	NR	NR	U	U
Radio Network ID	U	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
RBC ID/Phone Number	TBR	U	U	U	U	U	U	U	U	U	D	U	U	NR	NR	D	U
Train Running Number	D	TBR	U	U	U	U	U	U	D	U	U	U	U	NR	NR	U	U
Reversing Area Information	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	U
Reversing Supervision Information	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	U
Track Ahead Free Request	D	D	D	D	D	D	U	U	D	D	D	D	U	NR	NR	D	D
Permitted Braking Distance Information	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
Level Crossing information	D	D	D	D	U	U	D	U	D	D	D	D	U	NR	NR	D	D
RBC/RIU System Version	D	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Operated System Version	U	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Virtual Balise Covers	U	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Language used to display information to the driver	U	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	U	U
Generic LS function marker	U	U	U	U	U	U	U	U	U	U	U	U	U	NR	NR	<u>U</u>	U
LSSMA display toggle on order	D	D	D	D	D	U	D	D	D	D	D	D	U	NR	NR	D	D

[1]: exception: "U" when coming from SH

[2]: exception: "U" when coming from PS

#### 4.10.1.4 NOTES:

4.10.1.4.1 Intentionally deleted.

4.10.1.4.2 The following information is not considered to be stored information:

- a) Repositioning information
- b) Session Management (exception: the RBC ID/phone number, which is given with an order to establish a communication session, is stored on-board)
- c) Danger for SH information
- d) Assignment of Co-ordinate system
- e) Infill Location Reference



- f) Location Identity (NID\_C + NID\_BG transmitted in the balise telegram)
- g) Recognition of exit from TRIP mode
- h) Acknowledgement of Train Data
- i) SH refused
- j) SH authorised
- k) Balise/loop System Version
- l) Track Condition Station Platforms
- m) Track Condition Change of Allowed Current Consumption
- n) Revocation of Emergency Stop (Conditional or Unconditional)
- o) Temporary Speed Restriction Revocation
- p) Initiation of communication session
- q) Acknowledgement of session termination
- r) Default Balise Information
- s) Co-operative shortening of MA (if this message is used, it replaces the movement authority)
- t) Train Rejected
- u) Train Accepted
- v) SoM position report confirmed by RBC
- w) Track Ahead Free up to level 2/3 transition location
- x) Signalling related speed restriction value zero (i.e., train trip order)
- y) Stop if in SR mode
- z) Data to be forwarded to a National System through the STM interface
- aa) LSSMA display toggle off order

## 4.11 What happens to stored information when exiting NP mode

- 4.11.1.1 Status of stored information, which is set to "Invalid" when No Power mode is entered, shall be affected, when relevant, by information from the Cold Movement Detection function, according to the following table:

Transition conditions	Status of On-board stored information														
	EOLM information			Train Position			ERTMS/ETCS Level			Table of trackside supported levels			RBC ID/Phone Number		
	Un-known	Invalid	Valid	Un-known	Invalid	Valid	Un-known	Invalid	Valid	Un-known	Invalid	Valid	Un-known	Invalid	Valid
No Cold movement occurred		● →			● →			● →			● →			● →	
Cold movement detected or Cold movement information not available	← ●									← ●					

- 4.11.1.2 Note: Status of stored information, which remains valid after NP mode has been entered, is not affected by information from the Cold Movement Detection function.
- 4.11.1.3 If a cold movement has been detected, or the Cold Movement Detection function is not able to confirm that no cold movement has taken place, no change of status of information to "valid" shall be made until it has been validated by a different means than cold movement detection.