ERTMS/ETCS
Performance requirements for STMs
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Company	Technical Approval	Management approval
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2.1.1 2005-09-13	5.2.10	Updated based on comments from EEIG: • "Maximum worst-case HS state order transfer time (announcement from a balise group and announcement via radio from RBC), when another STM is in HS" deleted. • "Maximum worst-case HS state order transfer time (STM deactivated)" added. • "Maximum worst-case CS state order transfer time (announcement from a balise group and announcement via radio from RBC)" added. • "Maximum worst-case DA state order transfer time (transition border and level transition location), when another STM is in DA" deleted. • "Maximum worst-case DA state order transfer time (STM deactivated)" added. • "Maximum worst-case CS state order transfer time (transition border and level transition location)" added.	P. Luehrs (Siemens)
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	5.2.10.21	WG-8: Time outs values are defined (see open points affected). SUM = 1.2 s 3.8 s for DA 8.8 for HS,CS;DE and CO	
	Doc front page	WG-10: Deletion of AZD and Mer Mec from the front page and change ANSALDO SIGNAL for ANSALDO STS.	O. Morente Invensys Rail
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	3.3	Title changed to "References" Referenced document integrated in a table (no revision marks)	
	4.2.2.9 4.2.2.9.1 4.3.1.2	Removed "(TBC)" Removed Removed "(TBC)" Removed comment in MaxClockInaccuracyAfterAdjustFactor	
	5.2.8	Title changed to "Juridical data"	
	5.2.9 5.2.9.1	DRU removed	

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	5.2.10.21	Removal of requirements on State Order timers	
2.9.2 2012-02-18	All	Minor corrections for document consistency	M. Lorenzo Invensys Rail
	3.1.1.1 3.4.1.1.2 5.2.10.4	Replace "Level STM" with "Level NTC"	
	4.1.1.3	Removed "Note: An STM Group is considered as one STM (with one NID_STM)."	
	5.2.4	Removal of BIU Status performance requirement: no more linked to the Train Interface	
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		Update according to ERA remarks	
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	5.2.6.3 5.2.6.4	- Comment #2 (Moved to 5.2.10.20 and 5.2.10.21 respectively)	
	5.2.7.5 5.2.7.7	- Comment #3 ("Speed and distance supervision information" instead of "National ETCS DMI")	
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2. TABLE OF CONTENTS

3. INTRODUCTION

3.1 Scope

3.1.1.1 This document defines the performance parameters of the ERTMS/ETCS on-board equipment for operation in Level NTC.

3.1.1.1.1 Exception: RAMS requirements are not in the scope in this document.

3.1.1.2 The requirements on a particular STM can be seen as the difference between the performance of the Target System (national performance requirements) and the performance of the ERTMS/ETCS on-board as defined within this document.

3.1.1.2.1 Definition: The Target System is the national train control system as defined in [2].

3.1.1.3 The purpose of this document is to specify performance requirements to be met by all ERTMS/ETCS on-board equipment and STMs.

3.1.1.4 This document does not take into account the requirements of the Target System (national performance requirements).

3.1.1.4.1 In case the performance of the ERTMS/ETCS on-board for STMs as given in this document is not sufficient to fulfil the requirements of the Target System (national performance requirements) due to some strict national performance requirements, the unfulfilled national performance requirements shall be adapted - if possible - in order to provide for an implementation of the Target System as an STM which is connected to an ERTMS/ETCS on-board that fulfils the performance requirements given in this document.

3.1.1.4.2 In case it is not possible to adapt the national performance requirements and the performance of the ERTMS/ETCS on-board for STMs is better than given in this document and sufficient to fulfil the requirements of the Target System (national performance requirements), the STM shall use the FFFIS STM.

3.1.1.4.3 In case it is not possible to adapt the national performance requirements and the performance of the ERTMS/ETCS on-board for STMs as given in this document is not sufficient to fulfil the requirements of the Target System (national performance requirements), the STM shall provide for a separate function or a separate interface in order to fulfil the national performance requirements.

3.1.1.5 The relation of this document to the document [3] is the following:

3.1.1.5.1 [3] does not include performance requirements linked to the interface defined in the FFFIS STM. Performance requirements for the ERTMS/ETCS on-board regarding the FFFIS STM (e.g. the FFFIS STM is the starting or ending condition for a time-related performance requirement) shall be listed within this document.

3.2 Measurements

3.2.1.1 When a performance requirement starts or ends with a transmission of a message on the STM bus (FFFIS STM), it is clocked with the following definition:

3.2.1.1.1 "End of detection of last bit of bus telegram", as could be measured by a bus protocol analyser device.

3.2.1.1.2 Justification: This allows for simple and precise measurement of time-related performances.

3.2.1.2 When a performance requirement starts or ends with a reception of a balise message, it is clocked as described in [3]

3.2.1.3 When a performance requirement starts or ends with a reception of a radio message, it is clocked as described in [3].

3.3 References

Ref. N°	Document Reference	Title
[1]	SUBSET-026	System Requirements Specification
[2]	SUBSET-035	Specific Transmission Module FFFIS
[3]	SUBSET-041	Performance Requierements for Interoperability
[4]	SUBSET-056	STM FFFIS Safe Time Layer
[5]	SUBSET-058	FFFIS STM Application Layer
[6]	CENELEC 50170-2 (1996)	PROFIBUS

3.4 Presentation of the document

3.4.1.1 This document consists of two parts:

3.4.1.1.1 Performance requirements linked to the PROFIBUS are listed in chapter 4.

3.4.1.1.2 The performance requirements of the ERTMS/ETCS on-board functions for operation in Level NTC are listed in chapter 5.

4. ARCHITECTURE REQUIREMENTS

4.1 Requirements concerning the system (ERTMS/ETCS on-board plus STMs)

4.1.1.1 Maximum number of STMs simultaneously connected to the ERTMS/ETCS on-board (FFFIS STM).

4.1.1.2 Maximum number of nodes on the bus.

4.1.1.2.1 Definition: For the definition of "Node" refer to [6].

4.1.1.3 Values table.

Definition	Value	Comments
Maximum number of STMs, see 4.1.1.1	8	This value applies to "logical STM" (STMs with different values for NID_STM).
Maximum number of nodes on the STM bus, see 4.1.1.2	24	This allows (as an example) 8 STMs + 12 nodes for distributed ERTMS/ETCS on-board architecture+ 4 additional nodes

4.2 Requirements for the communication on the STM bus (FFFIS STM interface)

4.2.1 Allowed bandwidth

4.2.1.1 The use of the STM bus for the communication according to the FFFIS STM specification to one or more STMs as well as for communication outside the FFFIS STM implies a mutual need for limitation of bandwidth for the different types of communication.

4.2.1.1.1 Note: The STM bus is used for the communication according to the FFFIS STM specification between one or more STMs and the ERTMS/ETCS on-board (see [2]).

4.2.1.1.2 Note: The STM bus may also be used for communication outside the FFFIS STM specification.

4.2.1.1.3 Justification: The limitation of bandwidth has the purpose of maintaining real-time behaviour of the STM bus, keeping token rotation time down.

4.2.1.2   The (maximum) bus bandwidth for the transmission of all Multicast Messages from the ERTMS/ETCS on-board to the STMs defined in [4] (e.g. SyncAndRefTime messages) can be calculated based on the values included in this document (see 4.3). For all other types of communication a maximum value for the bus bandwidth shall be defined in this document.

4.2.1.3   A bus node may transmit at full bus bandwidth for a short time. The average bandwidth is some fraction of the total bandwidth.

4.2.1.4   The sum of bandwidth shall be below the total bandwidth. Bus access is to some extent stochastic and will be congested near the limit.

4.2.1.5   In case a node transmits larger volume of data, it shall transmit with longer interval. In case data transfer is smaller in volume, bandwidth limit allows for more frequent transmission.

4.2.2   Performance parameters

4.2.2.1   Maximum bus bandwidth for the transmission of all Multicast essages according to the FFFIS STM specification from the ERTMS/ETCS on-board to the STMs (Odometer Multicast messages, STL Startup messages for Multicast (for the Odometer Multicast message), and SyncAndRefTime messages).

4.2.2.2   Maximum bus bandwidth for the bi-directional information exchange according to the FFFIS STM specification between one STM and the ERTMS/ETCS on-board when the STM is in Data Available or Hot Standby state. This bandwidth is defined as the long term average bit rate generated by the STM and the ERTMS/ETCS on-board on the STM bus.

4.2.2.2.1   Note: All Multicast messages defined in the FFFIS STM specification (e.g. SyncAndRefTime messages and Odometer Multicast messages) sent by the ERTMS/ETCS on-board are not included in this bandwidth.

4.2.2.3   Maximum bus bandwidth for the bi-directional information exchange according to the FFFIS STM specification between one STM and the ERTMS/ETCS on-board when the STM is in Cold Standby state. This bandwidth is defined as the long term average bit rate generated by the STM and the ERTMS/ETCS on-board on the STM bus.

4.2.2.3.1   Note: All Multicast messages defined in the FFFIS STM specification (e.g. SyncAndRefTime messages and Odometer Multicast messages) sent by the ERTMS/ETCS on-board are not included in this bandwidth.

4.2.2.4   Maximum bus bandwidth for the bi-directional information exchange according to the FFFIS STM specification between one STM and the ERTMS/ETCS on-board when the STM is not in Cold Standby, Hot Standby and Data Available states. This bandwidth is defined as the long term average bit rate generated by the STM and the ERTMS/ETCS on-board on the STM bus.

4.2.2.4.1 Note: All Multicast messages defined in the FFFIS STM specification (e.g. SyncAndRefTime messages and Odometer Multicast messages) sent by the ERTMS/ETCS on-board are not included in this bandwidth.

4.2.2.5 Maximum bus bandwidth for the bi-directional information exchange outside the FFFIS STM specification between one STM and the ERTMS/ETCS on-board. This bandwidth is defined as the long term average bit rate generated by the STM and the ERTMS/ETCS on-board on the STM bus.

4.2.2.6 Maximum bus bandwidth for ERTMS/ETCS on-board internal information exchange on the STM bus. This bandwidth is defined as the long term average bit rate generated by the ERTMS/ETCS on-board on the STM bus.

4.2.2.7 Maximum bus bandwidth for STM internal information exchange on the STM bus. This bandwidth is defined as the long term average bit rate generated by the STM on the STM bus.

4.2.2.8 Maximum bus bandwidth for any other information exchange (not included in 4.2.2.1, 4.2.2.2, 4.2.2.3, 4.2.2.4, 4.2.2.5, 4.2.2.6 and 4.2.2.7) on the STM bus. This bandwidth is defined as the long term average bit rate generated by the communicating nodes on the STM bus.

4.2.2.9 Values table.

Definition	Value	Comments
Maximum bus bandwidth for all Multicast Messages, see 4.2.2.1	10 kbits/s	
Maximum bus bandwidth for the FFFIS STM communication (STM in Data Available or Hot Standby state), see 4.2.2.2	20 kbits/s	This allows for a transmission of 5 messages with a length of 250 bytes and 10 messages with a length of 125 bytes every second as a long term average.
Maximum bus bandwidth for the FFFIS STM communication (STM in Cold Standby state), see 4.2.2.3	10 kbits/s	
Maximum bus bandwidth for the FFFIS STM communication (STM not in Cold Standby, Hot Standby and Data Available state), see 4.2.2.4	10 kbits/s	
Maximum bus bandwidth for communication outside FFFIS STM between an STM and ERTMS/ETCS on-board, see 4.2.2.5	10 kbits/s	
Maximum bus bandwidth for ERTMS/ETCS on-board internal communication, 4.2.2.6	200 kbits/s	
Maximum bus bandwidth for STM internal communication, see 4.2.2.7	50 kbits/s	

Definition	Value	Comments
Maximum bus bandwidth for any other communication, see 4.2.2.8	50 kbits/s	

4.2.2.9.1   Intentionally deleted

4.3 Constants specified in the 'FFFIS STM Safe Time Layer'

4.3.1.1   The specification of the Safe Time Layer (see [4]) includes a list of constants used within the Safe Time Layer with no assignment of values. This assignment is included here.

4.3.1.2   Values table.

Definition	Value	Comments
LocalClockMaxReSyncInterval	3 s	It is the responsibility of the Reference Clock node to ensure that the Local Clock receives two consecutive messages within this time. An average cycle time for SyncAndRefTimeSyncInterval and SyncAndRefTimeRunInterval of 500 ms gives a good margin.
SafeTimeLayerStartupInterval	< 1 s	
SafeTimeLayerReStartInterval	< 5 s	
StartupSynchronisationTimeLimit	120 s	
MaxClockInaccuracyAfterAdjustFactor	100 ms	
TimeForLongTermDriftCheck	30 s	
MinNumberofSyncAndRefMsgReceived	18	
SyncAndRefTimeSyncInterval	< 1.5 s	
SyncAndRefTimeRunInterval	< 1.5 s	
SyncAndRefTimeStartupTimeLimit	120 s	
ConnectionSetupTimeLimit	10 s	

4.3.1.2.1   Note: The table includes only the names of the constants. The definitions can be found in [4].

5. PERFORMANCE REQUIREMENTS FOR THE ERTMS/ETCS ON-BOARD

5.1 Introduction

5.1.1.1 According to the specification of the FFFIS STM ([2]) the ERTMS/ETCS on-board offers different functionalities to the STMs. All performance requirements for these functionalities shall be listed in this chapter.

5.1.1.2 The performance requirements to the different functionalities offered by the ERTMS/ETCS on-board are listed in an order depending on the ERTMS/ETCS on-board function they belong to.

5.1.1.2.1 Note: The separation into functions is done according to the ETCS function analysis approach (see "UNISIG ERTMS / ETCS reference architecture" in [1] and "Functional architecture" in [2]).

5.1.1.3 The performance requirements for the ERTMS/ETCS on-board can be time requirements as well as accuracy requirements:

5.1.1.3.1 A time requirement for a functionality offered by the ERTMS/ETCS on-board as an output (command) of the STM starts with the transmission of the corresponding message on the STM bus (for the measurement of the starting condition see chapter 3.2.1.1) and ends when the requested action is performed by the ERTMS/ETCS on-board.

5.1.1.3.2 A time requirement for a functionality offered by the ERTMS/ETCS on-board as an input (status) to the STM starts when the input is achieved by the ERTMS/ETCS on-board from the outside and ends with the transmission of the corresponding message on the STM bus (for the measurement of the end condition see chapter 3.2.1.1).

5.1.1.3.3 In addition to the time requirements, the accuracy requirements for the Odometer Function of the ERTMS/ETCS on-board (as specified in [2]) are listed within this chapter.

5.1.1.4 All time requirements including a transmission of a message via the STM bus shall not take into account the fact that a message on the STM bus may be lost.

5.2 Performances parameters

5.2.1.1 The performance parameters given in this chapter are based on the Performance Requirements for Interoperability (see [3]), which were part of the requirements for the development of the ERTMS/ETCS on-board.

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5.2.2 TIU Status

5.2.2.1 Maximum worst-case time between the reception of a train interface signal from the train interface and the transmission of the corresponding TIU status / availability message on the STM bus.

5.2.2.1.1 Note: This requirement applies to all "Train Interface FFFIS STM status signals" as listed in [2].

5.2.2.2 Values table.

Definition	Value	Comments
Maximum worst-case train interface signal transfer time, see 5.2.2.1	< 1 s	

5.2.3 TIU Commands

5.2.3.1 Maximum worst-case time between the transmission of a TIU command message on the STM bus and the corresponding output of the TIU command to the train interface.

5.2.3.1.1 Note: This requirement applies to all "Train Interface FFFIS STM command signals" as listed in [2].

5.2.3.2 Values table.

Definition	Value	Comments
Maximum worst-case TIU command execution time, see 5.2.3.1	< 1 s	

5.2.4 Intentionally deleted

5.2.5 BIU Commands

5.2.5.1 Maximum worst-case time between the transmission an Emergency Brake command message on the STM bus and the corresponding output of the Emergency Brake command to the train interface.

5.2.5.2 Maximum worst-case time between the transmission of a Service Brake command message on the STM bus and the corresponding output of the Service Brake command to the train interface.

5.2.5.3 Values table.

Definition	Value	Comments
Maximum worst-case Emergency Brake command execution time, see 5.2.5.1	< 1 s	
Maximum worst-case Service Brake command execution time, see 5.2.5.2	< 1 s	

5.2.6 DMI Inputs (from driver to STM)

5.2.6.1 Maximum worst-case time between the generation of a button event on the ETCS DMI by the driver and the transmission of the corresponding message on the STM bus.

5.2.6.2 Maximum worst-case time between the generation of an acknowledgement reply on the ETCS DMI by the driver and the transmission of the corresponding message on the STM bus.

5.2.6.3 Intentionally deleted

5.2.6.4 Values table.

Definition	Value	Comments
Maximum worst-case ETCS DMI button event transfer time, see 5.2.6.1	< 1.5 s	
Maximum worst-case ETCS DMI acknowledgment reply transfer time, see 5.2.6.2	< 1.5 s	

5.2.7 DMI Outputs (from STM to driver)

5.2.7.1 Maximum worst-case time between the transmission of an STM display order message "Button Request" on the STM bus and the presentation of the corresponding information on the ETCS DMI.

5.2.7.2 Maximum worst-case time between the transmission of an STM display order message "Indicator Request" on the STM bus and the presentation of the corresponding information on the ETCS DMI.

5.2.7.3 Maximum worst-case time between the transmission of an STM display order message "Text Message" on the STM bus and the presentation of the corresponding information on the ETCS DMI.

5.2.7.3.1 Note: This document specifies static performances. From this point of view there is no difference from a text message and an acknowledgement text message.

5.2.7.4 Maximum worst-case time between the transmission of an STM display order message "Delete Text Message" on the STM bus and the deletion of the corresponding information on the ETCS DMI.

5.2.7.5 Maximum worst-case time between the transmission of an STM display order message "Speed and distance supervision information" on the STM bus and the presentation of the corresponding information within the ETCS DMI.

5.2.7.5.1 Intentionally deleted

5.2.7.6 Maximum worst-case time between the transmission of an STM display order message "Sound Command" on the STM bus and the presentation of the corresponding information on the ETCS DMI.

5.2.7.7 Values table.

Definition	Value	Comments
Maximum worst-case display time for "Button Request", see 5.2.7.1	< 1.5 s	
Maximum worst-case display time for "Indicator Request", see 5.2.7.2	< 1.5 s	
Maximum worst-case display time for "Text Message", see 5.2.7.3	< 1.5 s	
Maximum worst-case deletion time for "Text Message", see 5.2.7.4	< 1.5 s	
Maximum worst-case display time for "Speed and distance supervision information", see 5.2.7.5	< 1.5 s	
Maximum worst-case output time for "Sound Command", see 5.2.7.6	< 1.5 s	

5.2.8 Juridical Data

5.2.8.1 Not applicable.

5.2.9 Intentionally deleted

5.2.9.1 Intentionally deleted

5.2.10 STM Control Function

5.2.10.1 Maximum worst-case time delay for the ERTMS/ETCS on-board (STM Control Function) to take the safe action when required (see [2]).

5.2.10.1.1 Note: In case the safe action has to be applied due to a loss of the connection between an active STM and the STM Control Function, the time to detect that the connection is lost is not included in this value.

5.2.10.2   Maximum worst-case time between the transmission on the STM bus of the "State request from STM" information including a request for Data Entry state and the transmission on the STM bus of the "State order to STM" information including an order to Data Entry state.

5.2.10.2.1 Intentionally deleted

5.2.10.3   Maximum worst-case time between the activation of the Override status in the ERTMS/ETCS on-board, when activated by the ERTMS/ETCS on-board in any ETCS level, and the transmission of the Override status message on the STM bus.

5.2.10.3.1 Note: This time shall be counted from the time the driver activates the Override status and the transmission of the Override status message on the STM bus.

5.2.10.4   Maximum worst-case time between the activation of the Override status in the ERTMS/ETCS on-board, when activated by the active STM in the corresponding NTClevel, and the transmission of the Override status message on the STM bus.

5.2.10.4.1 Note: This time shall be counted from the transmission of the Override activation message on the STM bus and the transmission of the Override status message on the STM bus.

5.2.10.5   Maximum worst-case time between a change / re-validation of the ETCS data and the transmission of the corresponding message on the STM bus.

5.2.10.5.1 Note: This time shall be counted from the time the driver validates the ETCS data and the transmission of the ETCS data messages on the STM bus.

5.2.10.6   Maximum worst-case time between the validation of the Specific NTC Data to STM and the transmission of the Specific NTC Data message on the STM bus.

5.2.10.7   Maximum worst-case time between the reception of a balise group message with a level transition announcement and the transmission of the "State order to STM" message (order to HS state) to an STM to be activated, when no STM is in HS state.

5.2.10.8   Maximum worst-case time between receiving a level transition announcement via radio from an RBC and the transmission of the "State order to STM" message (order to HS state) to an STM to be activated, when no STM is in HS state.

5.2.10.9   Maximum worst-case time between the reception of the "State report from STM message" (CS state) from an STM in HS state at the time of the reception of the level transition announcement and the transmission of the "State order to STM" message (order to HS state) to an STM to be activated.

5.2.10.10   Maximum worst-case time between the reception of a balise group message with a level transition announcement and the transmission of the "State order to STM" message (order to CS state) to an STM in HS state at the time of the reception of the level transition announcement.

5.2.10.11   Maximum worst-case time between receiving a level transition announcement via radio from an RBC and the transmission of the "State order to STM" message (order to CS state) to an STM in HS state at the time of the reception of the level transition announcement.

5.2.10.12   Maximum worst-case time between the reception of a balise group message at a level transition border and the transmission of:

a) the "State order to STM" message (order to DA state) to an STM to be activated, when no STM is in DA state, and

b) ETCS status data (with the changed level) to all STMs.

5.2.10.13   Maximum worst-case time between passing the transition location given in the level transition announcement with the estimated front end of the train and the transmission of:

a) the "State order to STM" message (order to DA state) to an STM to be activated, when no STM is in state DA state, and

b) ETCS status data (with the changed level) to all STMs.

5.2.10.14   Maximum worst-case time between the reception of the "State report from STM" message (CS state) from an STM to be deactivated and the transmission of the "State order to STM" message (order to DA state) to an STM to be activated.

5.2.10.15   Maximum worst-case time between the reception of a balise group message at a level transition border and the transmission of:

a) the "State order to STM" message (order to CS state) to an STM to be deactivated, and

b) ETCS status data (with the changed level) to all STMs.

5.2.10.16   Maximum worst-case time between passing the transition location given in the level transition announcement with the estimated front end of the train and the transmission of:

a) the "State order to STM" message (order to CS state) to an STM to be deactivated, and

b) ETCS status data (with the changed level) to all STMs.

5.2.10.17   Maximum worst-case transfer time for an "ETCS trackside message for STMs" counted from the reception of a balise message with an "ETCS trackside message for STMs" and the transmission of the corresponding packet on the STM bus.

5.2.10.18   Maximum worst-case time between the transmission of the "STM max speed" message on the STM bus and the update of the MRSP by the ERTMS/ETCS on-board.

5.2.10.19 Maximum worst-case time between the transmission of the "STM system speed / distance" message on the STM bus and the update of the MRSP by the ERTMS/ETCS on-board.

5.2.10.20 Maximum worst-case time between the selection of the driver language on the ETCS DMI by the driver and the transmission of the corresponding message on the STM bus.

5.2.10.20.1 **General exception**: If a previous order to the STM has not yet been answered, the maximum worst-case time for sending a new order shall be counted from the time of reception of the STM state report.

5.2.10.21 Values table.

Definition	Value	Comments
Maximum worst-case delay time for safe action, see 5.2.10.1	1 s	
Maximum worst-case time between a request for DE state and an order to DE state, see 5.2.10.2	1.5 s	
Maximum worst-case Override status transfer time (activated by ERTMS/ETCS on-board), see 5.2.10.3	1.5 s	
Maximum worst-case Override status transfer time (activated by STM), see 5.2.10.4	1.5 s	
Maximum worst-case ETCS data transfer time, see 5.2.10.5	1.5 s	
Maximum worst-case Specific NTC Data transfer time, see 5.2.10.6	1.5 s	
Maximum worst-case HS state order transfer time (announcement from a balise group), when no STM is in HS state, see 5.2.10.7	1.5 s	
Maximum worst-case HS state order transfer time (announcement via radio from RBC), when no STM is in HS state, see 5.2.10.8	1.5 s	
Maximum worst-case HS state order transfer time (STM deactivated), see 5.2.10.9	1.5 s	
Maximum worst-case CS state order transfer time (announcement from a balise group), see 5.2.10.10	1.5 s	
Maximum worst-case CS state order transfer time (announcement via radio from RBC), see 5.2.10.11	1.5 s	

Definition	Value	Comments
Maximum worst-case DA state order transfer time (level transition border balise), when no STM is in DA state, see 5.2.10.12	1.5 s	
Maximum worst-case DA state order transfer time (level transition location), when no STM is in DA state, see 5.2.10.13	1.5 s	
Maximum worst-case DA state order transfer time (STM deactivated), see 5.2.10.14	1.5 s	
Maximum worst-case CS state order transfer time (level transition border balise), see 5.2.10.15	1.5 s	
Maximum worst-case CS state order transfer time (level transition location), see 5.2.10.16	1.5 s	
Maximum worst-case transfer time for "ETCS trackside messages for STMs", see 5.2.10.17	1.5 s	
Maximum worst-case "STM Max speed" processing time, see 5.2.10.18	1.5 s	
Maximum worst-case "STM system speed / Distance" processing time, see 5.2.10.19	1.5 s	
Maximum worst-case language selection transfer time, see 5.2.10.20	< 1.5 s	

5.2.11   Odometer parameters

5.2.11.1   The FFFIS STM specification (see [2]) includes a list of performance-related information (configuration information) which is transmitted from the ERTMS/ETCS on-board Odometer Function to the STMs with no assignment of values. This assignment is included here.

5.2.11.2   Maximum worst-case time between the transmission of two consecutive "Odometer multicast" messages from the ERTMS/ETCS on-board on the STM bus.

5.2.11.3   Maximum worst-case time between the transmission of two consecutive "Odometer parameters to STM" messages from the ERTMS/ETCS on-board on the STM bus.

5.2.11.4   Values table.

Definition	Value	Comments
Worst case maximum production delay time (including time stamping inaccuracy and CSI)	850 ms	This is the worst case value for definition taken from, [2] §12.4.1.4

Definition	Value	Comments
Absolute Speed Accuracy	-	Requirement according to [3].
Relative Speed Accuracy	-	Requirement according to [3].
Absolute Distance Accuracy	-	Requirement according to [3]. .
Relative Distance Accuracy	-	Requirement according to [3].
Maximum worst-case cycle time for "Odometer multicast" message, see 5.2.11.2	500 ms	
Maximum worst-case cycle time for "Odometer parameters to STM" message, see 5.2.11.3	5 s	

5.2.11.4.1 Note: The table includes only the names of the constants. The definitions can be found in [2].

5.2.12 Intentionally deleted