EEIG ERTMS Users Group
123-133 Rue Froissart, 1040 Brussels, Belgium
Tel: +32 (0)2 673.99.33 - TVA BE0455.935.830
Website: www.ertms.be E-mail: info@ertms.be

ERTMS/ATO

Operational Performance Requirements

Ref:	18E094
Version:	0i
Date:	2022-03-24

Modification history

Version	Date	Modification / Description	Editor
0a	26/10/2018	Draft	Kirschbauer, Fabian
0b	06/03/2019	Inserted first requirements for discussion	Kirschbauer, Fabian
0c	18/03/2019	Inserted results of first discussion of Stockholm meeting (2019-03-13)	Kirschbauer, Fabian
0d	04/12/2019	Changes of discussion in Praha meeting (2019-12-04)	Users in ATO WP
0e	14/05/2020	Changes of discussion in video conference (2020-05-14)	Users in ATO WP
0f	19/08/2020	Changes due to supplier comments	Users in ATO WP
0g	2021-06-23	Changes due to supplier comments on 0e	Bäärnhielm, Arvid
0h	2022-01-07	Added requirements on availability and EBI violation, as well as added and updated values for two other requirements.	Users in ATO WP
0i	2022-03-24	Changes due to ATO-WP review	ATO-WP

Table of Contents

1 Introduction 4
1.1 Scope 4
1.2 References 4
1.3 Abbreviations 4
2 Operational Performance Requirements 4
2.1 Activating the ATO 4
2.2 ATO status available on the interface 5
2.3 ATO OB packet sending time 5
2.4 ETCS input to ATO OB reaction 5
2.5 Receiving a JP update and ATO OB updating 5
2.6 Packet response 6
2.7 Age of speed and position measurement in the Status Report to trackside 6
2.8 Accuracy of estimated times in the Status Report 6
2.9 Availability - MTBF 7
2.10 Availability - MTBIF 7

1 Introduction

1.1 Scope

1.1.1.1 This document specifies requirements for the ATO that are related to performance and not already covered by the other documents of the Operational Concept.

1.1.1.2 The document is specifying values that are part of the ERTMS/ATO specification. Therefore, no values that influence the performance of ETCS such as specified in Subset-041 are taken into consideration.

1.1.1.3 It is assumed that any value defined in this document is seen as limit that has to be respected.

1.2 References

1.2.1.1 The following references are used in this document:

[1] SUBSET-041 V320

[2] ERTMS/ATO GLOSSARY, 13E154

1.3 Abbreviations

1.3.1.1 Abbreviations in the context of ERTMS/ATO are defined in the ATO Glossary

2 Operational Performance Requirements

2.1 Activating the ATO-OB

Description	**Activating the ATO-OB**
Start event	Received command to energise (NP)
Stop event	ATO-OB being in CO or FA State
Value	≤ 60 sec
Notes	This event will happen when the vehicle is at 0 km/h.

2.2 ATO status available on the interface

Description	ATO status available on the interface
Start event	All required inputs are available on the ATO input interfaces.
Stop event	ATO request to display ATO status sent by ATO on the subset 130 interface to ETCS
Value	< 0.5 sec
Notes	The ATO status is described in Subset-125 section 8.2.1.

2.3 ATO OB packet sending time

Description	ATO OB packet sending time
Start event	All required inputs are available on the ATO input interfaces.
Stop event	Information at the mobile terminal interface
Value	< 0.5 sec
Notes	This requirement is applicable for packets to be sent to the ATO-TS.

2.4 ETCS input to ATO OB reaction

Description	ETCS input to ATO OB reaction
Start event	ETCS input on the ATO interface
Stop event	ATO state change on Subset-130 interface
Value	<0.5 sec
Notes	This could be notifying ATO about ETCS changing from or to AD mode. The value of 0.5 sec is to achieve an intended total reaction time for the state change to be visible on the DMI in less than 1 second.

2.5 Receiving a JP update and ATO OB updating

Description	Receiving a JP update and ATO OB updating
Start event	The reception of a complete message at the ATO communication module (see figure 1 in Subset-148) with JP Update; e.g. imposing the skip of the next targeted Stopping Point.
Stop event	Updated information is detected at interface level (Subset-139 or Subset-130); e.g. for a request for displaying the Stopping Point skip.
Value	E.g. the reaction time should be < 1 sec for sending a request to skip the next Stopping Point via Subset-130.

Notes	
Assumptions	Precondition: A JP and the referenced SPs are already available on-board

2.6 Packet response

Description	Packet response
Start event	Receiving the packet (new JP / HS request) from the ATO-OB / ATO-TS interface.
Stop event	Sending the response packet (e.g. acknowledgement) to the ATO-OB / ATO-TS interface.
Value	< 0.25 sec
Notes	

2.7 Age of speed and position measurement in the Status Report to trackside

Description	Age of speed and position measurement in the Status Report to trackside
Start event	N/A
Stop event	N/A
Value	< 1.05 sec
Notes	This needs to be validated using an external position and speed measurement system.

2.8 Accuracy of estimated times in the Status Report

Description	Accuracy of estimated times in the Status Report
Start event	N/A
Stop event	N/A
Value	± (5 sec + 5 % * t_rem) t_rem = the estimated remaining travel time to the next TP
Notes	The accuracy applies to the reported estimated remaining travel time to the next TP and will be compared to the actual arrival time at that TP. The estimated remaining travel time is the difference between the estimated arrival time (see clause 7.7.1.6.e.2. in Subset-125) and the time stamp of the Status Report.
Assumptions	Data quality recommendation in the application guide are met. Train characteristics information adheres to a level of quality jointly agreed during application.

	Unexpected delays due to external systems (e.g. signalling) or circumstances (e.g. weather conditions) are excluded.

2.9 Availability - MTBF

Description	Service affecting failure
Start event	N/A
Stop event	N/A
Value	50 000 hrs
Notes	When the ATO-OB goes to failure State (FA), but the train can still be driven manually.

2.10 Availability - MTBIF

Description	Immobilising/mission affecting failures
Start event	N/A
Stop event	N/A
Value	100 000 hrs
Notes	When the ATO-OB fails, with the consequence that the train cannot be driven at all.