Control, Command and Signalling National Technical Specification Notice

CCS NTSN – Technical Annex

Draft for preliminary consultation based on the NTSN published on 1st January 2021 with the ERA proposals for the TSI 2022 package (Digital Rail and Green Freight) shown as changes to this. The markup reflects the proposed TSI text, except where this has been amended for applicability to GB, such as substituting 'NTSN' for 'TSI'. Please note, this draft still includes TSI proposals which need to be further amended where text is not applicable to GB, for example, interaction with the ERA and EC for error corrections and a national implementation plan.

This is provided to elicit views on the TSI proposals to inform the development of the industry recommendation for similar NTSN changes. It does not reflect RSSB or industry proposals for NTSN changes. These will be provided with a supporting business case for change for consultation in early 2023.

ANNEX

NTSN relating to the 'control-command and signalling' subsystems of the rail system

TABLE OF CONTENTS

1. INTRODUCTION

1.1. TECHNICAL SCOPE

This NTSN concerns the Control Command and Signalling On-board Subsystem and the Control-Command and Signalling Trackside Subsystem.

This NTSN is applicable to control-command and signalling trackside Subsystems of the rail network defined in the point 1.2 (Geographical scope) of this NTSN and to the control-command and signalling on-board subsystems of vehicles which are (or are intended to be) operated on it. These vehicles are of one of the following types:

(1) locomotives and passenger rolling stock, including thermal or electric traction units, self-propelling thermal or electric passenger trains, and passenger coach, if equipped with a driving cab.

(2) special vehicles, such as on-track machines, if equipped with a driving cab and intended to be used in transport mode on its own wheels.

This list of vehicles shall include those which are specially designed to operate on the different types of high-speed lines described in point 1.2. (Geographical scope).

1.2. GEOGRAPHICAL SCOPE

The geographical scope of this NTSN is the network of the GB rail system. and the NTSN does not apply to parts of the rail system excluded by regulation 3 of the Railways (Interoperability) Regulations 2011.

The NTSN shall apply to networks with 1 435 mm track gauge.

1.3. This provision has been left intentionally blank.

2. SUBSYSTEM DEFINITION AND SCOPE

2.1. INTRODUCTION

The Control-Command and Signalling Subsystems are defined in paragraph 2 of Schedule 3 to the Railways (Interoperability) Regulations 2011 as:

~~(a)~~(1) Trackside control-command and signalling as: ‘~~“~~all the trackside equipment required to ensure safety and to command and control movements of trains authorised to travel on the network.~~”~~’

~~(b)~~(2) On-board control-command and signalling as '~~"~~all the on-board equipment required to ensure safety and to command and control movements of trains authorised to travel on the network~~".~~'

The features of the Control-Command and Signalling Subsystems are:

~~(1)~~(3) the functions that are essential for the safe control of railway traffic, and that are essential for its operation, including those required for degraded modes[1];

~~(2)~~(4) the interfaces;

~~(3)~~(5) the level of performance required to meet the essential requirements.

2.2. SCOPE

The Control-Command and Signalling Subsystem NTSN specifies only those requirements which are necessary to assure the interoperability of the GB rail system and the compliance with the essential requirements[2].

The Control-Command and Signalling Subsystems include the following parts:

(1) train protection;

(2) voice radio communication;

(3) data radio communication;

(4) train detection;~~.~~

~~(4)~~(5) automatic train operation[3].

ERTMS (European Rail Traffic Management System) is composed of train protection (ETCS), radio communication (RMR) and automatic train operation (ATO).

The Class A train protection system is ETCS (European Train Control System) [4] whilst the Class A radio system is ~~GSM-R~~ RMR (Railway Mobile Radio system). In this NTSN, RMR comprises two radio class A systems: GSM-R and FRMCS (Future

1 Degraded modes are modes of operation designed to deal with faults. They have been taken into account when designing the Control-Command and Signalling Subsystems

2 Currently the CCS NTSN does not specify any interoperability requirement for the interlockings, level crossings and certain other elements of the CCS.

[3] In this document the term ATO is referring to ERTMS/ATO specifications.

4 In some documents referenced in this NTSN the term 'ERTMS' (European Rail Traffic Management System) is used to indicate a system including both ETCS and GSM-R and 'ETCS' is indicated as 'ERTMS/ETCS'.

Railway Mobile Communication System) that may be implemented both at the same time or each of them independently[5].

For ~~Class A~~ train detection this NTSN specifies only the requirements for the interface with other subsystems.

Class B systems for the GB network are a limited set of train protection and voice radio legacy systems that were already in use in the UK rail network before 20 April 2001.

Class B systems for other parts of the network of the rail system are a limited set of train protection and voice radio legacy systems that were already in use in those networks before 1 July 2015.

The following list of Class B systems is in use in GB:

— GW ATP

— RETB

— TPWS

— TVM 430

— Chiltern-ATP

— Mechanical Trainstops

— KVB

The requirements for the Control-Command and Signalling On-board Subsystem are specified in relation to Class A radio mobiles ~~and~~, train protection and automatic train operation.

The requirements for the Control-Command and Signalling Trackside Subsystem are specified in relation to:

(1) the Class A radio network;

(2) the Class A train protection;

~~(2)~~(3) the Class A automatic train operation;

~~(3)~~(4) the interface requirements for train detection systems, to ensure their compatibility with rolling stock.

[5] When referring to both Class A systems, the term RMR system is used. When referring to specific one of these Class A systems, the terms GSM-R or FRMCS are used.

All Control-Command and Signalling Subsystems, even where not specified in this NTSN, shall be assessed according with Commission Implementing Regulation (EU) No 402/2013[6].

2.3. TRACKSIDE APPLICATION LEVELS (ETCS)

The interfaces specified by this NTSN define the means of data transmission to, and (where appropriate) from trains. The ETCS specifications referenced by this NTSN provide application levels from which a trackside implementation may choose the means of transmission that meet its requirements.

This NTSN defines the requirements for all application levels.

For the technical definition of the ETCS application levels see ~~Annex~~ Appendix A, 4.1c.

3. THE ESSENTIAL REQUIREMENTS FOR THE CONTROL-COMMAND AND SIGNALLING SUBSYSTEMS

3.1. GENERAL

The Railways (Interoperability) Regulations 2011 requires that the subsystems and the interoperability constituents including interfaces meet the essential requirements set out in general terms in Schedule 2 of the Railways (Interoperability) Regulations 2011.

The essential requirements are:

(1) Safety;

(2) Reliability and Availability;

(3) Health;

(4) Environmental Protection;

(5) Technical compatibility;

(6) Accessibility.

6 Commission Implementing Regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009. This EU legislation is retained EU law under section 3 of the European Union (Withdrawal) Act 2018, and it has been amended under that Act by the Rail Safety (Amendment etc.) (EU Exit) Regulations 2019 to make amendments to EU legislation as a result of the UK's exit from the EU.

The essential requirements for Class A systems are described ~~below~~in table 3.1.

The requirements for Class B systems are the responsibility of the Competent Authority and set out in national technical rules.

The following table indicates the essential requirements, as set out and numbered in ~~Annex III of Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011, taken into account by the basic parameters defined in Chapter 4 of this NTSN.

Table 3.1

Relation between Essential Requirements and Basic Parameters

Basic Parameter Section	Basic Parameter Title	Safety	Reliability-Availability	Health	Environmental protection	Technical compatibility
4.2.1	Control-Command and Signalling reliability, availability and safety characteristics relevant to interoperability	1.1.1 1.1.3 2.3.1	1.2			
4.2.2	On-board ETCS functionality	1.1.1				1.5 2.3.2
4.2.3	Trackside ETCS functionality	1.1.1				1.5 2.3.2
4.2.4	Mobile communication functions for railways RMR				1.4.3	1.5 2.3.2
4.2.5	RMR, ETCS and ATO air gap interfaces					1.5 2.3.2
4.2.6	On-Board Interfaces Internal to Control-Command and Signalling					1.5 2.3.2
4.2.7	Trackside Interfaces Internal to Control-Command and Signalling					1.5 2.3.2

Basic Parameter Section	Basic Parameter Title	Safety	Reliability-Availability	Health	Environmental protection	Technical compatibility
4.2.8	Key Management					1.5 2.3.2
4.2.9	ETCS-ID Management					1.5 2.3.2
4.2.10	Trackside Train Detection Systems					1.5 2.3.2
4.2.11	Electromagnetic Compatibility between Rolling Stock and Control-Command and Signalling trackside equipment				1.4.3	1.5 2.3.2
4.2.12	ETCS DMI (Driver-Machine Interface)					1.5 2.3.2
4.2.13	RMR DMI (Driver Machine Interface)					1.5 2.3.2
4.2.14	Interface to Data Recording for Regulatory Purposes	1.1.1				1.5 2.3.2
4.2.15	Trackside Control-Command and Signalling objects					1.5 2.3.2
4.2.16	Construction of equipment used in CCS subsystems	1.1.3 1.1.4		1.3.2	1.4.2	
4.2.17	ETCS and Radio System Compatibility					1.5 2.3.2
4.2.18	On-Board ATO functionality					1.5 2.3.2

Basic Parameter Section	Basic Parameter Title	Safety	Reliability-Availability	Health	Environmental protection	Technical compatibility
4.2.19	Trackside ATO functionality					1.5 2.3.2
4.2.20	Technical documentation for Maintenance	1.1.5 1.1.1				

3.2. SPECIFIC ASPECTS OF THE CONTROL-COMMAND AND SIGNALLING SUBSYSTEMS

3.2.1. Safety

Every Control-Command and Signalling Subsystems project shall take the measures necessary to ensure that the level of risk of an ~~incident~~ error occurring within the scope of the Control-Command and Signalling Subsystems, is not higher than the objective for the service.

To ensure that the measures taken to achieve safety do not jeopardise interoperability, the requirements of the basic parameter defined in ~~point~~ section 4.2.1 (Control-Command and Signalling reliability, availability and safety characteristics relevant to interoperability) shall be respected.

For the ETCS Class A system the safety objective is apportioned between the Control-Command and Signalling On-board and Trackside Subsystems. The detailed requirements are specified in the basic parameter defined in ~~point~~ section 4.2.1 (Control-Command and Signalling reliability, availability and safety characteristics relevant to interoperability). This safety requirement shall be met together with the availability requirements as defined in ~~Point~~ section 3.2.2 (Reliability and Availability).

~~For the ETCS Class A system:~~

~~(a) the changes made by railway undertakings and infrastructure managers shall be managed in compliance with the processes and procedures of their safety management system;~~

~~(b)~~(a) ~~the changes made by other actors (e.g. manufacturers or other suppliers) shall be managed according to the risk management process set out in Annex I to the Commission Implementing Regulation (EU) No 402/2013.~~

~~Additionally the correct application of the risk management process as set out in Annex I of Regulation (EU) No 402/2013, as well as the appropriateness of the results from this application, shall be independently assessed by a CSM assessment body according to Article 6 of that Regulation. The CSM Assessment Body shall be accredited or recognised according to the requirements in Annex II of Regulation (EU) No 402/2013 in the fields of "Control-command and signalling" and "System safe integration".~~

~~The application of the specifications as referred to in Annex A, Table A 3 is an appropriate means to fully comply to the risk management process as set out in Annex I of the Commission Implementing Regulation (EU) No 402/2013 for design, implementation, production, installation and validation (incl. Safety acceptance) of interoperability constituents and subsystems. When different specifications from the ones referred to in Annex A, Table 3 are applied, at least equivalence shall be demonstrated with the specifications in Annex A, Table 3.~~

~~Whenever the specifications as referred to in Annex A, Table A 3 are used as an appropriate means to fully comply to the risk management process as set out in Annex I of the Commission Implementing Regulation (EU) No 402/2013, in order to avoid unnecessary duplication of independent assessment work, the independent safety assessment activities that are required by the specifications referred to in Annex A, Table A 3 shall be carried out by an Assessment Body accredited or recognized as specified in the section above instead of a CENELEC independent safety assessor.~~

3.2.2. Reliability and Availability

For the Class A system, the reliability and availability objectives are apportioned between the Control-Command and Signalling On-board and Trackside Subsystems. The detailed requirements are specified in the basic parameter defined in ~~point~~ section 4.2.1 (Control-Command and Signalling safety characteristics relevant to interoperability).

The level of risk caused by age and wear of constituents used within the subsystem shall be monitored. The requirements for maintenance stated in ~~point~~ section 4.5 shall be respected.

~~3.2.3. Health~~

~~In accordance with national legislation, care shall be taken to ensure that the materials used in and the design of the Control Command and Signalling Subsystems do not constitute a health hazard to persons having access to them.~~

~~3.2.4. Environmental Protection~~

~~3.2.5.~~3.2.3. Technical Compatibility

Technical compatibility includes the functions, interfaces and performances required to achieve interoperability.

The requirements of technical compatibility are subdivided in the following three categories:

(1) The first category sets out the general engineering requirements for interoperability namely environmental conditions, internal electromagnetic compatibility (EMC) within the railway boundaries, and installation. These compatibility requirements are defined in this chapter.

(2) The second category describes how the Control Command and Signalling Subsystems have to be applied technically and what functions they have to perform to ensure interoperability. This category is defined in Chapter 4.

(3) The third category describes how the Control Command and Signalling Subsystems is interfaced with the Operation and Traffic Management Subsystem~~have to be operated~~ in order that operational interoperability is achieved. This category is ~~defined~~ described in Chapter 4.

~~3.2.5.1.~~3.2.3.1. *Engineering Compatibility*

~~3.2.5.1.1.~~3.2.3.1.1. Physical environmental conditions

Control Command and Signalling equipment shall be capable of operating under the climatic and physical conditions which characterise the area in which the relevant part of the GB rail system is located.

The requirements of basic parameter 4.2.16 (Construction of equipment used in CCS Subsystems) shall be respected.

~~3.2.5.1.2.~~3.2.3.1.2. Railway Internal Electromagnetic Compatibility

~~In accordance with national legislation, the Control Command and Signalling equipment shall neither interfere with nor be interfered with by other control-command and signalling equipment or other subsystems.~~

The basic parameter related ~~for~~ to electromagnetic compatibility between R~~r~~olling ~~s~~Stock and ~~c~~Control-~~c~~Command and ~~s~~Signalling trackside equipment is described in ~~point~~ section 4.2.11 (Electromagnetic Compatibility).

~~3.2.6. Accessibility~~

~~No requirements are mandated for the CCS subsystems for the essential requirement accessibility.~~

3.3. ESSENTIAL REQUIREMENTS NOT DIRECTLY COVERED BY THIS NTSN

3.3.1. Safety

The essential requirement 1.1.2 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011 is not in the scope of this NTSN.

The essential requirement 1.1.4 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011 for the Control-Command Signalling trackside subsystems is covered by the applicable ~~European and~~ national provisions in force.

3.3.2. Health

In accordance with national legislation, care shall be taken to ensure that the materials used in and the design of the Control-Command and Signalling Subsystems do not constitute a health hazard to persons having access to them. This is in relation with the essential requirement 1.3.1 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011. The essential requirement 1.3.2 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011 for the Control-Command Signalling trackside subsystems is covered by the applicable ~~European and~~ national provisions in force.

3.3.3. Environmental Protection

In accordance with national legislation:

(1) the Control-Command and Signalling equipment, if subjected to excessive heat or fire, shall not exceed limits for the emission of fumes or gases which are harmful to the environment. This is in relation with the essential requirement 1.4.2 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011;

(2) the Control-Command and Signalling equipment shall not contain substances which may abnormally contaminate the environment during their normal use.~~;~~ This is in relation with the essential requirement 1.4.1 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011;

(3) the Control-Command and Signalling equipment shall be subject to the Union legislation in force controlling the limits to the emission of and the susceptibility to electromagnetic interference along the boundaries of railway property. This is in relation with the essential requirement 1.4.3 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011;

(4) the Control-Command and Signalling equipment shall comply with existing regulations on noise pollution. This is in relation with the essential requirement 1.4.4 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011;

(5) the Control-Command and Signalling equipment shall not give rise to any inadmissible level of vibration which could jeopardise the integrity of the infrastructure (when the infrastructure is in the correct state of maintenance). This is in relation with the essential requirement 1.4.5 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011.

3.3.4. Technical Compatibility

3.3.4.1. Railway Internal Electromagnetic Compatibility

In accordance with national legislation, the Control Command and Signalling equipment shall neither interfere with nor be interfered with by other control-command and signalling equipment or other subsystems.

3.3.5. Accessibility

The essential requirement 1.6 in ~~Annex III to Directive (EU) 2016/797~~ Schedule 2 to the Railways (Interoperability) Regulations 2011 is not in the scope of this NTSN.

4. CHARACTERISATION OF THE SUBSYSTEMS

4.1. INTRODUCTION

4.1.1. Basic parameters

In accordance with the relevant essential requirements, the Control-Command and Signalling Subsystems are characterised by the following basic parameters:

(1) Control-Command and Signalling reliability, availability and safety characteristics relevant to interoperability (~~point~~section 4.2.1)

(2) On-board ETCS functionality (~~point~~section 4.2.2)

(3) Trackside ETCS functionality (~~point~~section 4.2.3)

(4) Mobile communication functions for railways — ~~GSM-R~~RMR (~~point~~section 4.2.4)

(5) ETCS, ATO and ~~GSM-R~~RMR air gap interfaces (~~point~~section 4.2.5)

(6) On-board interfaces Internal to Control-Command and Signalling (~~point~~section 4.2.6)

(7) Trackside interfaces Internal to Control-Command and Signalling (~~point~~section 4.2.7)

(8) Key management (~~point~~section 4.2.8)

(9) ETCS-ID management (~~point~~section 4.2.9)

(10) Train detection systems (~~point~~section 4.2.10)

(11) Electromagnetic compatibility between rolling stock and Control-Command and Signalling trackside equipment (~~point~~section 4.2.11)

(12) ETCS DMI (driver-machine interface) (~~point~~section 4.2.12)

(13) ~~GSM-R~~RMR DMI (driver-machine interface) (~~point~~section 4.2.13)

(14) Interface to data recording for regulatory purposes (~~point~~section 4.2.14)

(15) ~~Visibility of t~~Trackside Control-Command and Signalling objects (~~point~~section 4.2.15)

(16) Construction of equipment used in CCS subsystems (~~point~~section 4.2.16)

(17) ETCS and Radio System Compatibility (~~point~~section 4.2.17)

(18) On-Board ATO functionality (section 4.2.18)

(19) Trackside ATO functionality (section 4.2.19)

~~(17)~~(20) Technical documentation for Maintenance (section 4.2.20)

4.1.2. Overview of the requirements

All requirements in ~~point~~ section 4.2 (Functional and technical specifications of the Subsystems) related to these basic parameters shall be applied to the Class A system.

Requirements for Class B systems and for STMs (which enable the Class A On-board system to operate on Class B infrastructure) are set out in National Technical Rules. For achieving safe integration of subsystems, projects might need to consider additional relevant standards.

This NTSN is based on the principles of enabling the Control-Command and Signalling Trackside Subsystem to be compatible with NTSN-compliant Control-Command and Signalling On-board Subsystems. To achieve this goal:

(1) functions, interfaces and performance~~s~~ of the Control-Command and Signalling On-board Subsystem are standardised, ensuring that every train will react in a predictable way to data received from trackside;

(2) for the Control-Command and Signalling Trackside Subsystem, track-to-train and train-to-track communication are fully standardised in this NTSN. The specifications referenced in the points below allow Control-Command and Signalling trackside functionality to be applied in a flexible way, so that it can be optimally integrated into the railway system. This flexibility shall be exploited without limiting the movement of vehicles with NTSN-compliant on-board subsystems.

The Control-Command and Signalling functions are classified in categories indicating whether they are optional or mandatory. The categories are defined in chapter 7.2.6 of this NTSN and in ~~the~~ specifications referred to in ~~Annex~~ Appendix A and these texts also state how the functions are classified.

~~Annex~~ Appendix A, 4.1 c provides the Glossary of ETCS and ATO terms and definitions, which are used in the specifications referred to in ~~Annex~~ Appendix A.

4.1.3. Parts of Control-command and Signalling Subsystems

According to ~~point~~ section 2.2 (Scope) the Control-Command and Signalling Subsystems can be subdivided in parts.

The following table indicates which basic parameters are relevant for each subsystem and for each part.

Table 4.1

Parts of Control Command and Signalling Subsystems

Subsystem	Part	Basic parameters
Control-Command and Signalling On-board	Train protection	4.2.1, 4.2.2, 4.2.5, 4.2.6, 4.2.8, 4.2.9, 4.2.12, 4.2.14, 4.2.16, 4.2.17, 4.2.20
	Voice radio communication	4.2.1.2, 4.2.4.1, 4.2.4.2, 4.2.5.1, 4.2.13, 4.2.16, 4.2.17, 4.2.20
	Data radio communication	4.2.1.2, 4.2.4.1, 4.2.4.3, 4.2.5.1, 4.2.6.2, 4.2.16, 4.2.17, 4.2.20
	Automatic Train Operation	4.2.1.2, 4.2.5.1, 4.2.6, 4.2.12, 4.2.16, 4.2.18, 4.2.20
Control-Command and Signalling Trackside	Train protection	4.2.1, 4.2.3, 4.2.5, 4.2.7, 4.2.8, 4.2.9, 4.2.15, 4.2.16, 4.2.17, 4.2.20
	Voice radio communication	4.2.1.2, 4.2.4, 4.2.5.1, 4.2.7, 4.2.16, 4.2.17, 4.2.20
	Data radio communication	4.2.1.2, 4.2.4, 4.2.5.1, 4.2.7, 4.2.16, 4.2.17, 4.2.20
	Train detection	4.2.10, 4.2.11~~, 4.2.16~~
	Automatic Train Operation	4.2.1.2, 4.2.5.1, 4.2.7, 4.2.16, 4.2.19, 4.2.20

4.2. FUNCTIONAL AND TECHNICAL SPECIFICATIONS OF THE SUBSYSTEMS

4.2.1. Control-Command and Signalling reliability, availability and safety characteristics relevant to interoperability

This basic parameter describes the requirements for the Control-Command and Signalling On-board Subsystem and Trackside subsystem with reference to ~~point~~ section 3.2.1 (Safety) and ~~point~~ section 3.2.2 (Availability and Reliability).

In order to achieve interoperability, when implementing Control-Command and Signalling On-board and Trackside subsystems the following provisions shall be respected:

(a) The design, implementation and use of a Control-Command and Signalling On-board or Trackside subsystem shall not export any requirements:

  (a) across the interface between Control-Command and Signalling On-board and Trackside subsystems in addition to the requirements specified in this NTSN;

  (b) to any other subsystem in addition to the requirements specified in the corresponding NTSNs.

(b) The requirements set out in ~~points~~ sections 4.2.1.1 and 4.2.1.2 below shall be respected.

4.2.1.1. Safety

The Control-Command and Signalling On-board and Trackside subsystems shall respect the requirements for ETCS equipment and installations stated in this NTSN.

For the hazard 'exceeding speed and/or distance limits advised to ETCS' the tolerable hazard rate (THR) ~~is~~ shall be 10^{-9} h^{-1} for random failures, ~~for~~ of the on-board ETCS and 10^{-9} h^{-1} for random failures of the trackside ETCS. See ~~Annex~~ Appendix A 4.2.1 a.

To achieve interoperability, the on-board ETCS shall fully respect all requirements specified in ~~Annex~~ Appendix A 4.2.1. Nevertheless, less stringent safety requirements are acceptable for trackside ETCS provided that, in combination with NTSN-compliant Control-Command and Signalling On-board subsystems, the safety level for the service is met.

For the ETCS Class A system:

(1) the changes made by railway undertakings and infrastructure managers to implement preventive or corrective maintenance actions shall be managed in

compliance with the processes and procedures of their safety management system according to Article 9 of the Safety Directive (EU) 2016/798;

(2) other types of changes made by railway undertaking and infrastructure managers (e.g. changes of the design or implementation of ETCS), as well as the changes made by other actors (e.g. manufacturers or other suppliers) shall be managed according to the risk management process set out in Annex I to the Commission Implementing Regulation (EU) No 402/2013, as referred to in Article 6(1)(a) of Directive (EU) 2016/798 of the European Parliament and of the Council.

Additionally the correct application of the risk management process as set out in Annex I of Regulation (EU) No 402/2013, as well as the appropriateness of the results from this application, shall be independently assessed by a CSM assessment body according to Article 6 of that Regulation. There shall not be restrictions with respect to the type A, B or C of independence of the CSM assessment body permitted by Regulation (EU) No 402/2013. The appointed CSM ~~A~~assessment ~~B~~body shall be accredited or recognised according to the requirements in Annex II of Regulation (EU) No 402/2013 in the field~~s~~ of '~~"~~Control-C~~c~~ommand and S~~s~~ignalling"' ~~and "System safe integration"~~ sub-system, as listed in item 5 'classification' of ERADIS database entry for Assessment Bodies.

The accreditation, or recognition, in the field of 'Control-Command and Signalling' sub-system, covers the CSM assessment body competence to independently assess the 'safe integration' at the level of an ETCS subsystem, or an ETCS Interoperability Constituent. This includes the competence for:

(1) the assessment of safe integration of all internal "components and interfaces" that form the architecture of the ETCS subsystem or ETCS Interoperability Constituent;

(2) the assessment of safe integration of all "external interfaces" of the ETCS sub-system, or ETCS Interoperability Constituent, within its direct physical, functional, environmental, operational and maintenance context.

The application of the ~~specifications~~standards as referred to in ~~Annex~~Appendix A, Table A 3 is an appropriate means to fully comply to the risk management process as set out in Annex I of the Commission Implementing Regulation (EU) No 402/2013 for design, implementation, production, installation and validation (incl. Safety acceptance) of interoperability constituents and subsystems. When different ~~specifications~~standards from the ones referred to in ~~Annex~~Appendix A, Table A 3 are applied, at least equivalence shall be proven~~demonstrated with the specifications in Annex A, Table 3~~.

Whenever for an ETCS subsystem or an ETCS Interoperability Constituent the specifications as referred to in ~~Annex~~Appendix A, Table A 3 are used as an

appropriate means to fully comply to the risk management process as set out in Annex I of the Commission Implementing Regulation (EU) No 402/2013, in order to avoid unnecessary duplication of independent assessment work, the independent safety assessment activities that are required by the specifications referred to in ~~Annex~~Appendix A, Table A 3 shall be carried out by ~~an Assessment Body~~ a CSM assessment body accredited or recognized as specified in the section above instead of a CENELEC independent safety assessor.

4.2.1.2. Availability/Reliability

This point refers to the occurrence of failure modes not causing safety hazards but creating degraded situations, the management of which could decrease the overall safety of the system.

In the context of this parameter, 'failure' means the termination of the ability of an item to perform a required function with the required performance and 'failure mode' means the effect by which the failure is observed.

To ensure that the relevant infrastructure managers and railway undertaking are given all the information they need to define appropriate procedures for managing degraded situations, the technical file accompanying the UK declaration of verification for an on-board or trackside CCS subsystem shall contain the calculated availability/reliability values related to failure modes having an impact on the capability of the CCS subsystem to supervise the safe movement of one or more vehicles or to establish radio voice communication between traffic control and the train drivers.

Compliance with the following calculated values shall be ensured:

(1) Mean time of hours of operation between failures of a CCS on-board subsystem requiring the isolation of the train protection functions: (open point).

(2) Mean time of hours of operation between failures of a CCS on-board subsystem preventing radio voice communication between traffic control and the train driver: (open point).

To allow the infrastructure managers and railway undertakings to monitor, during the life of the subsystems, the level of risk and the respect of the reliability/availability values used for the definition of procedures to manage degraded situations, the requirements for maintenance stated in ~~point~~ section 4.2.20~~5~~ (Technical documentation for maintenance~~Maintenance rules~~) shall be respected.

4.2.2. On-board ETCS functionality

The basic parameter for ETCS on-board functionality describes all of the functions needed to run a train in a safe way. The primary function is to provide automatic train protection and cab signalling:

(1) setting the train characteristics (e.g., maximum train speed, braking performance);

(2) selecting the supervision mode on the basis of information from trackside;

(3) performing odometry functions;

(4) locating the train in a coordinate system based on Eurobalise locations;

(5) calculating the dynamic speed profile for its mission on the basis of train characteristics and of information from trackside;

(6) supervising the dynamic speed profile during the mission;

(7) providing the intervention function.

These functions shall be implemented in accordance with ~~Annex~~ Appendix A 4.2.2 b and their performance shall conform to ~~Annex~~ Appendix A 4.2.2 a.

The ETCS functionality of an Interoperability Constituent or a subsystem shall be described with a 'system identifier', which is as a numbering scheme to identify the system version and distinguish between a functional and a realisation identifier. The 'functional identifier' is part of the system identifier and means a figure or a number of figures defined by the individual configuration management, which represents a reference of the functionality for CCS implemented in a CCS subsystem or Interoperability Constituent. The 'Realisation identifier' is part of the system identifier and means a figure or a number of figures defined by the individual configuration management of a supplier, which represents a specific configuration (e.g. HW and SW) of a CCS subsystem or Interoperability Constituent. The 'system identifier', 'functional identifier' and 'realisation identifier' shall be defined by each supplier.

The requirements for tests are specified in ~~Annex~~ Appendix A 4.2.2 c.

The main functionality is supported by other functions, to which ~~Annex~~Appendix A 4.2.2 a and ~~Annex~~Appendix A 4.2.2 b also apply, together with the additional specifications indicated below:

(1) Communication with the Control-Command and Signalling Trackside Subsystem.

(a) Eurobalise data transmission. See ~~point~~ section 4.2.5.2 (Eurobalise communication with the train).

(b) Euroloop data transmission. See ~~point~~ section 4.2.5.3 (Euroloop communication with the train). This functionality is optional on-board unless required by specific cases in section 7.6 which shall only refer to the Appendix A specifications~~Euroloop is installed trackside in ETCS Level 1 and the release speed is set to zero for safety reasons (e.g. protection of danger points)~~.

(c) Radio data transmission for radio infill. See ~~Annex~~ Appendix A, 4.2.2 d, ~~point~~ section 4.2.5.1 (Radio communications with the train), ~~point~~ section 4.2.6.2 (Interface between ~~GSM-R~~RMR Radio Data Communication and ETCS) and ~~point~~ section 4.2.8 (Key Management). This functionality is optional on-board unless required by specific cases in section 7.6 which shall only refer to the Appendix A specifications~~radio data transmission for radio in-fill is installed trackside in ETCS Level 1 and the release speed is set to zero for safety reasons (e.g., protection of danger points)~~.

(d) Radio data transmission. See ~~point~~ section 4.2.5.1 (Radio communications with the train), ~~point~~ section 4.2.6.2 (Interface between ~~GSM-R Radio~~RMR Data Communication and ETCS) and ~~point~~ section 4.2.8 (Key Management). This radio data transmission is optional unless operating on an ETCS level R (formerly ETCS level 2 or level 3) line~~s~~.

(2) Communicating with the driver. See ~~Annex~~ Appendix A, 4.2.2 e, ~~and~~ ~~point~~ section 4.2.12 (ETCS DMI) and ~~Annex~~Appendix A 4.2.2 g.

~~(2)~~(3) Communicating with the STM. See ~~point~~ section 4.2.6.1 (Interface between ETCS and STM). This function includes:

(a) managing the STM output;

(b) providing data to be used by the STM;

(c) managing STM transitions.

(4) Managing information about ~~the~~

(a) completeness of the train ~~(train integrity)~~ — Supplying the train integrity and safe consist length information to the on-board subsystem, is optional unless it is required by trackside.

(b) cold movement detection – The ETCS on-board equipment shall be fitted with a Cold Movement Detection only on newly developed

vehicle designs requiring a first authorisation as defined in Article 14 of Commission Implementing Regulation 2018/545.

~~(a)~~

~~(3)~~(5) Equipment health monitoring and degraded mode support. This function includes:

(a) initialising the on-board ETCS functionality;

(b) providing degraded mode support;

(c) isolating the on-board ETCS functionality.

~~(4)~~(6) Support data recording for regulatory purposes. See ~~point~~ section 4.2.14 (Interface to Data Recording for Regulatory Purposes).

~~(5)~~(7) Forwarding information/orders and receiving state information from rolling stock:

~~(a) to the DMI. See point 4.2.12 (ETCS DMI)~~

(a) to/from the train interface unit. See ~~Annex~~ Appendix A, 4.2.2 f.

Note: the ETCS on-board shall be compliant with the train FFFIS only on newly developed vehicle designs requiring a first authorisation as defined in Article 14 clause 1(a) of Commission Implementing Regulation 2018/545.

(8) Forwarding information/orders and receiving state information from ATO on-board. See Appendix A, 4.2.2 h

4.2.3. Trackside ETCS functionality

This Basic parameter describes the ETCS trackside functionality. It contains all ETCS functionality to provide a safe path to a specific train.

The main ~~functionality is~~functionalities are:

(1) locating a specific train in a coordinate system based on Eurobalise locations (~~level 2 and level 3~~ETCS level R);

(2) translating the information from trackside signalling equipment into a standard format for the Control-Command and Signalling On-board Subsystem;

(3) sending movement authorities including track description and orders assigned to a specific train.

These functions shall be implemented in accordance with ~~Annex~~ Appendix A 4.2.3 b and their performance shall conform to ~~Annex~~ Appendix A 4.2.3 a.

The 'system identifier' is as a numbering scheme to identify the system version of a CCS subsystem and distinguish between a functional and a realisation identifier. The 'functional identifier' is part of the system identifier and means a figure or a number of figures defined by the individual configuration management, which represents a reference of the basic design characteristics for CCS implemented in a CCS subsystem. The 'Realisation identifier' is part of the system identifier and means a figure or a number of figures defined by the individual configuration management of a supplier, which represents a specific configuration (e.g. HW and SW) of a CCS subsystem. The 'system identifier', 'functional identifier' and 'realisation identifier' shall be defined by each supplier.

The main functionality is supported by other functions, to which ~~Annex~~ Appendix A 4.2.3 a and ~~Annex~~ Appendix A 4.2.3 b also apply, together with the additional specifications indicated below:

(1) communicating with the Control-Command and Signalling On-board Subsystem. This includes:

(a) Eurobalise data transmission. See ~~point~~ section 4.2.5.2 (Eurobalise communication with the train) and ~~point~~ section 4.2.7.4 (Eurobalise/Line-side Electronic Unit (LEU));

(b) Euroloop data transmission. See ~~point~~section 4.2.5.3 (Euroloop communication with the train) and ~~point~~section 4.2.7.5 (Euroloop/LEU). Euroloop is only relevant in level 1, in which it is optional;

(c) Radio data transmission for radio infill. See ~~Annex A, 4.2.3 d,~~ ~~point~~section 4.2.5.1 (Radio communications with the train), ~~point~~section 4.2.7.3 1a (GSM-R/trackside ETCS functionality) and ~~point~~section 4.2.8 (Key Management). Radio in~~-~~fill is only relevant in level 1, in which it is optional;

(d) Radio data transmission. See ~~point~~section 4.2.5.1 (Radio communications with the train), ~~point~~section 4.2.7.3 (~~GSM-R~~RMR/trackside ETCS functionality) and ~~point~~section 4.2.8 (Key Management). Radio data transmission is only relevant to ~~level 2 and level 3~~ETCS level R.

(2) generating information/orders to the on-board ETCS, e.g. information related to closing/opening the air flaps, lowering/raising the pantograph, opening/closing the main power switch, changing from traction system A to

traction system B. Implementation of this functionality is optional for trackside; it can however be required by other applicable NTSNs or national ~~technical~~ rules or the application of risk evaluation and assessment to ensure safe integration of subsystems;

(3) managing the transitions between areas supervised by different Radio Block Centres (RBCs) (only relevant for ~~level 2 and level 3~~ETCS level R). See ~~point~~section 4.2.7.1 (Functional interface between RBCs) and ~~point~~ section 4.2.7.2 (Technical interface between RBCs).

4.2.4. Mobile communication functions for railways ~~GSM-R~~RMR

This basic parameter describes the radio communication functions. Such functions shall be implemented in the Control-Command and Signalling On-board and Trackside subsystems, according to the specifications indicated below.

4.2.4.1. Basic communication function

4.2.4.1a GSM-R Basic communication function

The general requirements are specified in ~~Annex~~ Appendix A 4.2.4 a.

In addition, the following specifications shall be respected:

(1) ASCI features; ~~Annex~~Appendix A 4.2.4 b;

(2) SIM card; ~~Annex~~Appendix A 4.2.4 c;

(3) location-dependent addressing; ~~Annex~~Appendix A 4.2.4 e.

4.2.4.1b FRMCS Basic communication function

The general requirements are specified in Appendix A 4.2.4 l

In addition, the following specifications shall be respected:

(1) FRMCS Profile; Appendix A 4.2.4 n;

4.2.4.2. Voice and operational communication applications

4.2.4.2a GSM-R Voice and operational communication applications

The general requirements are defined in ~~Annex~~Appendix A 4.2.4 f.

The requirements for tests are specified in ~~Annex~~Appendix A 4.2.4 g.

In addition, the following specifications shall be respected:

(1) confirmation of high priority calls; ~~Annex~~Appendix A 4.2.4 h;

(2) functional addressing; ~~Annex~~Appendix A 4.2.4 j;

(3) presentation of functional numbers; ~~Annex~~Appendix A 4.2.4 k;

(4) User-to-User Signalling; ~~Annex~~Appendix A 4.2.4 d.

4.2.4.2b FRMCS Voice and operational communication applications

The general requirements are defined in Appendix A 4.2.4 m

The requirements for tests are specified in Appendix A 4.2.4 o.

4.2.4.3. Data communication applications for ETCS and ATO

~~4.2.4.1.1.~~4.2.4.3.1. Data communication for ETCS

~~The general requirements are defined in Annex A 4.2.4f.~~

~~The requirements for tests are specified in Annex A 4.2.4g.~~

The 'data radio communication' part of the On-board Control-command and Signalling Subsystem shall be able to support the establishment of at least two simultaneous communication sessions with ~~the Trackside Control-command and signalling Subsystem~~ETCS.

4.2.4.3.1a GSM-R data communication for ETCS

The general requirements are defined in ~~Annex~~Appendix A 4.2.4 f.

The requirements for tests are specified in ~~Annex~~Appendix A 4.2.4 g.

This functionality is mandatory only in the case of ETCS level ~~2 and level 3~~R and radio in-fill applications.

4.2.4.3.1b FRMCS data communication for ETCS

The general requirements are defined in ~~Annex~~Appendix A 4.2.4 m.

The requirements for tests are specified in ~~Annex~~Appendix A 4.2.4 o.

This functionality is mandatory in the case of ETCS level R applications.

4.2.4.3.2. Data communication for ATO

4.2.4.3.2a GSM-R data communication for ATO

The general requirements are defined in ~~Annex~~Appendix A 4.2.4 f.

The requirements for tests are specified in ~~Annex~~Appendix A 4.2.4 g.

4.2.4.3.2b FRMCS data communication for ATO

The general requirements are defined in ~~Annex~~Appendix A 4.2.4 m.

The requirements for tests are specified in ~~Annex~~Appendix A 4.2.4 o.

4.2.5. RMR, ETCS and ~~GSM-R~~ATO air gap interfaces

This basic parameter specifies the requirements for the air gap between Control-Command and Signalling Trackside and On-board subsystems and has to be taken into account in conjunction with the requirements for the interfaces between ETCS, ATO and ~~GSM-R~~RMR equipment, as specified in ~~point~~ section 4.2.6 (On-board Interfaces Internal to Control-Command and Signalling) and ~~point~~ section 4.2.7 (Trackside Interfaces Internal to Control-Command and Signalling).

This basic parameter includes:

(1) the physical, electrical and electromagnetic values to be respected to allow safe functioning;

(2) the communication protocol to be used;

(3) the availability of the communication channel.

The applicable specifications are listed below.

4.2.5.1. ~~Radio communications with the train~~RMR air gap interface

4.2.5.1a GSM-R air gap interface

The air gap interface shall comply with the requirements specified in ~~Annex~~Appendix A 4.2.5 a and in ~~Annex~~Appendix A 4.2.4 f.

Note 1: GSM-R~~Class A~~ radio communication interfaces shall operate in the frequency band specified in ~~Annex~~Appendix A 4.2.5 a and in ~~Annex~~Appendix A 4.2.4 f.

Note 2: On-B~~b~~oard Control-command and Signalling Subsystems shall be protected against interference, fulfilling the requirements specified in ~~Annex~~Appendix A 4.2.4 f.

4.2.5.1b FRMCS air gap interface

The air gap interface shall comply with the requirements specified in ~~Annex~~Appendix A 4.2.5 f.

4.2.5.1.1. RMR air gap interface for ETCS application

4.2.5.1.1a GSM-R air gap interface for the ETCS application

~~For~~ The data communication ~~the~~ protocols shall comply with ~~Annex~~Appendix A 4.2.5 b.

Where radio in~~-~~fill is implemented, the requirements stated in ~~Annex~~Appendix A 4.2.5 c shall be respected in addition.

4.2.5.1.1b FRMCS air gap interface for the ETCS application

The data communication protocols shall comply with ~~Annex~~Appendix A 4.2.5 b.

4.2.5.1.2. RMR air gap interface for ATO application

4.2.5.1.2a GSM-R air gap interface for ATO application

Packet switch communication shall be used and the data communication protocols shall comply with the relevant requirements in ~~Annex~~Appendix A 4.2.5 h.

4.2.5.1.2b FRMCS air gap interface for ATO application

The data communication protocols shall comply with ~~Annex~~Appendix A 4.2.5 j.

4.2.5.2. Eurobalise communication with the train for ERTMS applications

Eurobalise communication interfaces shall comply with ~~Annex~~Appendix A 4.2.5 d.

4.2.5.3. Euroloop communication with the train for ERTMS applications

Euroloop communication interfaces shall comply with ~~Annex~~Appendix A 4.2.5 e.

4.2.6. On-Board Interfaces Internal to Control-Command and Signalling

This Basic Parameter consists of ~~three~~ the following parts.

4.2.6.1. ETCS and Class B train protection

Where ETCS and Class B train protection functions are installed on-board, the integration and transitions between them ~~can~~ shall be managed with ~~a standardised interface as specified in Annex A, 4.2.6 a.~~ one of the following:

(1) a standardised interface (STM); or

(2) a non-standardised interface; or

(3) Class B and Class A integrated within the same equipment (e.g "bi-standards"); or

(4) no direct interface between both equipment.

Where the integration of, and transitions between, ETCS and Class B systems are managed with the standardised interface (STM), it shall comply with requirements as specified in Appendix A 4.2.6 a.

~~Annex~~Appendix A, 4.2.6 b specifies the K interface (to allow certain STMs to read information from Class B balises through the ETCS on-board antenna) and ~~Annex~~Appendix A 4.2.6 c the G interface (air gap between ETCS on-board antenna and Class B balises).

Implementation of Interface 'K' is optional, but if done it must be in accordance with ~~Annex~~Appendix A, 4.2.6 b.

Furthermore, if Interface 'K' is implemented, the on-board transmission channel functionality must be able to handle the properties of ~~Annex~~Appendix A, 4.2.6 c.

If the integration and transitions between ETCS and Class B train protection on-board are not managed using the standardised interface specified in ~~Annex~~Appendix A~~,~~ 4.2.6 a, ~~steps must be taken to ensure that~~ the method ~~used does~~ shall not impose any additional requirements on the Control-Command and Signalling Trackside Subsystem.

4.2.6.2. Interface between ~~GSM-R Radio~~RMR Data Communication and ETCS/ATO applications

4.2.6.2.1. Interface between RMR Data Communication and ETCS

4.2.6.2.1a Interface between GSM-R Data Communication and ETCS

The requirements for the interface between the ~~Class A radio~~on-board GSM-R and the on-board ETCS functionality are specified in ~~Annex~~Appendix A 4.2.6 d.

Where radio in-fill is implemented the requirements stated in ~~Annex~~Appendix A 4.2.6 e shall be respected.

4.2.6.2.1b Interface between FRMCS Data Communication and ETCS

The requirements for the interface between on-board FRMCS and the on-board ETCS functionality are specified in Appendix A 4.2.6 g.

4.2.6.2.2. Interface between RMR Data Communication and ATO

4.2.6.2.2a Interface between GSM-R Data Communication and ATO

The requirements for the interface between the on-board GSM-R and the on-board ATO functionality are specified in Appendix A 4.2.6 j.

4.2.6.2.2b Interface between FRMCS Data Communication and ATO

The requirements for the interface between on-board FRMCS and the on-board ATO functionality are specified in Appendix A 4.2.6 k.

4.2.6.2.3. Interface between FRMCS on-board Voice application and FRMCS Gateway

The requirements for the interface between FRMCS voice application and FRMCS Gateway are specified in Appendix A 4.2.6 l.

~~4.2.6.2.~~4.2.6.3. *Odometry*

~~The interface between the odometry function and on-board ETCS shall meet the requirements of Annex A. This interface contributes to this Basic Parameter only when odometry equipment is supplied as a separate interoperability constituent (see point 5.2.2, Grouping of interoperability constituents).~~Intentionally deleted

4.2.6.4. Interface between ATO and ETCS

The requirements for the interface between the on-board ATO functionality and the on-board ETCS functionality are specified in ~~Annex~~Appendix A 4.2.6 h.

4.2.6.5. Additional CCS On-Board Internal Interfaces

4.2.6.5.1. CCS Consist network communication layers

The interface between the end devices (e.g. ETCS on-board, ATO on-board and FRMCS on-board) and the Ethernet Consist Network shall comply with Appendix A 4.2.6 i unless otherwise specified. This interface is only applicable on newly developed vehicle designs requiring a first authorisation as defined in Article 14, clause 1(a), of Commission Implementing Regulation 2018/545.

4.2.7. Trackside Interfaces Internal to Control-Command and Signalling

This Basic Parameter consists of five parts.

4.2.7.1. Functional interface between RBCs

This interface defines the data to be exchanged between neighbouring RBCs to allow the safe movement of a train from one RBC area to the next:

(1) Information from the 'Handing Over' RBC to the 'Accepting' RBC.

(2) Information from the 'Accepting' RBC to the 'Handing Over' RBC.

The requirements are specified in ~~Annex~~Appendix A, 4.2.7 a.

4.2.7.2. RBC/RBC

This is the technical interface between two RBCs. The requirements are specified in ~~Annex~~Appendix A, 4.2.7 b.

4.2.7.3. RMR/trackside ETCS and RMR/trackside ATO

4.2.7.3.1. RMR/trackside ETCS

4.2.7.3.1a GSM-R/trackside ETCS

~~This is~~The requirements for the interface between ~~the Class A radio system~~GSM-R and the trackside ETCS functionality~~. The requirements~~ are specified in ~~Annex~~Appendix A, 4.2.7 c.

4.2.7.3.1b FRMCS/trackside ETCS

The requirements for the interface between FRMCS and the trackside ETCS functionality are specified in ~~Annex~~Appendix A, 4.2.7c.7 f.

4.2.7.3.2. RMR/trackside ATO

4.2.7.3.2a GSM-R/trackside ATO

The requirements for the interface between GSM-R and the trackside ATO functionality are specified in ~~Annex~~Appendix A 4.2.7 g.

4.2.7.3.2b FRMCS/trackside ATO

The requirements for the interface between FRMCS and the trackside ATO functionality are specified in ~~Annex~~Appendix A 4.2.7 h.

~~4.2.7.3.~~4.2.7.4. Eurobalise/LEU

This is the interface between Eurobalise and the LEU. The requirements are specified in ~~Annex~~Appendix A, 4.2.7 d.

This interface contributes to this basic parameter only when Eurobalise and LEU are supplied as separate interoperability constituents (see ~~point~~ section 5.2.2, Grouping of interoperability constituents).

~~4.2.7.4.~~4.2.7.5. Euroloop/LEU

This is the interface between Euroloop and the LEU. The requirements are specified in ~~Annex~~Appendix A, 4.2.7 e.

This interface contributes to this Basic Parameter only when Euroloop and LEU are supplied as separate interoperability constituents (see ~~point~~ section 5.2.2, Grouping of interoperability constituents).

4.2.8. Key Management

This basic parameter specifies requirements for the management of cryptographic keys used for the protection of data transmitted via radio.

The requirements are specified in ~~Annex~~Appendix A 4.2.8 a. Only requirements related to the interfaces of Control-Command and Signalling equipment fall within the scope of this NTSN.

4.2.9. ETCS-ID Management

This basic parameter concerns the ETCS-identities (ETCS-IDs) for equipment in Control-Command and Signalling Trackside and On-board Subsystems.

The requirements are specified in ~~Annex~~Appendix A, 4.2.9 a.

4.2.10. Trackside Train Detection Systems

This basic parameter specifies the interface requirements between the trackside train detection systems and rolling stock, related to vehicle design and operation.

The interface requirements to be respected by the train detection systems are specified in ~~Annex~~Appendix A 4.2.10 a.

4.2.11. Electromagnetic Compatibility between Rolling Stock and Control-Command and Signalling trackside equipment

This basic parameter specifies the interface requirements for electromagnetic compatibility between rolling stock and trackside Control-Command and Signalling train detection equipment.

The interface requirements to be respected by the train detection system are specified in ~~Annex~~Appendix A 4.2.11 a

4.2.12. ETCS DMI (Driver-Machine Interface)

This basic parameter describes the information provided from ETCS and ATO to the driver and entered into the on-board ~~ETCS~~ by the driver. See ~~Annex~~Appendix A, 4.2.12 a.

It includes:

(1) ergonomics (including visibility);

(2) ETCS and ATO functions to be displayed;

(3) ETCS and ATO functions triggered by driver input.

4.2.13. ~~GSM-R~~RMR DMI (Driver-Machine Interface)

This basic parameter describes the information provided from ~~GSM-R~~RMR to the driver and entered into the ~~GSM-R~~RMR on-board by the driver. ~~See Annex A, 4.2.13a.~~

It includes:

(1) ergonomics (including visibility);

(2) ~~GSM-R~~RMR functions to be displayed;

(3) call-related information outgoing;

(4) call-related information incoming.

4.2.13a GSM-R DMI (Driver Machine Interface)

See ~~Annex~~Appendix A 4.2.13 a for GSM-R.

4.2.13b FRMCS DMI (Driver Machine Interface)

See ~~Annex~~Appendix A 4.2.13 b for FRMCS.

4.2.14. Interface to Data Recording for Regulatory Purposes

This basic parameter describes:

(1) data exchange between the on-board ETCS and the rolling stock recording device;

~~(2) communication protocols;~~

~~(3) physical interface.~~

See ~~Annex~~Appendix A 4.2.14 a.

4.2.15. ~~Visibility of t~~Trackside Control-Command and Signalling objects

This basic parameter describes:

(1) the characteristics of retro-reflecting signs to ensure correct visibility;

(2) the characteristics of interoperable marker boards.

~~(2)~~(3) the positioning of interoperable marker boards to meet their intended operational purpose

For (1) and (2) see ~~See Annex~~Appendix A 4.2.15a.

For (3) see ~~Annex~~Appendix A 4.2.15 b

In addition, the installation of trackside Control-Command and Signalling objects shall be compatible with the driver's field of view and the infrastructure requirements.

4.2.16. Construction of equipment used in CCS subsystems

The environmental conditions specified in the documents listed in ~~Annex~~Appendix A, Table A2 of this NTSN shall be respected.

Requirements for materials referred to in the LOC&PAS NTSN (e.g. related to fire protection) shall be respected by Control-command and signalling On-board Interoperability Constituents and Subsystems.

4.2.17. ETCS and Radio System Compatibility

Due to the different possible implementations and the status of the migration to fully compliant CCS Subsystems, checks shall be performed in order to demonstrate the technical compatibility between the on-board and trackside CCS

Subsystems. The necessity of these checks shall be considered as a measure to increase the confidence on the technical compatibility between the CCS subsystems. It is expected that these checks will be reduced until the principle stated in 6.1.2.1 is achieved.

4.2.17.1. ETCS System Compatibility

ETCS System Compatibility (ESC) ~~shall be~~is the recording of technical compatibility between ETCS on-board and the trackside parts ETCS of the CCS subsystems within an area of use.

Each ESC Type identifies the set of ESC checks (e.g. document check, lab or track test, …) applicable for a section or group of sections within an area of use. It is possible to use the same ESC type for cross border infrastructure and for different national infrastructures.

The results of the ESC checks for an on-board unit on the Interoperability Constituent level or subsystem level, including findings and conditions arising, are recorded in the ESC Check Report.

"Representative configuration" means a configuration on the basis of which test results can be achieved, which are valid for various configurations of the same certified ETCS on-board interoperability constituent or of a certified on-board subsystem. These results shall also be equivalent for various configurations of a certified ETCS trackside subsystem.

For ESC checks at ETCS on-board Interoperability Constituent level the following is to be observed:

(1) The ESC Interoperability Constituent Statement records the ESC results of the ETCS On-board Interoperability Constituent to the ESC Type(s) that is valid regardless of the specific configuration of the ETCS on-board Interoperability Constituent. This document shall be produced by the on-board supplier. The template provided in Appendix C.2 or C.6 shall be used.

(2) The ESC Interoperability Constituent Statement shall include the summary findings and conditions of the ESC Check Report(s) on the results of the ESC checks passed (defined in one or more ESC Types), which are valid independently from the specific configuration parameters of the on-board Interoperability Constituent and can therefore be used in every applicable specific on-board CCS subsystem level.

(3) The ESC Interoperability Constituent Statement shall include the list of ESC checks performed for the ESC Type(s).

(4) The ESC Interoperability Constituent Statement shall include the reference to the NoBo assessment Report according to 6.2.4.3.

The ESC of the specific on-board CCS subsystem with respect to one or more ESC Type(s) is laid down in the ESC Statement. The template provided in Appendix C.1 or C.5 shall be used.

At subsystem level, the ESC Statement shall also include the summary of the ESC Check Report and shall demonstrate the fulfilment of the required ESC checks (for each ESC Type included in the Statement) published in the Agency ESC/RSC technical document in addition to already provided ESC interoperability constituent statements.

The ESC Statement shall also include the full list of ESC Interoperability Constituent statements taken into account in the assessment (if any), the conditions (if any) with respect to the different ESC Types and the NoBo Assessment Report according to 6.3.3.1.

4.2.17.2. Requirements for ETCS System Compatibility

The Infrastructure Manager is responsible for defining the ESC type(s). All sections of the network which require the same set of checks for the demonstration of ESC shall have the same ESC type.

The list of ESC Types is published and maintained by the European Union Agency for Railways in a technical document. See Appendix A 4.2.17 a. The Agency shall assess the checks unless they have been assessed by a NoBo as required in Table 6.3 row 10. The technical document will be updated within 10 working days after positive review.

The ESC Types shall only be used when published with status “Valid” in the Agency Technical document.

Infrastructure Managers, with the support of the ETCS suppliers for their network, shall submit to the Agency the definition of the necessary checks for each ESC type on their network. The minimum information that shall be included:

(1) Definition of each check to be performed

(2) Criteria to pass each check

(3) If a check is only required for trains compatible with a specific M_VERSION functionality and a given NTSN release.

(4) If checks are to be performed in laboratories or on the track. In case of track, it shall be indicated if a specific location is required.

(5) Contact details in order to request the performance of each check

(6) Description of the representative configuration of a check whenever defined by the relevant IM to be performed in a laboratory.

(7) Proposal of the transition period between the new version of ESC Types definition and prior version, or the national procedure. It shall also be indicated the validity of the previous ESC Types. The final transition period shall be agreed with the Agency. In the absence of agreement it will be 6 months.

~~The project entity shall comply with any requirements set out in a technical document published by the Agency setting out the checks to demonstrate the technical compatibility of an on-board subsystem with the trackside subsystem.~~

Infrastructure Managers shall classify the ETCS lines according to ESC T~~t~~ypes and register the ESC Types in RINF. If no ESC definition is received by the Agency by 16th June 2023, it shall be considered that no ESC checks are required for the concerned lines.

Infrastructure Manager shall provide the necessary means, laboratory or access to the infrastructure, to perform the checks, as required by Article 6 of the Commission Implementing Regulation (EU) 2018/545.

~~ESC type shall be the value assigned to record the technical compatibility between an ETCS on-board and a section within the area of use. All sections of the network which require the same set of checks for the demonstration of ESC shall have the same ESC type.~~ Infrastructure Managers shall submit to the Agency any changes on the referred checks for their network.

The ESC types are valid indefinitely unless modified or withdrawn by the Infrastructure Manager. In case of changes, the provisions on 7.2.1b.4 shall be respected. If an on-board needs to be rechecked, only the new/updated ESC checks need to be done, applying the principle that already passed checks remain valid, if the vehicle is not modified.

When ESC checks are published or updated by the Agency, the corresponding existing National Rules for ETCS compatibility testing shall be withdrawn and only ESC checks shall be performed to demonstrate technical compatibility between subsystems. The IM shall indicate the equivalence (none, partial or complete) of the ESC with the previous national procedure, if existing. In such a case, Interoperability Constituent or subsystems which have demonstrated technical compatibility with the previous national procedure, may reuse that as evidence for the demonstration of the equivalent part of the new ESC without the need to

execute them again. If not fully equivalent, the IM shall indicate a transition period as mentioned in point (7).

The Entity in charge of ESC demonstration shall define a representative configuration of the ETCS on-board subsystem.

The ESC Statement shall be produced by the Entity applying for ESC Demonstration.

The Entity applying for ESC Demonstration shall have the ESC check report for the Interoperability Constituent or Subsystem assessed by a Notified Body according with sections 6.2.4.3 or 6.3.3.1.

If a Check Report or an ESC Interoperability Constituent Statement referred to in the ESC Statement contains Conditions, all Conditions shall be recorded, reflecting the status and if agreed how they are managed by the affected party (e.g. RU willing to demonstrate the compatibility with a route), and this responsibility shall be recorded in the ESC Statement.

4.2.17.3. Radio System Compatibility

Radio System Compatibility (RSC) ~~shall be~~ is the recording of technical compatibility between voice or data radio on-board and the trackside parts of ~~GSM-R~~RMR of the CCS subsystems within an area of use.

Each RSC Type identifies the set of RSC checks (e.g. document check, lab or track test, …) applicable for a section or group of sections within an area of use. It is possible to use the same RSC type for cross border infrastructure and for different national infrastructures.

The results of the RSC checks for an on-board voice or data radio part on the Interoperability Constituent level or subsystem level, including findings and conditions arising, are recorded in the RSC Check Report.

Representative Configuration means a configuration on the basis of which test results can be achieved, which are valid for various configurations of the same certified Interoperability Constituent or of a certified on-board subsystem. These results shall also be equivalent for various configurations of a certified RMR trackside subsystem.

For RSC checks at Interoperability Constituent level the following is to be observed:

(1) The RSC Interoperability Constituent Statement records the RSC results of the Interoperability Constituent (e.g. Cab Radio or EDOR) to the RSC Type(s) that is valid regardless of the specific configuration of the Interoperability Constituents. This document shall be produced by the supplier. The template provided in Appendix C.4 or C.6 shall be used.

(2) The RSC Interoperability Constituent Statement shall include the summary of the findings and conditions of RSC Check Report(s) on the results of the RSC check passed (define in one or more RSC Type), which are valid independently from the specific configuration parameters of the on-board Interoperability Constituents and can therefore be used in every applicable specific vehicle type on the on-board CCS subsystem level.

(3) The RSC Interoperability Constituent Statement shall include the list of RSC checks performed for the RSC Type(s).

(4) The RSC Interoperability Constituent Statement shall include the reference to the NoBo assessment Report according to 6.2.4.3.

The RSC of the specific on-board CCS subsystem with respect to one or more RSC Type(s) is laid down in the RSC Statement. The template provided in Appendix C.3 or C.5 shall be used.

At subsystem level, the RSC Statement shall also include the summary of the Check Report and shall demonstrate the fulfilment of the required RSC checks (for each RSC Type included in the Statement) published in the Agency ESC/RSC technical document in addition to already provided RSC interoperability constituent statements.

The RSC Statement shall also include the full list of RSC Interoperability Constituent statements taken into account in the assessment (if any), the conditions (if any) with respect to the different RSC Types and the NoBo Assessment Report according to 6.3.3.1.

4.2.17.4. Requirements for Radio System Compatibility

The Infrastructure Manager is responsible for defining the RSC type(s). All sections of the network which require the same set of checks for the demonstration of RSC shall have the same RSC type.

The list of RSC Types is published and maintained by the European Union Agency for Railways in a technical document. See Appendix A 4.2.17 a. The Agency shall assess the checks unless they have been assessed by a NoBo as required in Table 6.3 row 10. The technical document will be updated within 10 working days after positive review.

The RSC Types shall only be used when published with status “Valid” in the Agency Technical document.

Infrastructure Managers, with the support of the RMR suppliers for their network, shall submit to the Agency the definition of the necessary checks for each RSC type on their network. The minimum information that shall be included:

(1) Definition of each check to be performed

(2) Criteria to pass each check

(3) If a check is only required for trains equipped with a specific RMR GSM-R/FRMCS baseline and a given NTSN release.

(4) If checks are to be performed in laboratories or on the track. In case of track, it shall be indicated if a specific location is required.

(5) Contact details in order to request the performance of each check

(6) Description of the representative configuration of a check whenever defined by the relevant IM to be performed in a laboratory

(7) Proposal of the transition period between the new version of RSC Types definition and prior version, or the national procedure. It shall also be indicated the validity of the previous RSC Types. The final transition period shall be agreed with the Agency. In the absence of agreement it will be 6 months.

~~The project entity shall comply with any requirements set out in a technical document published by the Agency setting of checks to demonstrate the technical compatibility of an on-board subsystem with the trackside subsystem.~~

Infrastructure Managers shall classify their lines according to RSC Ttypes for voice and, if applicable, ETCS data ~~in RINF~~. This RSC type classification shall be registered in RINF. If no RSC definition is received by the Agency by 16th June 2023, it shall be considered that no RSC checks are required for the concerned lines.

Infrastructure Manager shall provide the necessary means, laboratory or access to the infrastructure, to perform the checks, as required by Article 6 of the Commission Implementing Regulation (EU) 2018/545.

Infrastructure Managers shall submit to the Agency any changes on the referred checks for their network.

The RSC types are valid indefinitely unless modified or withdrawn by the Infrastructure Manager. In case of changes, the provisions on 7.2.1b.4 shall be respected. If an on-board needs to be rechecked, only the new/updated RSC checks need to be done, applying the principle that already passed checks remain valid, if the vehicle is not modified.

When RSC checks are published or updated by the Agency, the corresponding existing National Rules for Radio compatibility testing shall be withdrawn and only RSC checks shall be performed to demonstrate technical compatibility between subsystems. The IM shall indicate the equivalence (none, partial or complete) of

the RSC with the previous national procedure, if existing. In such a case, Interoperability Constituent or subsystems which have demonstrated technical compatibility with the previous national procedure, may reuse that as evidence for the RSC without the need to execute them again.

Entity in charge of RSC demonstration shall define a representative configuration of the Radio on-board subsystem.

The RSC Statement shall be produced by the Entity applying for RSC Demonstration.

The Entity applying for RSC Demonstration shall have the check report for the Interoperability Constituent or Subsystem assessed by a Notified Body according with sections 6.2.4.3 or 6.3.3.1.

If a Check Report or an RSC Interoperability Constituent Statement referred to in the RSC Statement contains Conditions, all Conditions shall be recorded, reflecting the status and if agreed how they are managed by the affected party (e.g. RU willing to demonstrate the compatibility with a route), and this responsibility shall be recorded in the RSC Statement.

~~RSC type shall be the value assigned to record the technical compatibility between a voice or data radio and a section within the area of use. All sections of the network which require the same set of checks for the demonstration of RSC shall have the same RSC type.~~

4.2.18. On-Board ATO functionality

This basic parameter describes the ATO on-board functionality needed to operate a train up to Grade of Automation 2 with ETCS providing the automatic train protection functionality to enable it.

The functions shall be implemented according to Appendix A 4.2.18 a in addition to those required for On-board ETCS functionality as detailed in 4.2.2.

The ATO functionality is supported by the additional specifications indicated below:

(1) Communication with the Control-Command and Signalling Trackside Subsystem for radio data transmission. See section 4.2.5.1 (Radio communications with the train), section 4.2.6.2 (Interface between RMR Data Communication and ATO).

(2) Communicating with the driver. See Appendix A 4.2.2 e and section 4.2.12 a (ETCS DMI).

(3) Forwarding information/orders and receiving state information from rolling stock (to/from the train interface unit). See Appendix A 4.2.18 c.

(4) Forwarding information/orders and receiving state information from on-board ETCS. See Appendix A 4.2.18 d

The requirements for tests are specified in Appendix A 4.2.18 b.

4.2.19. Trackside ATO functionality

This basic parameter describes the ATO trackside functionality needed to operate a train up to Grade of Automation 2 with ETCS providing the automatic train protection functionality to enable it.

In addition to those required for Trackside ETCS functionality as detailed in 4.2.3, the functions shall be implemented according to Appendix A, 4.2.19 a.

The ATO functionality is supported with the additional specifications for communicating with the Control-Command and Signalling On-board Subsystem based on radio data transmission. See Appendix A, section 4.2.5.1 (Radio communications with the train) and section 4.2.7.3 (RMR/trackside ATO functionality).

The requirements for tests are specified in Appendix A, 4.2.19 b.

4.2.20. Technical documentation for Maintenance

This basic parameter describes the necessary requirements in relation to the technical documentation for maintenance to be fulfilled by the manufacturers of equipment and the applicant for subsystem verification.

~~4.2.17.5.~~4.2.20.1. *Responsibility of the manufacturer of equipment*

The manufacturer of equipment incorporated in the subsystem shall specify:

(1) all maintenance requirements and procedures (including health monitoring, diagnosis of events, test methods and tools and also the required professional competence) necessary for achieving essential requirements and values quoted in the mandatory requirements of this NTSN throughout the equipment life-cycle (transport and storage before installation, normal operation, failures and effects of failures, repair work, checking and maintenance, decommissioning, etc.) For ~~equipment~~further details on error corrections see ~~point~~sections 6.5 and 7.2.7;

(2) all requirements and procedures (test methods and tools, the required professional competence and the evaluation of the impact on the updated Interoperability Constituent to the subsystem) necessary to implement updated Interoperability Constituents due to specification error corrections

throughout the equipment life cycle (specifications maintenance). This includes the definition of the necessary procedures for updates for approved system modules and processes, during all life cycle phases, when there are error corrections according to Article 10 of this regulation applicable to the subsystems;

~~(2)~~(3) the health and safety risks that may affect the public and the maintenance staff;

~~(3)~~(4) the conditions for first line maintenance, i.e. the definition of Line Replaceable Units (LRUs), the definition of approved compatible versions of hardware and software, the procedures for replacing failed LRUs, the conditions for storing LRUs and for repairing failed LRUs;

~~(4)~~(5) the checks to be carried out if equipment is subject to exceptional stress (e.g. adverse environmental conditions or abnormal shocks);

~~(5)~~(6) the checks to be carried out when maintaining equipment other than Control-Command and Signalling equipment and which influences the Control-Command and Signalling Subsystems (e.g. changing the wheel diameter).

~~4.2.17.6.~~4.2.20.2. *Responsibility of the applicant for subsystem verification*

The applicant shall:

(1) ensure that the maintenance requirements as described in ~~point 4.5.1~~section 4.2.20.1 (Responsibility of the Manufacturer of Equipment) are defined for all components within the scope of this NTSN regardless of whether or not they are interoperability constituents;

(2) complete the above requirements in section 4.2.20.1 taking into account the risks arising from interactions between different components of the subsystem and interfaces to other subsystems.

(3) define procedures for the roll-out of updated interoperability constituents due to specification error corrections (specifications maintenance) according to the relevant documentation of the interoperability constituent, where applicable. The applicant shall provide a configuration management system to identify the impact on the subsystem. The applicant shall ensure the availability of the documentation regarding the version of the interoperability constituents included in their subsystems.

4.3. FUNCTIONAL AND TECHNICAL SPECIFICATIONS OF THE INTERFACES TO OTHER SUBSYSTEMS

4.3.1. Interface to the Operation and Traffic Management Subsystem

Interface with Operation and Traffic Management NTSN			
Reference CCS NTSN		**Reference Operation and Traffic Management NTSN**	
Parameter	**Point**	**Parameter**	**Point**
Operating rules (normal and degraded conditions)	4.4	Driver's Rule book Operating rules ERTMS trackside engineering information relevant to operation	4.2.1.2.1 4.4 Appendix D3
~~Visibility of t~~Trackside Control-Command and Signalling objects	4.2.15	Requirements for ~~S~~signal and line-side marker sighting	4.2.2.8
Train braking performance and characteristics	4.2.2	Train ~~B~~braking ~~performance~~	4.2.2.6
Use of sanding equipment On-board flange lubrication Use of composite brake blocks	4.2.10	Driver's Rule book	4.2.1.2.1
Interface to Data Recording for Regulatory Purposes	4.2.14	Data recording ~~on-board~~	4.2.3.5
ETCS DMI	4.2.12	Format of ~~T~~train running number	4.2.3.2.1
~~GSM-R~~RMR DMI	4.2.13	Format of ~~T~~train running number	4.2.3.2.1
Key Management	4.2.8	Ensuring that the train is in running order	4.2.2.7
Route compatibility checks before the use of authorised vehicles	4.9	Parameters for the vehicle and train compatibility over the route intended for operation	Appendix D1

4.3.2. Interface to the Rolling Stock Subsystem

Interface with Rolling Stock NTSNs					
Reference CCS NTSN		**Reference Rolling Stock ~~TSIs and~~ NTSNs**			
Parameter	**Point**	**Parameter**			**Point**
Compatibility with trackside train detection systems: vehicle design	4.2.10	Rolling stock characteristics to be compatible with train detection systems based on track circuits	~~HS RS TSI~~[7]	~~wheelset location~~	~~4.2.7.9.2~~
				~~axle load~~	~~4.2.3.2~~
				~~sanding~~	~~4.2.3.10~~
				~~electrical resistance between wheels~~	~~4.2.3.3.1~~
			~~CR RS TSI~~[8]		~~4.2.3.3.1.1~~
			LOC & PAS NTSN		4.2.3.3.1.1
			Wagon NTSN		4.2.3.2
		Rolling stock characteristics to be compatible with train detection systems based on axle counters	~~HS RS TSI~~	~~wheelset geometry~~	~~4.2.7.9.2~~
				~~wheels~~	~~4.2.7.9.3~~
			~~CR RS TSI~~		~~4.2.3.3.1.2~~
			LOC & PAS NTSN		4.2.3.3.1.2
			Wagon NTSN		4.2.3.3
		Rolling stock characteristics to be compatible with loop equipment	~~HS RS TSI~~		~~None~~
			~~CR RS TSI~~		~~4.2.3.3.1.3~~
			LOC & PAS NTSN		4.2.3.3.1.3
			Wagon NTSN		4.2.3.3
	4.2.11		~~HS RS TSI~~		~~4.2.6.6.1~~

~~7 HS RS TSI is Commission Decision of 21 February 2008 concerning a technical specification for interoperability relating to the rolling stock sub-system of the trans-European high-speed rail system (2008/232/CE).~~

~~8 CR RS TSI is Commission Decision of 26 April 2011 concerning a technical specification for interoperability relating to the rolling stock subsystem — Locomotives and passenger rolling stock of the trans-European conventional rail system (2011/291/EU).~~

Interface with Rolling Stock NTSNs					
Reference CCS NTSN		**Reference Rolling Stock ~~TSIs and~~ NTSNs**			
Parameter	**Point**	**Parameter**			**Point**
Electromagnetic compatibility between rolling stock and Control-Command and Signalling trackside equipment		Rolling stock characteristics to be compatible with train detection systems based on track circuits	~~CR RS TSI~~		~~4.2.3.3.1.1~~
			LOC & PAS NTSN		4.2.3.3.1.1
			Wagon NTSN		4.2.3.3
		Rolling stock characteristics to be compatible with train detection systems based on axle counters	~~HS RS TSI~~		~~4.2.6.6.1~~
			~~CR RS TSI~~		~~4.2.3.3.1.2~~
			LOC & PAS NTSN		4.2.3.3.1.2
			Wagon NTSN		4.2.3.3
Train braking performance and characteristics	4.2.2 4.2.18	~~Emergency b~~Braking performance	~~HS RS TSI~~	~~Emergency braking~~	~~4.2.4.1~~
				~~Service braking~~	~~4.2.4.4~~
			~~CR RS TSI~~	~~Emergency braking~~	~~4.2.4.5.2~~
				~~Service braking~~	~~4.2.4.5.3~~
			LOC & PAS NTSN	Emergency braking	4.2.4.5.2
				Service braking	4.2.4.5.3
			Wagon NTSN		4.2.4.1.2
Position of Control-Command and Signalling on-board antennas	4.2.2	Kinematic gauge	~~HS RS TSI~~		~~4.2.3.1~~
			~~CR RS TSI~~		~~4.2.3.1~~
			LOC & PAS NTSN		4.2.3.1
			Wagon NTSN		none
	4.2.2	Operating rules	~~HS RS TSI~~		~~4.2.7.9.1~~

Interface with Rolling Stock NTSNs					
Reference CCS NTSN		**Reference Rolling Stock ~~TSIs and~~ NTSNs**			
Parameter	**Point**	**Parameter**			**Point**
Isolation of on-board ETCS functionality			~~CR RS TSI~~		~~4.2.12.3~~
			LOC & PAS NTSN		4.2.12.3
			Wagon NTSN		none
~~Data interfaces~~	~~4.2.2~~	~~Monitoring and diagnostic concepts~~	~~HS RS TSI~~		~~4.2.7.10~~
			~~CR RS TSI~~		~~4.2.1.1~~
			~~LOC & PAS NTSN~~		~~4.2.1.1~~
			~~Wagon NTSN~~		~~None~~
~~Visibility of t~~Trackside Control-Command and Signalling objects	4.2.15	External visibility Head lights	~~HS RS TSI~~		~~4.2.7.4.1.1~~
			~~CR RS TSI~~		~~4.2.7.1.1~~
			LOC & PAS NTSN		4.2.7.1.1
			Wagon NTSN		None
		Driver's external field of view	~~HS RS TSI~~	~~line of sight~~	~~4.2.2.6 b~~
				~~windscreen~~	~~4.2.2.7~~
			~~CR RS TSI~~	~~line of sight~~	~~4.2.9.1.3.1~~
				~~windscreen~~	~~4.2.9.2~~
			LOC & PAS NTSN	line of sight	4.2.9.1.3.1
				windscreen	4.2.9.2
			Wagon NTSN		None
Interface to data recording for regulatory purposes	4.2.14	Recording device	~~HS RS TSI~~		~~4.2.7.10~~
			~~CR RS TSI~~		~~4.2.9.6~~
			LOC & PAS NTSN		4.2.9.6
			Wagon NTSN		none
ETCS on-board: Forwarding	4.2.2 ~~4.2.3~~	~~Phase s~~Separation sections	~~HS RS TSI~~		~~4.2.8.3.6.7~~
			~~CR RS TSI~~		~~4.2.8.2.9.8~~

Interface with Rolling Stock NTSNs				
Reference CCS NTSN		**Reference Rolling Stock ~~TSIs and~~ NTSNs**		
Parameter	**Point**	**Parameter**		**Point**
information/orders and receiving state information from rolling stock ~~Commands to rolling stock equipment~~			LOC & PAS NTSN	4.2.8.2.9.8
			Wagon NTSN	none
		Dynamic braking command	LOC & PAS NTSN	4.2.4.4.4
			Wagon NTSN	None
		Magnetic track brake	LOC & PAS NTSN	4.2.4.8.2
			Wagon NTSN	None
		Eddy current track brake	LOC & PAS NTSN	4.2.4.8.3
			Wagon NTSN	None
		Maximum power and current from the overhead contact line	LOC & PAS NTSN	4.2.8.2.4
			Wagon NTSN	None
		Door opening	LOC & PAS NTSN	4.2.5.5.6
			Wagon NTSN	None
		Requirements on performance	LOC & PAS NTSN	4.2.8.1.2
			Wagon NTSN	None
		Smoke control	LOC & PAS NTSN	4.2.10.4.2
			Wagon NTSN	None
		Radio Remote control function by staff for shunting operation	LOC & PAS NTSN	4.2.9.3.6
			Wagon NTSN	None
		Driver's desk — Ergonomics	LOC & PAS NTSN	4.2.9.1.6
			Wagon NTSN	None
		Requirements for management of ETCS modes: sleeping mode	LOC & PAS NTSN	4.2.9.3.7.1
			Wagon NTSN	None
			LOC & PAS NTSN	4.2.9.3.7.2

Interface with Rolling Stock NTSNs				
Reference CCS NTSN		**Reference Rolling Stock ~~TSIs and~~ NTSNs**		
Parameter	**Point**	**Parameter**		**Point**
		Requirements for management of ETCS modes: passive shunting	Wagon NTSN	None
		Requirements for management of ETCS modes: non leading	LOC & PAS NTSN	4.2.9.3.7.3
			Wagon NTSN	None
		Type of brake system	LOC & PAS NTSN	4.2.4.3
			Wagon NTSN	None
		Traction Status	LOC & PAS NTSN	4.2.9.3.8
			Wagon NTSN	None
		Running dynamic behaviour	LOC & PAS NTSN	4.2.3.4.2
			Wagon NTSN	None
Emergency braking command	4.2.2	Emergency braking command	~~HS RS TSI~~	~~none~~
			~~CR RS TSI~~	~~4.2.4.4.1~~
			LOC & PAS NTSN	4.2.4.4.1
			Wagon NTSN	none
Construction of equipment	4.2.16	Material requirements	~~HS RS TSI~~	~~4.2.7.2.2~~
			~~CR RS TSI~~	~~4.2.10.2.1~~
			LOC&PAS NTSN	4.2.10.2.1
			Wagon NTSN	none
Service braking command	4.2.2	Service braking command	LOC&PAS NTSN	4.2.4.4.2
			Wagon NTSN	None

4.3.3. Interfaces to Infrastructure Subsystem

Interface with Infrastructure ~~TSIs and~~ NTSN~~s~~				
Reference CCS NTSN		**Reference Infrastructure ~~TSIs and~~ NTSN~~s~~**		
Parameter	**Clause**	**Parameter**		**Clause**
~~Train detection systems (space for installation)~~	~~4.2.10~~	~~Minimum infrastructure gauge~~ ~~Structure gauge~~ ~~Structure gauge~~	~~HS INF TSI (1)~~ ~~CR INF TSI (2)~~ ~~INF NTSN~~	~~4.2.3~~ ~~4.2.4.1~~ ~~4.2.3.1~~
Eurobalise communication (space for installation)	4.2.5.2	~~Minimum infrastructure gauge~~ ~~Structure gauge~~ Structure gauge	~~HS INF TSI~~ ~~CR INF TSI~~ INF NTSN	~~4.2.3~~ ~~4.2.4.1~~ 4.2.3.1
Euroloop communication (space for installation)	4.2.5.3	~~Minimum infrastructure gauge~~ ~~Structure gauge~~ Structure gauge	~~HS INF TSI~~ ~~CR INF TSI~~ INF NTSN	~~4.2.3~~ ~~4.2.4.1~~ 4.2.3.1
~~Visibility of t~~Trackside Control-Command and Signalling objects	4.2.15	~~Minimum infrastructure gauge~~ ~~Structure gauge~~ Structure gauge	~~HS INF TSI~~ ~~CR INF TSI~~ INF NTSN	~~4.2.3~~ ~~4.2.4.1~~ 4.2.3.1

~~(1) HS INF TSI is 2008/217/EC: Commission Decision of 20 December 2007 concerning a technical specification for interoperability relating to the infrastructure sub-system of the trans-European high-speed rail system, repealed on 1 January 2015 (OJ L 77, 19.3.2008, p. 1).~~

~~(2) CR INF TSI is 2011/275/EU: Commission Decision of 26 April 2011 concerning a technical specification for interoperability relating to the 'infrastructure' subsystem of the trans-European conventional rail system, repealed on 1 January 2015 (OJ L 126, 14.5.2011, p. 53).~~

4.3.4. Interfaces to Energy Subsystem

Interface with Energy NTSN~~s and TSIs~~				
Reference CCS NTSN		**Reference Energy NTSN~~s and TSIs~~**		
Parameter	**Clause**	**Parameter**		**Clause**
Commands to rolling stock equipment	4.2.2 4.2.3	~~Phase separation sections~~ ~~System separation points~~ ~~Phase separation sections~~ ~~System separation points~~ Phase separation sections System separation ~~points~~sections	~~HS ENE TSI (1)~~ ~~CR ENE TSI (2)~~ ENE NTSN	~~4.2.21~~ ~~4.2.22~~ ~~4.2.19~~ ~~4.2.20~~ 4.2.15 4.2.16

~~(1) HS ENE TSI is 2008/284/EC: Commission Decision of 6 March 2008 concerning a technical specification for interoperability relating to the energy sub-system of the trans-European high-speed rail system, repealed on 1 January 2015 (OJ L 104, 14.4.2008, p. 1).~~

~~(2) CR ENE TSI is 2011/274/EU: Commission Decision of 26 April 2011 concerning a technical specification for interoperability relating to the 'energy' subsystem of the trans-European conventional rail system, repealed on 1 January 2015 (OJ L 126, 14.5.2011, p. 1).~~

4.4. OPERATING RULES

The rules for operating a railway service with ETCS, ATO and ~~GSM-R~~RMR are specified in the Operation and Traffic Management NTSN.

4.5. MAINTENANCE RULES

The maintenance rules of the subsystems covered by this NTSN shall ensure that the values quoted in the basic parameters indicated in Chapter 4 are maintained within the required limits throughout the lifetime of the subsystems. However, during preventative or corrective maintenance, the subsystem may not be able to respect the values quoted in the basic parameters; the maintenance rules shall ensure that safety is not prejudiced during these activities.

The entity in charge of the Control-Command and Signalling Subsystems shall set up maintenance rules to achieve the above objectives. ~~To assist with t~~The preparation of these rules shall be done with the assistance of~~,~~ the ~~following~~ requirements ~~shall be respected~~in 4.2.20.

4.6. PROFESSIONAL COMPETENCES

The manufacturers of the equipment and of the subsystem shall provide information sufficient to define the professional competences required for the installation, final inspection and maintenance of the Control-Command and Signalling Subsystems. See point 4.5 (Maintenance rules).

4.7. HEALTH AND SAFETY CONDITIONS

Care shall be taken to ensure health and safety for maintenance and operations staff, in accordance with national legislation.

Manufacturers shall indicate the risks for health and safety that arise from using and maintaining their equipment and subsystems. See point 4.4 (Operating rules) and point 4.5 (Maintenance rules).

4.8. REGISTERS

The data to be provided for the list of determinations of types of vehicles and the Register of Infrastructure is indicated in regulations 8 and 35 of the Railways (Interoperability) Regulations 2011.

4.9. This provision has been left intentionally blank.

5. INTEROPERABILITY CONSTITUENTS

5.1. DEFINITION

Interoperability constituents means any elementary component, group of components, subassembly or complete assembly of equipment incorporated or intended to be incorporated into a subsystem, upon which the interoperability of the rail system depends directly or indirectly, including both tangible objects and intangible objects.

5.2. LIST OF INTEROPERABILITY CONSTITUENTS

5.2.1. Basic interoperability constituents

The basic interoperability constituents in the Control-Command and Signalling Subsystems are defined in:

(1) Table 5.1.~~a~~ for the Control-Command and Signalling On-board Subsystem;

(2) Table 5.2.~~a~~ for the Control-Command and Signalling Trackside Subsystem.

5.2.2. Grouping of interoperability constituents

5.2.2.1 The functions of basic interoperability constituents may be combined to form a group. This group is then defined by those functions and by its remaining external interfaces. If a group is formed in this way, it shall be considered as an interoperability constituent.

~~(1) Table 5.1.b lists the groups of interoperability constituents of the Control-Command and Signalling On-board Subsystem.~~

~~(2) Table 5.2.b lists the groups of interoperability constituents of the Control-Command and Signalling Trackside Subsystem.~~

Compliance of interfaces internal to the group of Interoperability Constituents to basic parameters of Chapter 4 does not have to be verified. Compliance of interfaces external to the group of Interoperability Constituents has to be verified to demonstrate conformity with the basic parameters related to the requirements of these external interfaces.

5.2.2.2 When interoperability constituents are grouped, the grouped functions and their addressing must be configurable in such a way that the grouped functions of the ATO, ETCS and the radio ICs can be replaced during the life cycle of the CCS subsystem by an external ATO, ETCS or Radio ICs. Therefore, the following interfaces in a grouped Interoperability Constituent shall be made externally accessible on the CCS Consist network communication layers as specified in Appendix A, 4.2.6 i:

(1) Interface between ATO On-Board and ETCS On-Board as specified in Appendix A, 4.2.6 h;

(2) Interface between ATO On-Board and GSM-R Data Radio On-Board interface as specified in Appendix A, 4.2.5 g;

(3) Interface between On-board FRMCS and the CCS applications (ETCS in Appendix A, 4.2.6 g and ATO in Appendix A, 4.2.6 k);

5.3. CONSTITUENTS' PERFORMANCE AND SPECIFICATIONS

For each basic interoperability constituent or group of interoperability constituents, the tables in Chapter 5 describe:

(1) in column 3, the functions and interfaces. Note that some interoperability constituents have functions and/or interfaces that are optional;

(2) in column 4, the mandatory specifications for the conformity assessment of each function or interface (where applicable) by reference to the relevant ~~point~~ section of Chapter 4.

Table 5.1~~.a~~

Basic interoperability constituents in the Control-Command and Signalling On-board Subsystem

~~1~~	~~2~~	~~3~~	~~4~~
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
1	ETCS on-board	Reliability, Availability, Maintainability, Safety (RAMS) — Safety — Availability / Reliability — Maintainability	4.2.1.1 ~~4.5.1~~4.2.1.2 4.2.20.1
		On-board ETCS functionality (excluding odometry) System identifier	4.2.2 4.2.2
		ETCS and GSM-R air gap interfaces — RBC (Radio data transmission optional) — Radio in-fill unit (functionality optional) — Eurobalise air gap — Euroloop air gap (functionality optional)	4.2.5 4.2.5.1.1 4.2.5.1.1a 4.2.5.2 4.2.5.3
		Interfaces — STM (implementation of interface K optional) — GSM-R ETCS Data ~~Only~~ Radio — ~~Odometry~~On-board FRMCS — Key management system — ETCS ID Management	4.2.6.1 4.2.6.2.1a 4.2.6.2.1b ~~4.2.6.3~~ 4.2.8

~~1~~	~~2~~	~~3~~	~~4~~
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
		— ETCS Driver-Machine Interface — Train interface (see note below) — On-board recording device — ATO interface — CCS Consist network communication layers. Note for train interface: The implementation of all functions described in Appendix A Index 7 document is mandatory at Interoperability Constituent level.	4.2.9 4.2.12 4.2.2 4.2.14 4.2.6.4 4.2.6.5.1
		Construction of equipment	4.2.16
		ETCS System Compatibility (ESC) (optional)	4.2.17.1 4.2.17.2
2	Odometry equipment	Reliability, Availability, Maintainability, Safety (RAMS) — Safety — Availability / Reliability — Maintainability	4.2.1.1 4.2.1.2~~4.5.1~~ 4.2.20.1
		On-board ETCS functionality: only Odometry	4.2.2
		Interfaces — On-board ETCS	4.2.6.3
		Construction of equipment	4.2.16
3	Standardised interface ~~Interface of External~~ STM	Interfaces — On-board ETCS	4.2.6.1

~~1~~	~~2~~	~~3~~	~~4~~
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
4	GSM-R voice cab radio Note: SIM card, antenna, connecting cables and filters are not part of this interoperability constituent	Reliability, Availability, Maintainability, (RAM) — Availability / Reliability — Maintainability	4.2.1.2 4.2.20.1~~4.5.1~~
		Basic communication functions	4.2.4.1a
		Voice and operational communication applications	4.2.4.2a
		Interfaces — GSM-R air gap — GSM-R Driver-Machine Interface	4.2.5.1a 4.2.13a
		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3 4.2.17.4
5	GSM-R ~~ETCS~~ Data ~~only~~ Radio Note: SIM card, antenna, connecting cables and filters are not part of this interoperability constituent	Reliability, Availability, Maintainability (RAM) — Availability / Reliability — Maintainability	4.2.1.2 4.2.20.1~~4.5.1~~
		Basic communication functions	4.2.4.1a
		ETCS data communication applications	4.2.4.3.1a
		Interfaces — On-board ETCS — On-board ATO — GSM-R air gap for ETCS — GSM-R air gap for ATO	4.2.6.2.1a 4.2.6.2.2a 4.2.5.1.1a 4.2.5.1.2a
		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3

~~1~~	~~2~~	~~3~~	~~4~~
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
			4.2.17.4
6	GSM-R SIM card Note: it is the responsibility of the GSM-R network operator to deliver to railway undertakings the SIM cards to be inserted in GSM-R terminal equipment	Basic communication functions	4.2.4.1a
		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3 4.2.17.4
7	ATO On-Board	Reliability, Availability, Maintainability (RAM): — Availability / Reliability — Maintainability	4.2.1.2 4.2.20.1
		On-board ATO functionality (excluding communication	4.2.18
		ATO air gap interfaces	4.2.5.1.2
		Interfaces — GSM-R Data Radio — On-board FRMCS — Train interface — ETCS interface — CCS Consist network communication layers	4.2.6.2.2a 4.2.6.2.2b 4.2.18 4.2.6.4 4.2.6.5.1
		Construction of equipment	4.2.16
8	FRMCS on-board voice application	Reliability, Availability, Maintainability (RAM)	

~~1~~	~~2~~	~~3~~	~~4~~
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
		— Availability / Reliability — Maintainability	4.2.1.2 4.2.20.1
		Basic communication functions	4.2.4.1b
		Operational Voice applications	4.2.4.2b
		Interfaces — On-board FRMCS — FRMCS Driver-Machine Interface	 4.2.6.2.3 4.2.13b
		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3 4.2.17.4
9	On-board FRMCS	Reliability, Availability, Maintainability (RAM) — Availability / Reliability — Maintainability	 4.2.1.2 4.2.20.1
		Basic communication functions	4.2.4.1b
		Interfaces — FRMCS on-board voice application — On-board ETCS — On-board ATO — CCS Consist network communication layers	 4.2.6.2.3 4.2.6.2.1b 4.2.6.2.2b 4.2.6.5.1
		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3 4.2.17.4
10	FRMCS Profile Note: it is the responsibility of the FRMCS	Basic communication functions	4.2.4.1b
		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3

~~1~~	~~2~~	~~3~~	~~4~~
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
	network operator to ensure that the FRMCS profile is made available to the subscribers		4.2.17.4

~~Table 5.1.b~~

~~Groups of interoperability constituents in the Control-Command and Signalling On-board Subsystem~~

~~This table is an example to show the structure. Other groups are allowed~~

~~1~~	~~2~~	~~3~~	~~4~~
~~No~~	~~Group of Interoperability constituents~~	~~Characteristics~~	~~Specific requirements to be assessed by reference to Chapter 4~~
~~1~~	~~ETCS on-board Odometry equipment~~	~~Reliability, Availability, Maintainability, Safety (RAMS)~~	~~4.2.1~~ ~~4.5.1~~
		~~On-board ETCS functionality~~	~~4.2.2~~
		~~ETCS and GSM-R air gap interfaces~~ ~~— RBC (Radio data transmission optional)~~ ~~— Radio in-fill unit (functionality optional)~~ ~~— Eurobalise air gap~~ ~~— Euroloop air gap (functionality optional)~~	~~4.2.5~~ ~~4.2.5.1~~ ~~4.2.5.1~~ ~~4.2.5.2~~ ~~4.2.5.3~~

~~1~~	~~2~~	~~3~~	~~4~~
~~No~~	~~Group of Interoperability constituents~~	~~Characteristics~~	~~Specific requirements to be assessed by reference to Chapter 4~~
		~~Interfaces~~ ~~— STM (implementation of interface K optional)~~ ~~— GSM-R ETCS Data Only Radio~~ ~~— Key management system~~ ~~— ETCS ID Management~~ ~~— ETCS Driver Machine Interface~~ ~~— Train interface~~ ~~— On-board recording device~~	~~-~~ ~~4.2.6.1~~ ~~4.2.6.2~~ ~~4.2.8~~ ~~4.2.9~~ ~~4.2.12~~ ~~4.2.2~~ ~~4.2.14~~
		~~Construction of equipment~~	~~4.2.16~~

Table 5.2~~.a~~

Basic interoperability constituents in the Control-Command and Signalling Trackside Subsystem

1	**2**	**3**	**4**
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
1	RBC	Reliability, Availability, Maintainability, Safety (RAMS) — Safety — Availability / Reliability — Maintainability	4.2.1.1 ~~4.5.1~~4.2.1.2 4.2.20.1
		Trackside ETCS functionality (excluding communication via Eurobalises, radio in-fill and Euroloop) System identifier	4.2.3 4.2.3

1	2	3	4
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
		ETCS and ~~GSM-R~~RMR air gap interfaces: only radio communication with train — GSM-R air gap interface — FRMCS air gap interface	4.2.5.1.1a 4.2.5.1.1b
		Interfaces — Neighbouring RBC — GSM-R Data radio communication — FRMCS trackside — Key management system — ETCS-ID Management	4.2.7.1, 4.2.7.2 4.2.7.3.1a 4.2.7.3.1b 4.2.8 4.2.9
		Construction of equipment	4.2.16
2	Radio in-fill unit	Reliability, Availability, Maintainability, Safety (RAMS) — Safety — Availability / Reliability — Maintainability	4.2.1 4.2.1.2 4.2.20.1~~4.5.1~~
		Trackside ETCS functionality (excluding communication via Eurobalises, Euroloop and level ~~2 and level 3~~R functionality)	4.2.3
		ETCS and ~~GSM-R~~RMR air gap interfaces: only radio communication with train	4.2.5.1
		Interfaces — GSM-R Data radio communication — Key management system — ETCS-ID Management — Interlocking and LEU	4.2.7.3 4.2.8 4.2.9 4.2.3
		Construction of equipment	4.2.16

1	2	3	4
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
3	Eurobalise	Reliability, Availability, Maintainability, Safety (RAMS) — Safety — Availability / Reliability — Maintainability	4.2.1.1 4.2.1.2 4.2.20.1~~4.5.1~~
		ETCS and ~~GSM-R~~RMR air gap interfaces: only Eurobalise communication with train	4.2.5.2
		Interfaces — LEU — Eurobalise	4.2.7.4
		Construction of equipment	4.2.16
4	Euroloop	Reliability, Availability, Maintainability, Safety (RAMS) — Safety — Availability / Reliability — Maintainability	4.2.1 4.2.1.2 4.2.20.1~~4.5.1~~
		ETCS and ~~GSM-R~~RMR air gap interfaces: only Euroloop communication with train	4.2.5.3
		Interfaces — LEU – Euroloop	4.2.7.5
		Construction of equipment	4.2.16
5	LEU Eurobalise	Reliability, Availability, Maintainability, Safety (RAMS) — Safety — Availability / Reliability — Maintainability	4.2.1 4.2.1.2 4.2.20.1~~4.5.1~~
		Trackside ETCS functionality (excluding communication via radio in-fill, Euroloop and level ~~2 and level 3~~R functionality)	4.2.3

1	2	3	4
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
		Interfaces — LEU — Eurobalise	4.2.7.4
		Construction of equipment	4.2.16
6	LEU Euroloop	Reliability, Availability, Maintainability, Safety (RAMS) — Safety — Availability / Reliability — Maintainability	4.2.1 4.2.1.2 4.2.20.1~~4.5.1~~
		Trackside ETCS functionality (excluding communication via radio in-fill, Eurobalise and level ~~2 and level 3~~ R functionality)	4.2.3
		Interfaces — LEU – Euroloop	4.2.7.5
		Construction of equipment	4.2.16
7	Axle Counter	Trackside train detection systems (only parameters relevant for axle counters)	4.2.10
		Electromagnetic compatibility (only parameters relevant for axle counters)	4.2.11
		~~Construction of equipment~~	~~4.2.16~~
8	Marker Board	Trackside Control-Command and Signalling objects (only points 1 and 2)	4.2.15
		Construction of equipment	4.2.16
9	ATO Trackside	Reliability, Availability, Maintainability (RAM): — Availability / Reliability — Maintainability	4.2.1.2 4.2.20.1
		Trackside ATO functionality	4.2.19

1	2	3	4
No	**Interoperability constituent IC**	**Characteristics**	**Specific requirements to be assessed by reference to Chapter 4**
		ETCS and RMR air gap interfaces: only radio communication with train — GSM-R air gap interface — FRMCS air gap interface	 4.2.5.1.2a 4.2.5.1.2b
		Interfaces: — GSM-R Data radio communication — FRMCS Trackside	4.2.7.3.2a 4.2.7.3.2b
		Construction of equipment	4.2.16

~~Table 5.2.b~~

~~Groups of interoperability constituents in the Control-Command and Signalling Trackside Subsystem~~

~~This table is an example to show the structure. Other groups are allowed~~

~~1~~	~~2~~	~~3~~	~~4~~
~~N~~	~~Group of interoperability constituents~~	~~Characteristics~~	~~Specific requirements to be assessed by reference to Chapter 4~~
~~1~~	~~Eurobalise LEU Eurobalise~~	~~Reliability, Availability, Maintainability, Safety (RAMS)~~	~~4.2.1 4.5.1~~
		~~Trackside ETCS functionality (excluding communication via Euroloop and level 2 and level 3 functionality)~~	~~4.2.3~~
		~~ETCS and GSM-R air gap interfaces: only Eurobalise communication with train~~	~~4.2.5.2~~
		~~Construction of equipment~~	~~4.2.16~~

~~2~~	~~Euroloop~~ ~~LEU Euroloop~~	~~Reliability, Availability, Maintainability, Safety (RAMS)~~	~~4.2.1~~ ~~4.5.1~~
		~~Trackside ETCS functionality, (excluding communication via Eurobalise and level 2 and level 3 functionality)~~	~~4.2.3~~
		~~ETCS and GSM-R air gap interfaces: only Euroloop communication with train~~	~~4.2.5.3~~
		~~Construction of equipment~~	~~4.2.16~~

6. ASSESSING THE CONFORMITY AND/OR SUITABILITY FOR USE OF THE CONSTITUENTS AND VERIFYING THE SUBSYSTEMS

6.1. INTRODUCTION

6.1.1. General principles

6.1.1.1. Compliance with basic parameters

Fulfilment of the essential requirements set out in Chapter 3 of this NTSN shall be ensured through compliance with the basic parameters specified in Chapter 4.

This compliance shall be demonstrated by:

(1) assessing the conformity of the interoperability constituents specified in Chapter 5 (see ~~point~~ section 6.2.1, 6.2.2, 6.2.3, 6.2.4);

(2) verifying the subsystems (see ~~point~~ section 6.3 and ~~point~~ section 6.4).

In case of changes to existing subsystems, the requirements in 7.2.1a for on-board subsystems and 7.2.1b for trackside subsystems shall be considered in the assessment.

6.1.1.2. This provision has been left intentionally blank

~~*6.1.1.3.* Partial fulfilment of TSI requirements~~

~~With regard to checking if essential requirements are fulfilled through compliance with the basic parameters, and without prejudice to the obligations set out in~~

~~Chapter 7 of this NTSN, control-command and signalling interoperability constituents and subsystems that do not implement all functions, performance and interfaces as specified in Chapter 4 (including the specifications referred to in Annex A), can obtain UK certificates of conformity or, respectively, certificates of verification, under the following conditions for issuing and using the certificates:~~

~~(1) The applicant for UK verification of a trackside control-command and signalling subsystem is responsible for deciding which functions, performance and interfaces need to be implemented to meet the objectives for the service and to ensure that no requirements contradicting or exceeding the NTSNs are exported to the on-board control-command and signalling subsystems.~~

~~(2) The operation of an on-board control-command and signalling subsystem, that does not implement all functions, performance and interfaces specified in this NTSN, may be subject to conditions and limits of use due to compatibility and/or safe integration with trackside control-command and signalling subsystems. Without prejudice to the tasks of an approved body described in regulation 30 of the Railways (Interoperability) Regulations 2011, the applicant for UK verification is responsible for ensuring that the technical file provides all the information[9] that an operator needs to identify such conditions and limits of use.~~

~~(3) The authorising entity may refuse for duly justified reasons the authorisation for placing in service, or place conditions and limits of use on the operation, of control-command and signalling subsystems that do not implement all functions, performance and interfaces specified in this NTSN.~~

~~If a control-command and signalling interoperability constituent or subsystem does not implement all functions, performance and interfaces specified in this NTSN, the provisions of point 6.4.3 shall apply.~~

6.1.2. Principles for testing ETCS, ATO and ~~GSM-R~~RMR

6.1.2.1. *This provision has been left intentionally blank*

6.1.2.2. Operational test scenarios

For the purpose of this NTSN, an "operational test scenario" means a sequence of trackside and on-board events related to or influencing the Control-command and Signalling subsystems (e.g. sending/receiving messages, exceeding a speed limit, actions of operators) and the specified timing between them in order to test the intended railway system operation in situations relevant for ETCS, ATO and ~~GSM-~~

~~9 The template to be used to provide this information will be defined in the EU's TSI Application Guide.~~

~~R~~RMR (e.g. entry of a train into an equipped area, awakening of a train, overriding a signal at stop).

The operational tests scenarios are based on the engineering rules adopted for the project.

Check of compliance of a real implementation with an operational tests scenario shall be possible gathering information through easily accessible interfaces (preferably the standard interfaces specified in this NTSN).

6.1.2.3. Requirements for Operational test scenarios

The set of engineering rules for the trackside parts of ETCS, ATO and ~~GSM-R~~RMR and related operational test scenarios for the Trackside Control-command and Signalling Subsystem shall be sufficient to describe all intended system operations relevant for the Trackside Control-command and Signalling Subsystem in normal and identified degraded situations, and:

(1) shall be consistent with the specifications referenced in this NTSN;

(2) shall assume that functions, interfaces and performance of the Control-command and Signalling On-board Subsystems interacting with the Trackside Subsystem are compliant with the requirements of this NTSN;

(3) shall be the ones used in the UK Verification of the Trackside Control-command and Signalling Subsystem, to check that the implemented functions, interfaces and performance are able to ensure that the intended system operation in combination with the relevant modes and transitions between levels and modes of the Control-command and Signalling On-board Subsystems are respected.

6.2. INTEROPERABILITY CONSTITUENTS

6.2.1. Assessment procedures for Control-Command and Signalling Interoperability Constituents

Before placing on the market an interoperability constituent and/or groups of interoperability constituents the manufacturer or his authorised representative shall draw up a 'UK' declaration of conformity in accordance with regulation 25 of and Schedule 7 to the Railways (Interoperability) Regulations 2011.

The assessment procedure shall be carried out using one of the modules specified in ~~point~~ section 6.2.2 (Modules for Control-Command and Signalling Interoperability Constituents).

A 'UK' declaration of suitability for use is not required for Control-Command and Signalling interoperability constituents. Compliance with relevant basic parameters, as demonstrated by the 'UK' Declaration of conformity, is sufficient for placing the interoperability constituents on the market[10].

6.2.2. Modules for Control-Command and Signalling Interoperability Constituents

For assessing interoperability constituents within the Control-Command and Signalling Subsystems, the manufacturer or his authorised representative may choose:

(1) either the type-examination procedure (Module CB) for the design and development phase in combination with the production quality management system procedure (Module CD) for the production phase; or

(2) the type-examination procedure (Module CB) for the design and development phase in combination with the product verification procedure (Module CF); or

(3) the full quality management system with design examination procedure (Module CH1).

In addition, for checking the SIM card and Marker Board Interoperability Constituent, the manufacturer or his representative may choose Mmodule CA.

The modules are described in detail in the NTSN concerning modules for the procedures for assessment of conformity or suitability for use and UK verification ("Modules NTSN").

The following clarifications apply to the use of some of the modules:

(1) with reference to Chapter 2 of the 'Module CB', 'EC'-type examination shall be carried out through a combination of production type and design type;

(2) with reference to Chapter 3 of the 'Module CF' (product verification) statistical verification is not allowed, i.e. all interoperability constituents shall be individually examined.

6.2.3. Assessment requirements

Independently of the selected module:

10 Checking that an Interoperability Constituent is used appropriately is part of the overall UK verification of Control-Command and Signalling On-board and Track-side Subsystems, as explained in 6.3.3 and 6.3.4.

(1) the requirements stated in ~~point~~ section 6.2.4.1 of this NTSN shall be respected for the 'On-board ETCS' interoperability constituent,

(2) the activities shown in Table 6.1a shall be carried out when assessing the conformity of an interoperability constituent or a group of interoperability constituents as defined in Chapter 5 of this NTSN. All verifications shall be carried out by reference to the applicable table in Chapter 5 and the basic parameters indicated there.

(3) The manufacturer of the equipment shall inform a Notified Body about all changes affecting the conformity of the Interoperability Constituent due to the requirements of the applicable NTSN release. The manufacturer shall also demonstrate if these specifications of error corrections require new checks, in accordance with table 6.1a and by application of modules for the EC Conformity according §6.2.2. This information shall be provided by the manufacturer with corresponding references to the technical documentation relating to the existing EC certificate. The manufacturer shall justify and document that applicable requirements are met at interoperability constituent level, which shall be assessed by a Notified Body.

The manufacturer shall inform the impacted entities about changes, e.g. regarding operation and maintenance, if they affect existing and already implemented products/components.

Table 6.1a

Conformity assessment requirements of an interoperability constituent or a group of interoperability constituents

No	Aspect	What to assess	Supporting evidence
1a	Functions, interfaces and performances	Check that all mandatory functions, interfaces and performances as described in the basic parameters referenced in the relevant table of Chapter 5 are implemented and that they comply with the requirements of this NTSN	Design documentation and running of test cases and test sequences, as described in the basic parameters referenced in the relevant table of Chapter 5
1b		Check which optional functions and interfaces as	Design documentation and running of test cases and test

No	Aspect	What to assess	Supporting evidence
		described in the basic parameters referenced in the relevant table of Chapter 5 are implemented and that they comply with the requirements of this NTSN	sequences, as described in the basic parameters referenced in the relevant table of Chapter 5
1c		Check which additional functions and interfaces (not specified in this NTSN) are implemented and that they do not lead to conflicts with implemented functions specified in this NTSN	Impact analysis
2a	Construction of equipment	Check compliance with mandatory conditions, where specified in the basic parameters referenced in the relevant table of Chapter 5	Documentation on material used and, where necessary, tests to ensure that the requirements of the basic parameters referenced in the relevant table of Chapter 5 are satisfied
2b		In addition, check that the interoperability constituent functions correctly in the environmental conditions for which it is designed	Tests according to the applicant's specifications
3	Reliability, Availability, Maintainability, Safety (RAMS)	Check compliance with the safety requirements ~~described~~ where specified in the basic parameters referenced in the relevant table of Chapter 5, i.e. 1. respect for quantitative Tolerable Hazard Rates (THRs) caused by random failures 2. the development process is able to detect and	1. Calculations for the THRs caused by random failures, supported by reliability data. 2.1. The manufacturer's quality and safety management throughout design, manufacturing and testing conforms to a recognised standard (see note)

No	Aspect	What to assess	Supporting evidence
		eliminate systematic failures	2.2. The software development life-cycle, the hardware development life-cycle and the integration of hardware and software have each been undertaken in accordance with a recognised standard (see note) 2.3. The safety verification and validation process has been undertaken in accordance with a recognised standard (see Note) and respects the safety requirements described in the basic parameters referenced in the relevant table of Chapter 5 2.4. The functional and technical safety requirements (correct operation under fault-free conditions, effects of faults and of external influences) are verified in accordance with a recognised standard (see Note) *Note:* The standard shall satisfy at least the following requirements:

No	Aspect	What to assess	Supporting evidence
			1. be compliant with the requirements for code of practice, as stated in Annex I, point 2.3.2, of Regulation (EU) No 402/2013 2. be widely acknowledged in the railway domain. If this is not the case, the standard will have to be justified and be acceptable to the approved body; 3. be relevant for the control of the considered hazards in the system under assessment; 4. be publicly available for all actors who want to use it.
4		Check that the quantitative reliability target (related to random failures) indicated by the applicant is met	Calculations
5		Elimination of systematic failures	Tests of equipment (full Interoperability Constituent or separately for subassemblies) in operational conditions, with repair when defects are detected. Documentation accompanying the certificate which indicates which kind of verifications have been performed, which standards have been applied and criteria adopted to consider these tests completed (according to decisions of the applicant).

No	Aspect	What to assess	Supporting evidence
6	Technical documentation for maintenance	Check compliance with maintenance requirements – point ~~4.5.1~~4.2.20.1	Document check

6.2.4. Special issues

6.2.4.1. Mandatory tests for the on-board ETCS

Particular attention shall be given to assessing the conformity of the on-board ETCS interoperability constituent, since it is complex and plays a key role in achieving interoperability.

The tests for the on-board ETCS shall be specified in technical documents made available on the website of the European Union Agency for Railways (www.era.europa.eu). These tests shall become mandatory for the interoperability constituents placed in the market after the publication on the website of that technical document. The test specifications depend on the highest system version supported by the on-board ETCS.

Regardless of whether module CB or CH1 is chosen, the approved body shall check that

(1) a representative specimen of the interoperability constituent has been submitted to a full set of test sequences including all test cases necessary to check the functions referenced in ~~point~~ section 4.2.2 (on-board ETCS functionality). The applicant is responsible to define the test cases and their organisation in sequences, if this is not included in the website of the European Union Agency for Railways (www.era.europa.eu)~~specifications referenced in this NTSN~~;

(2) these tests were carried out in a laboratory accredited in accordance with Regulation (EC) No 765/2008 of the European Parliament and of the Council[11] and the standards referred to in ~~Annex~~Appendix A, Table A 4 to carry out tests with the use of the test architecture and the procedures specified in ~~Annex~~Appendix A 4.2.2.c.

11 Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance to the marketing of products and repealing Regulation (EEC) No 339/93 (OJ L 218, 13.8.2008, p. 30). This EU legislation is retained EU law under section 3 of the European Union (Withdrawal) Act 2018 and it has been amended under that Act by the Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019 to make amendments to EU legislation as a result of the UK's exit from the EU.

The laboratory shall provide a full report clearly indicating the results of the tests cases and sequences used. The approved body is responsible to assess the suitability of test cases and sequences to check compliance with all relevant requirements and to evaluate the results of tests in view of the certification of the Interoperability Constituent.

6.2.4.2. ~~*The Specific Transmission Module (STM)*~~*Class B interfaces*

Each Member State shall be responsible for verifying that Class B systems and their interfaces to the ETCS on-board Interoperability Constituent conform to its national requirements.

The ~~V~~verification of the standardised STM interface to the on-board ETCS requires a conformity assessment ~~against requirements, in this NTSN or relevant national technical rules,~~ carried out by an approved body or designated body.

6.2.4.3. ETCS and radio system compatibility checks for Interoperability Constituent

Since the ESC/RSC checks are not required in Table 6.1a, they are not required for issuing an interoperability constituent certificate.

If ESC/RSC are executed at Interoperability Constituent level, the task of the NoBo with regards to the ESC/RSC Interoperability Constituent statement(s) and associated report is to verify the correctness and completeness of the check report for the Interoperability Constituent, according to the requirements in this section.

In line with the Directive (EU) 2016/797 the Notified Body performing this assessment may be a different one from the Notified Body performing the EC Verification procedure for the interoperability constituent.

Table 6.1b

NoBo assessment of the ETCS or Radio System Compatibility Check for Interoperability Constituents.

No	Aspect	What to assess	Supporting evidence
1	Availability of the results	Assess that the check report gives reference to the checks according to the definition of the ESC/RSC types in the technical document published by ERA.	Evaluation of the ESC/RSC Check Report.

		Assess that the Interoperability Constituent check report clearly indicates which checks have been verified from the ESC/RSC Type.	
2	Availability of the results	Assess that ESC/RSC results indicate for every ESC/RSC Check whether the ESC/RSC Check was passed as specified or not;	Evaluation of the ESC/RSC Check Report.
3	Incompatibilities and errors reported	Assess that for every ESC/RSC Check which was not passed as specified, the incompatibilities and errors reported during ESC/RSC Checks are stated;	Evaluation of the ESC/RSC Check Report.
4	Impact analysis	Assess that for every ESC/RSC Check which was not passed as specified, an impact analysis of the effects on ESC/RSC has been performed and recorded using the template provided in the Appendix D.	Evaluation of the ESC/RSC Check Report.

~~6.2.5. Additional tests~~

~~To increase confidence that the On-board ETCS Interoperability Constituent will operate correctly when installed in On-board Control-command and Signalling Subsystems running on different Trackside Control-command and Signalling applications, it is recommended that it is tested using relevant; see point 6.1.2 (Principles for testing ETCS, ATO and GSM-RRMR). The tests can be performed using real equipment or a simulated Trackside Control-command and Signalling Subsystem.~~

~~These tests are not mandatory for the certification of the On-board ETCS Interoperability Constituent. The applicant for certification of the Interoperability Constituent may decide to perform them and have them assessed by an approved body; the corresponding documentation shall provide information about the operational test scenarios against which the Interoperability Constituent has been checked and whether tests have been carried out with simulators or using real equipment, including type and version of such equipment.~~

~~Performing these tests at the level of Interoperability Constituent may also reduce the amount of checks at the level of Control-command and Signalling Subsystem (see Table 6.2, last row, and point 6.5).~~

~~Note: while it is not mandatory to perform tests using different operational scenarios, it must be noted that these tests may assist the verification of the Interoperability Constituent to eliminate as much as possible systematic failures, which is mandatory to obtain an UK certificate of conformity.~~

~~6.2.6. Content of the 'UK' Declaration of conformity~~

~~The 'UK' Declaration of conformity specified in Schedule 7 to the Railways (Interoperability) Regulations 2011 shall include the following details concerning the interoperability constituent:~~

~~(1) which optional and additional functions are implemented;~~

~~the applicable environmental conditions.~~

6.3. CONTROL-COMMAND AND SIGNALLING SUBSYSTEMS

6.3.1. Assessment procedures for Control-Command and Signalling Subsystems

This Chapter deals with the "UK" declaration of verification for the Control-Command and Signalling On-board Subsystem and the "UK" declaration of verification for the Control-Command and Signalling Trackside Subsystem.

At the request of the applicant the approved body shall carry out a "UK" verification of a Control-Command and Signalling On-board or Trackside Subsystem in accordance with Schedule 4 to the Railways (Interoperability) Regulations 2011.

The applicant shall draw up the "UK" declaration of verification for the Control-Command and Signalling On-board or Trackside Subsystem in accordance with regulation 17 to and Schedule 5 to the Railways (Interoperability) Regulations 2011.

The content of the "UK" declaration of verification shall conform to Schedule 5 to the Railways (Interoperability) Regulations 2011.

The assessment procedure shall be carried out using the modules specified in ~~point~~ section 6.3.2 (Modules for Control-Command and Signalling Subsystems).

The "UK" declarations of verification for a Control-Command and Signalling On-board Subsystem and of a Control-Command and Signalling Trackside Subsystem, together with the certificates of conformity, shall be deemed sufficient to ensure that the subsystems are compatible under the conditions specified in this NTSN.

6.3.2. Modules for Control-Command and Signalling Subsystems

All modules indicated below are specified in the Modules NTSN.

6.3.2.1. On-board Subsystem

For verifying the Control-Command and Signalling On-board Subsystem, the applicant may choose either:

(1) the type-examination procedure (Module SB) for the design and development phase in combination with the production quality management system procedure (Module SD) for the production phase; or

(2) the type-examination procedure (Module SB) for the design and development phase in combination with the product verification procedure (Module SF); or

(3) the full quality management system with design examination procedure (Module SH1).

6.3.2.2. Trackside Subsystem

For verifying the Control-Command and Signalling Trackside Subsystem, the applicant may choose either:

(1) the unit verification procedure (Module SG); or

(2) the type-examination procedure (Module SB) for the design and development phase in combination with the production quality management system procedure (Module SD) for the production phase; or

(3) the type-examination procedure (Module SB) for the design and development phase in combination with the product verification procedure (Module SF); or

(4) the full quality management system with design examination procedure (Module SH1).

6.3.2.3. Conditions for using modules for On-board and Trackside Subsystems

With reference to ~~point~~ section 4.2 of Module SB (type-examination), design review is requested.

With reference to ~~point~~ section 4.2 of Module SH1 (full quality management system with design examination), an additional type test is required.

6.3.3. Assessment requirements for an On-board Subsystem

Table 6.2 a shows the checks that must be carried out when verifying a Control-Command and Signalling On-board Subsystem and the basic parameters that must be respected.

Independently of the module chosen:

(1) verification shall demonstrate that the Control-Command and Signalling On-board Subsystem complies with basic parameters when it is integrated into the vehicle;

(2) the functionality and performances of interoperability constituents already covered by their UK Declaration of conformity do not require additional verifications,

~~(2)~~(3) the update due to specifications maintenance of an already integrated Interoperability Constituent will not require additional verification by a subsystem Notified Body if the Interoperability Constituent Notified Body confirms that the impact of the update to be assessed is limited to the Interoperability Constituent and if no impact at subsystem level is identified by the CSM assessment body assessing the subsystem integration of the update.

Table 6.2a

Conformity assessment requirements for an On-board Subsystem

No	Aspect	What to assess	Supporting evidence
1a	Use of interoperability constituents	Check whether the interoperability constituents to be integrated into the subsystem are all covered by a "UK" Declaration of conformity and a corresponding certificate. The Subsystem needs to be checked with a SIM card compliant with the requirements of this NTSN. Changing the SIM card with another one compliant with the NTSN is not a modification of the Subsystem.	Existence and content of documents
1b		Check conditions and limits of use on the use of Interoperability Constituents against	Analysis by document check

No	Aspect	What to assess	Supporting evidence
		the characteristics of the subsystem and of the environment	
1c		For interoperability constituents that have been certified against a version of the CCS NTSN, which is different from the version applied for the "UK" Verification of the subsystem and/or against a set of specifications which is different from the set of specifications applied for the "UK" Verification of the subsystem, check that the certificate still ensures subsystem compliance with the requirements of the NTSN currently in force.	Impact analysis by document checks
2a	Integration of interoperability constituents in the subsystem	Check the correct installation and functioning of the internal interfaces of the subsystem — Basic parameter 4.2.6	Checks according to specifications
2b		Check that additional functions (not specified in this NTSN) do not impact the mandatory ones	Impact analysis
2c		Check that the values of ETCS IDs are within the allowed range and, if required by this NTSN, have unique values – Basic parameter 4.2.9	Check of design specifications
2d		Check that there is a system identifier for ETCS part of the subsystem In case of modification of the functional or realisation part of the system identifier, that the modification corresponds to the definition – Basic Parameter 4.2.2	Document check
3a	Integration with rolling stock	Check the correct installation of equipment — Basic Parameters 4.2.2, 4.2.4, 4.2.14 and conditions for installation of equipment, as specified by the manufacturer	Results of checks (according to specifications referenced in the Basic Parameters and

No	Aspect	What to assess	Supporting evidence
			the manufacturer's installation rules)
3b		Check that the Control-Command and Signalling On-board Subsystem is compatible with the rolling stock environment – Basic parameter 4.2.16	Document check (certificates of interoperability constituents and possible integration methods checked against characteristics of rolling stock)
3c		Check that parameters (e.g., braking parameters) are correctly configured and that they are within the allowed range	Document check (values of parameters checked against characteristics of rolling stock)
4a	Integration with Class B depending on ETCS on-board and Class B interface	Check that the standardised interface ~~external~~ STM is connected to on-board ETCS with NTSN-compliant interfaces	Nothing to test: there is a standard interface already tested at interoperability constituent level. Its functioning has already been tested when checking the integration of interoperability constituents in the subsystem

No	Aspect	What to assess	Supporting evidence
4b		Check that Class B functions implemented in the on-board ETCS– Basic parameter 4.2.6.1 — create no additional requirements for the Control-Command and Signalling Trackside Subsystem due to transitions	Nothing to test: everything has already been tested at interoperability constituent level
4c		Check that separate Class B equipment which is not connected to the on-board ETCS– Basic Parameter 4.2.6.1 — creates no additional requirements for Control-Command and Signalling Trackside Subsystem due to transitions	nothing to test: no interface[12]
4d		Check that separate Class B equipment connected on-board ETCS using (partly) non NTSN compliant interfaces – basic parameter 4.2.6.1 — creates no additional requirements for the Control-Command and Signalling Trackside Subsystem due to transitions. Also check that ETCS functions are not affected	impact analysis by document check and integration tests report
5a	Integration with Control-Command and Signalling Trackside Subsystems	Check that Eurobalise telegrams can be read (scope of this test is limited to checking that the antenna has been appropriately installed. The tests already carried out at Interoperability Constituent level shall not be repeated) – Basic Parameter 4.2.5	Test using a certified Eurobalise: the ability to read correctly the telegram is the supporting evidence.
5b		Check that Euroloop telegrams (if applicable) can be read – Basic Parameter 4.2.5	Test using a certified Euroloop: the ability to read correctly the telegram is the

12 In this case, the assessment of the management of transitions shall be according to national specifications.

No	Aspect	What to assess	Supporting evidence
			supporting evidence.
5c		Check that the equipment can handle a ~~GSM-R~~RMR call for voice and data (if applicable) – Basic Parameter 4.2.5	Test with a certified ~~GSM-R~~RMR network. The ability to set up, maintain and disconnect a connection is the supporting evidence.
6a	Reliability, Availability, Maintainability, Safety (RAMS)	Check that the equipment complies with safety requirements — Basic Parameter 4.2.1	Application of procedures specified in the Common Safety Method for Risk Evaluation and Assessment.
6b		Check that the quantitative reliability target is met — Basic Parameter 4.2.1	Calculations
6c		Check the compliance with requirements about maintenance – point 4.2.20.2~~5.2~~	Documents check
7	Integration with Control-Command and Signalling Trackside Subsystems and other subsystems: tests under conditions representing the intended operation.	Test the behaviour of the subsystem under as many different conditions as reasonably possible representing the intended operation (e.g line gradient, train speed, vibrations, traction power, weather conditions, design of Control-Command and Signalling trackside functionality). The test must be able to verify: 1 that odometry functions are correctly performed — basic parameter 4.2.2 2 that the on-board Control-Command and Signalling Subsystem is compatible with the rolling stock environment – basic parameter 4.2.16	Reports of test runs.

No	Aspect	What to assess	Supporting evidence
		These tests must also be such as to increase confidence that there will be no systematic failures. The scope of these tests excludes tests already carried out at different stages: tests performed on the interoperability constituents and tests performed on the subsystem in a simulated environment shall be taken into account. Tests under environmental conditions are not necessary for on-board ~~GSM-R~~RMR voice equipment. Note: Indicate in the certificate which conditions have been tested and which standards have been applied.	

6.3.3.1. ETCS and radio system compatibility checks

The task of the NoBo with regards to the ESC/RSC check report is to verify the correctness and completeness of the ESC/RSC check report for the subsystem, according to the requirements in this section.

Since the ESC/RSC checks are not required in Table 6.2a, they are not needed for issuing an on-board subsystem certificate. Such an on-board subsystem therefore will only be considered compatible with Class A infrastructures where no specific ESC/RSC check is required to demonstrate technical compatibility (i.e. identified by the IM as ESC-EU-0 or RSC-EU-0 in RINF).

Table 6.2b

NoBo assessment of the ETCS or Radio System Compatibility Check for On-Board Subsystems.

No	Aspect	What to assess	Supporting evidence
1	Availability of the results	Assess that the check report gives reference to the checks according to the definition of the ESC/RSC types in the technical document published by ERA.	Evaluation of the ESC/RSC Check Report.

No	Aspect	What to assess	Supporting evidence
		Assess that all required ESC/RSC checks of that ESC/RSC type have been evaluated;	
2	Availability of the results	Assess that ESC/RSC results indicate for every ESC/RSC Check whether the ESC/RSC Check was passed as specified or not;	Evaluation of the ESC/RSC Check Report.
3	Incompatibilities and errors reported	Assess that for every ESC/RSC Check which was not passed as specified, the incompatibilities and errors reported during ESC/RSC Checks are stated;	Evaluation of the ESC/RSC Check Report.
4	Impact analysis	Assess that for every ESC/RSC Check which was not passed as specified, an impact analysis of the effects on ESC/RSC has been performed and recorded using the template provided in the CCS NTSN Appendix D.	Evaluation of the ESC/RSC Check Report.
5	Conditions	Assess that all conditions are referred to in the check report.	Evaluation of the ESC/RSC Check Report.
6	Integration of ESC/RSC Interoperability Constituent Statements	Assess that if the ESC/RSC statement is based on ESC/RSC Interoperability Constituent statements, the results from ESC/RSC Interoperability Constituent Statement are applicable to the concerned subsystem.	Evaluation of the ESC/RSC Check Report.

~~Particular attention shall be given to assessing the conformity of the on-board CCS subsystem regarding the Basic Parameter ETCS and radio system compatibility referred to in 4.2.17.~~

~~Regardless of the module selected for the previous UK or EC verification procedure for the on-board subsystem, the approved body shall check:~~

~~(a) the availability of the result of the technical compatibility checks.~~

~~(b) That the technical compatibility checks have been performed in accordance with the technical document published by the Agency, referred in points 6.1.2.4 and 6.1.2.5.~~

~~(c) Based on the report of the checks, that the technical compatibility checks results indicate all the incompatibilities and errors encountered during the technical compatibility checks.~~

The approved body shall not check again any aspect covered during the already performed UK Verification procedure for the on-board subsystem or already covered in the ESC/RSC Interoperability Constituent Statement.

The approved body performing ~~these checks~~ this assessment may be a different one from the approved body performing the UK Verification procedure for the on-board subsystem or from the Notified Body performing the assessment on the ESC/RSC Interoperability Constituents check report.

~~Performing these checks also at the level of Interoperability Constituent may reduce the amount of checks at the level of Control-command and Signalling Subsystem.~~

6.3.4. Assessment requirements for a Trackside Subsystem

The purpose of assessments carried out within the scope of this NTSN is to verify that the equipment complies with the requirements stated in Chapter 4.

However, for the design of the ETCS part of the Control-Command and Signalling Trackside Subsystem, application-specific information is needed. This shall include:

(1) line characteristics such as gradients, distances, positions of route elements and Eurobalises/Euroloops, locations to be protected, etc.;

(2) the signalling data and rules to be handled by the ETCS system.

This NTSNI does not cover checks to assess whether the application-specific information is correct:

Regardless of the module chosen:

(1) Table 6.3 shows the checks that shall be carried out to verify a Control-Command and Signalling Trackside Subsystem and the basic parameters that shall be respected;

(2) functionality and performance that have already been checked at the level of the interoperability constituents do not require additional verification.

~~(2)~~(3) the update due to specifications maintenance of an already integrated Interoperability Constituent will not require additional verification by a subsystem Notified Body if the Interoperability Constituent Notified Body confirms that the impact of the update to be assessed is limited to the Interoperability Constituent and if no impact at subsystem level is identified

by the CSM assessment body assessing the subsystem integration of the update.

Table 6.3

Conformity assessment requirements for a Trackside Subsystem

No	Aspect	What to assess	Supporting evidence
1a	Use of interoperability constituents	Check that all interoperability constituents to be integrated into the subsystem are covered by either an EC or UK declaration of conformity and the corresponding certificate.	Existence and content of documents
1b		Check conditions and limits of use on the use of interoperability constituents against the characteristics of the subsystem and of the environment	Impact analysis by documents check
1c		For interoperability constituents that have been certified against a version of the Control-Command and Signalling TSI, which is different from the NTSN applied for the "UK" Verification of the subsystem and/or against a set of specifications which is different from the set of specifications applied for the "UK" Verification of the subsystem, check that the certificate still ensures compliance with the requirements of the NTSN currently in force	Impact analysis by comparison of specifications referenced in the NTSN and certificates of the interoperability constituents
2a	Integration of interoperability constituents in the subsystem Note: Only those with a specific assessment at	Check that the internal interfaces of the subsystem have been installed properly and function properly — Basic parameters 4.2.5, 4.2.7 and conditions specified by the manufacturer (N/A for IC axle counter~~)~~ and Marker Boards)	Checks according to specifications

No	Aspect	What to assess	Supporting evidence
2b	subsystem level.	Check that additional functions (not specified in this NTSN) do not impact the mandatory ones (N/A for IC axle counter and Marker Boards)	Impact analysis
2c		Check that the values of ETCS IDs are within the allowed range and, if required by this NTSN, have unique values – Basic Parameter 4.2.9 (N/A for IC axle counter~~)~~ and Marker Boards)	Check of design specifications
2d		For Interoperability Constituent ~~IC~~ axle counters (only): The integration of the IC in the subsystem has to be verified: Check index 77 document points 3.1.2.1, 3.1.2.4 and 3.1.2.5 only. Check the correct installation of equipment and conditions specified by the manufacturer and/or the Infrastructure manager.	Document check
2e		Check that there is a system identifier for the ETCS part of the subsystem In case of modification of the functional or realisation part of the system identifier, that the modification corresponds to the definition – Basic Parameter 4.2.3	Document check
3	~~Visibility of t~~Trackside Control-Command objects	Check that requirements for marker boards specified in this NTSN are fulfilled (characteristics, compatibility with the infrastructure requirements (gauge, …), compatibility with the driver's field of view, the positioning of interoperable marker boards to	Design documentation, results of tests or test runs with NTSN compliant rolling stock

No	Aspect	What to assess	Supporting evidence
		meet their intended operational purpose) – Basic parameter 4.2.15	
4a	Integration with infrastructure	Check that the ETCS, RMR and ATO equipment has been properly installed — Basic parameters 4.2.3, 4.2.4, 4.2.19 and conditions for installation specified by the manufacturer	Results of checks (according to specifications referenced in the basic parameters and manufacturer's installation rules)
4b		Check that the Control-Command and Signalling Trackside subsystem equipment is compatible with the trackside environment – Basic parameter 4.2.16	Document check (certificates of interoperability constituents and possible methods of integration checked against trackside characteristics)
5a	Integration with trackside signalling (not applicable for train detection part)	Check that all functions required by the application are implemented in accordance with specifications referenced in this NTSN — Basic parameter 4.2.3	Document check (applicant's design specification and certificates of interoperability constituents)
5b		Check the correct configuration of parameters (Eurobalise telegrams, RBC messages, marker boards positions, etc.)	Document check (values of parameters checked against characteristics of trackside and of signalling)
5c		Check that the interfaces are correctly installed and function properly.	Design verification and tests according to information supplied by the applicant
5d		Check that the Control-Command and Signalling Trackside subsystem operates correctly according to information at the interfaces with trackside signalling (e.g., appropriate generation of Eurobalise telegrams by a LEU or of message by RBC)	Design verification and tests according to the information supplied by the applicant

No	Aspect	What to assess	Supporting evidence
6a	Integration with Control-Command and Signalling On-board Subsystems ~~and with rolling stock~~	Check the ~~GSM-R~~RMR coverage — Basic Parameter 4.2.4	On site measurements
6b		Check that all functions required by the application are implemented in accordance with specifications referenced in this NTSN — basic parameters 4.2.3, 4.2.4 and 4.2.5	Reports of the operational test scenarios specified in point 6.1.2 with at least two certified Control-Command and Signalling On-board Subsystems from different suppliers. The report shall indicate which operational test scenarios have been tested, which on-board equipment has been used and whether tests have been performed in laboratories, test lines or real implementation.
7	Compatibility of train detection systems (Excluding axle counters)	Check that the train detection systems comply with the requirements of this NTSN — Basic parameters 4.2.10 and 4.2.11. Check index 77 document Chapter 4. Check the correct installation of equipment and conditions specified by the manufacturer and/or the Infrastructure manager.	Evidence of compatibility of equipment from existing installations (for systems already in use); perform tests according to standards for new types. On-site measurements to prove correctness of installation. Document check of correct installation of equipment.
8a	Reliability, Availability, Maintainability, Safety (RAMS)	Check compliance with safety requirements — Basic Parameter 4.2.1.1	Application of procedures specified in the Common Safety Method for Risk Evaluation and Assessment

No	Aspect	What to assess	Supporting evidence
8b	(excluding train detection)	Check that quantitative reliability targets are respected — Basic Parameter 4.2.1.2	Calculations
8c		Check the compliance with requirements about maintenance – point ~~4.5.2~~4.2.20.2	Document check
9	Integration with Control-Command and Signalling On-board Subsystems and rolling stock: tests under conditions representing the intended operation.	Test the behaviour of the subsystem under many different conditions as reasonably feasible representing the intended operation (e.g. train speed, number of trains on the line, weather conditions). The test must be able to verify: 1. the performance of train detection systems — Basic parameters 4.2.10, 4.2.11, 2. that the Control-Command and Signalling Trackside subsystem is compatible with trackside environment – Basic parameter 4.2.16 These tests will also increase confidence in the absence of systematic failures. The scope of these tests excludes tests already done in different steps: tests performed at the level of interoperability constituents and tests performed on the subsystem in a simulated environment shall be taken into account. Note: Indicate in the certificate which conditions have been tested and which standards have been applied.	Reports of test runs.

No	Aspect	What to assess	Supporting evidence
10	ETCS and radio System Compatibility	The proposed ESC and RSC checks are only covering NTSN requirements and are in line with the specifications – Basic Parameter 4.2.17. ~~The necessary ESC and RSC check definition.~~	- Document check of the envisaged ESC/RSC types in case they are new or modified. OR - The ~~T~~technical compatibility checks for ESC and RSC Type are published as "Valid" in the Agency ESC/RSC technical document, if they remain unchanged.

6.4. PROVISIONS IN CASE OF THE PARTIAL ~~FULFILMENT~~ ASSESSMENT OF NTSN REQUIREMENTS

6.4.1. Assessment of parts of control-command and signalling subsystems

Pursuant to regulation 17 of the Railways (Interoperability) Regulations 2011, the approved body may issue certificates of verification for certain parts of a subsystem, if allowed to do so under the relevant NTSN.

As pointed out in ~~point~~ section 2.2 (Scope) of this NTSN, the trackside and on-board control-command and signalling subsystems contain parts, as specified in ~~point~~ section 4.1 (Introduction).

A certificate of verification may be issued for each part or for a combination of parts specified in this NTSN; the approved body only checks if that particular part fulfils the NTSN requirements.

Regardless of which module is chosen, the approved body shall check that the NTSN requirements are fulfilled for:

(1) ~~the NTSN requirements~~ for the part in question ~~have been fulfilled~~; and

(2) their interfaces to the unchanged parts of the subsystem. ~~the fulfilment of the NTSN requirements already assessed for other parts of the same subsystem has not been modified.~~

In any case of assessment of parts of a control-command and signalling subsystem, a certificate of verification of the whole subsystem shall cover all the implemented parts and the integration between them.

Any subsequent assessment and certification of a part added or modified of a certified subsystem shall be handled as a change of the subsystem. The following principles apply:

(1) The NTSN version and assessment module referred in the EC certificate of verification corresponds to the assessed parts.

(2) The NoBo that assesses the change shall refer to the EC certificate of verification of the unchanged part in the file accompanying the new EC certificate of verification ("NoBo file") of the changed subsystem.

(3) It is not necessary that the NoBo of the changed subsystem repeats or incorporates the results and the limits and conditions of use originating from the previously certified part in the new certificate of verification of the changed subsystem or the accompanying NoBo's documentation – except for those which apply to the interface to the changed part.

6.4.2. Assessment in case of application of National Technical Rules

~~If some essential requirements are fulfilled by national technical rules, the UK certificate of conformity for an interoperability constituent and the UK certificate of verification for a subsystem shall make precise reference to the parts of this NTSN whose conformity has been assessed and the parts whose conformity has not been assessed.~~Intentionally deleted

6.4.3. Intentionally deleted ~~Partial fulfilment of the requirements due to limited application of the NTSN~~

~~*6.4.3.1.* Interoperability constituents~~

~~If an interoperability constituent does not implement all functions, performance and interfaces specified in this NTSN, a UK certificate of conformity may only be issued if the unimplemented functions, interfaces or performance are not required to integrate the interoperability constituent into a subsystem for the use indicated by the applicant, for example (13),~~

~~(1) the on-board ETCS interface to STM if the interoperability constituent is intended for installation on vehicles in which no external STM is needed;~~

~~(2) the RBC interface to other RBCs, if the RBC is intended for use in an application for which no neighbouring RBCs are planned.~~

~~13 The procedures described in this Chapter do not prejudice the possibility of grouping constituents together.~~

~~The UK certificate of conformity (or accompanying documents) for the interoperability constituent shall fulfil all the following requirements:~~

~~(1) it indicates which functions, interfaces or performance are not implemented;~~

~~(2) it provides enough information to make it possible to identify the conditions under which the interoperability constituent can be used;~~

~~(3) it provides enough information to make it possible to identify the conditions of and restriction on the use that will apply to the interoperability of a subsystem incorporating it.~~

~~***6.4.3.2.*** Subsystems~~

~~If a control-command and signalling subsystem does not implement all functions, performance and interfaces of this NTSN (e.g. because they are not implemented by an interoperability constituent integrated into it), the certificate of verification shall indicate which requirements have been assessed and the corresponding conditions and restrictions on the use of the subsystem and its compatibility with other subsystems.~~

~~*6.4.3.3.*~~*6.4.3.1.* ~~*This provision has been left intentionally blank*~~

6.4.4. Intermediate Statement of Verification

If conformity is assessed for ~~parts of~~ subsystems specified by the applicant and different from the parts allowed in Table 4.1 and the process described in Section 6.4.1 of this NTSN, or if only certain stages of the verification procedure have been performed, only an intermediate statement of verification may be issued.

6.5. MANAGEMENT OF ERRORS

Where deviations from intended functions and/or performance are detected during the tests or during the operational life of a subsystem, the applicants and/or operators shall inform without delay the Safety Authority that issued the authorisations for the concerned trackside subsystems or vehicles:

(1) if the deviation is due to incorrect application of this NTSN or to errors in design or installation of equipment, the applicant for the relevant certificates shall take the necessary corrective actions and the certificates affected and/or the corresponding technical files (for interoperability constituents and/or subsystems), together with the corresponding UK or EC Declarations, shall be updated;

(2) if the deviation is due to errors in this NTSN or in specifications referenced therein, the Safety Authority shall inform the Competent Authority.

Error corrections might impact the CCS trackside and CCS on-board subsystems. The Agency shall organise an efficient processing of all the information received in order to facilitate the Change Control Management process for improvement and further development of the specifications, including the test specifications.

6.5.1. Content of EC certificates

As per Regulation (EU) 2019/250 the notified bodies shall describe the restrictions and conditions for use of interoperability constituents and subsystems in the relevant EC certificates.

Notified bodies shall coordinate with the Agency the way in which errors, restrictions and conditions of use of interoperability constituents and subsystems are managed in the relevant EC certificates for verification and their accompanying technical files in the working group set up under Article 29 of Regulation (EU) 2016/796 of the European Parliament and of the Council.

In the accompanying technical file issued by the NoBo the template of CCS NTSN Appendix D shall be used

6.5.2. Content of EC declarations

As per Regulation (EU) 2019/250 the interoperability constituents manufacturer or the subsystem applicant shall describe in the EC declaration of conformity or verification the restrictions and conditions for use.

In the accompanying technical files the template of CCS NTSN Appendix D shall be used.

7. IMPLEMENTING THE NTSN CONTROL-COMMAND AND SIGNALLING

7.1. INTRODUCTION

This Chapter outlines the ~~strategy and the associated~~ technical measures for implementing the NTSN, and in particular the conditions for migrating to Class A systems.

Account must be taken of the fact that the implementation of a NTSN occasionally has to be coordinated with the implementation of other NTSN~~t~~s.

7.2. GENERALLY APPLICABLE RULES

7.2.1. Upgrading or renewing the Control-Command Subsystems or parts of them

Upgrading or renewing the Control-Command and Signalling Subsystems may concern any or all of the parts constituting them, as specified in ~~point~~ section 2.2.

The different parts of the Control-Command and Signalling Subsystems may therefore be upgraded or renewed separately, if interoperability is not jeopardised.

See Chapter 4.1 (Introduction) for the definition of the basic parameters for each part.

7.2.2. Legacy systems

This NTSN does not affect legacy systems and their interfaces remains unchanged, except where modifications are needed to mitigate safety-related flaws in these systems.

7.2.3. This provision has been left intentionally blank

7.2.4. Additional Class B equipment on a line equipped with Class A

On a line equipped with ETCS and/or ~~GSM-R~~RMR, additional Class B trackside equipment may be installed in order to allow the operation of rolling stock not compatible yet with Class A during the on-board Class A deployment~~migration~~ phase.

~~Trackside shall support transitions between Class A and Class B without imposing on the Control-Command and Signalling On-board Subsystem requirements additional to those specified in this NTSN.~~ Each Infrastructure Manager shall be responsible for verifying that the trackside design supports transitions between Class A and Class B and does not impose any additional requirements to the CCS Class A on-board;

The Control-Command and Signalling Trackside Subsystem shall be designed as if Control-Command and Signalling on-board is using standardised interface (STM) between Class A and Class B systems.

7.2.5. ~~Rolling stock~~Vehicle with Class A and Class B equipment

~~Rolling stock~~Vehicle may be equipped with both Class A and Class B systems to enable operation on several lines.

The Safety Authority concerned may restrict the use of an on-board Class B system on lines where the ~~corresponding~~ Class B system is not installed trackside.

~~When running on a line which is equipped with both Class A and Class B systems, a train that is also equipped with both Class A and Class B systems may use the Class B systems as a fallback arrangement.~~A vehicle equipped with both class A and class B shall demonstrate technical compatibility with trackside Class A on lines double equipped with Class A in parallel with Class B. Being equipped with a Class B system in addition to Class A shall not be a requirement for the compatibility of a vehicle with lines where Class B is installed in parallel with Class A.

~~The Class~~ For vehicle equipped with class A, class B train protection systems may be implemented according to requirements defined in §4.2.6.1 and following the requirements in section 7.2.3.~~:~~

~~(1) using an STM operating via the standard interface ('external STM'); or~~

~~(2) integrated within the ETCS equipment or connected via a non- standard interface; or~~

~~(3)~~(1) ~~independently from the ETCS equipment, for example via a system that enables switching between equipment. The railway undertaking must then ensure that the transitions between Class A and Class B train protection are carried out in conformity with the requirements of this NTSN and with the national rules for the Class B system.~~

7.2.6. Conditions for mandatory and optional functions

The applicant for UK verification of a Control-command and Signalling Trackside subsystem shall check whether Control-command and Signalling Trackside functions, which are defined '~~"~~optional'~~"~~ in this NTSN, are required by other NTSNs, ~~or~~ national ~~technical~~ rules or by the application of risk evaluation and assessment to ensure safe integration of subsystems.

The trackside implementation of national or optional functions shall be technically compatible and not prevent the use of that infrastructure by a train that complies only with the mandatory requirements of the On-board Class A system except as required for the following on-board optional functions in section 7.2.6.1 and 7.2.6.3. The trackside implementation of one of these optional functions which leads to a new mandatory on-board requirement on specific lines shall be notified minimum 5 years before the function can become a mandatory on-board requirement. The notification of a new mandatory on-board requirement shall be done within the RINF and these changes in RINF shall be listed in the Network Statement as part of article 27 of the Access Directive 2012/34/EU. A notification period shorter than 5 years is only allowed if this is agreed between the IM and

RU's who run services or intent to run services (at the time of establishing the agreement) on these lines. This agreement on shortening the notification period shall be notified to the European Commission.~~:~~

An on-board subsystem which incorporates a KER STM, may make it necessary to implement the K-interface.

7.2.6.1. ETCS Optional Functions

(1) An ETCS Level ~~3~~R Trackside application with no or reduced train detection (formerly ETCS level 3) relies on on-board information to determine track occupation and requires that the on-board is able to fulfil the requirements for train integrity; information and safe consist length information as specified in index 27~~confirm the train integrity~~;

(2) ~~An ETCS Level 1 Trackside application with infill requires that the on-board is equipped with the corresponding in-fill data transmission (Euroloop or radio) if the release speed is set to zero for safety reasons (e.g. protection of danger points).~~Intentionally deleted

(3) When ETCS needs data transmission by radio, the data radio communication part as specified in this NTSN is required.

~~An on-board subsystem, which incorporates a KER STM, may make it necessary to implement the K-interface.~~

(4) When ETCS trackside needs a specific ETCS system version according to the implementation requirements listed in 7.4.2.6.2

7.2.6.2. ATO

(1) ATO Trackside: the trackside implementation of ATO is an optional function for interoperability which does technically not prevent the use of that infrastructure by a train that is not equipped with ATO on-board. Where ATO GoA1/2 functionality is implemented over ETCS trackside, the specifications of ATO in Appendix A of this NTSN shall be applied.

(2) ATO on-board: the fitting of ATO in a CCS on-board Subsystem is mandatory when implementing ETCS for the first time into the vehicle and the vehicle is also intended for use on a line including at least one section equipped with ATO where the IM has notified in RINF the services requiring mandatory ATO on-board implementation.

7.2.6.3. RMR

GSM-R and/or FRMCS shall be implemented according to the implementation requirements listed in section 7.3.2.

7.2.7. Specifications maintenance (error corrections)

7.2.7.1. Responsibilities during the Change Control Management process

During the Change Control Management (CCM) process of the ERTMS specifications and before the entry into force of the release, on-board manufacturers and infrastructure managers with the necessary input from the trackside manufacturers shall describe their products and system implementations with respect to the situation identified in each Change Request classified as an error proposed to be included in the NTSN release by answering to the ERA questionnaires (which include the resolutions of the errors and the mitigation measures).

The answers on these ERA questionnaires shall be provided within 3 months after publication of the questionnaires, in particular the Infrastructure Manager shall evaluate within the ERA questionnaire if:

(1) the impact of the error is acceptable, as regards safety and operation for network operation;

(2) the impact of the error is acceptable for interoperability, this either means that:

(a) the non-implementation of the trackside error correction would allow any ERTMS vehicle complying with the latest NTSN release to provide normal service in the network.

or

(b) the non-implementation of the on-board error correction would allow that ERTMS vehicle to provide normal service in the network.

The Agency shall publish the results of the ERA questionnaires in a transparent manner. This will allow the fulfilment of implementation requirements in sections 7.2.7.2 and 7.2.7.3.

7.2.7.2. On-board and Trackside Manufacturer responsibilities

After the publication of the error corrections in a release, manufacturers shall update their existing Interoperability Constituents accordingly and are responsible

for maintaining the Interoperability Constituents as requested in section 4.2.20.1 (including maintaining the associated EC Certificates) and according to the transition requirements in Appendix B (table B3). These updated Interoperability Constituents (including the associated EC Certificates) shall be made available for integration in the concerned subsystems according to Appendix B (Table B3). This will allow to fulfil the subsystem requirements in section 4.2.20.2 and implementation requirements in 7.2.7.3.

7.2.7.3. Infrastructure Manager and Railway Undertaking responsibilities

Note: In case the impact of one of the errors is identified as unacceptable on the Infrastructure Manager's network, the Infrastructure Manager, based on the information previously provided by on-board manufacturers, shall identify the ERTMS vehicles authorised to run on their network or being authorised to run on their network that have not implemented a solution which mitigates the interoperability or safety problem caused by the specification error.

The Infrastructure Manager shall notify the Agency of the error corrections which will be implemented in the trackside and which error corrections are applicable (i.e. the error identified as unacceptable) for the on-board. This notification shall be sent to the Agency and the concerned NSA at the latest 6 months after the entry into force of the NTSN. This notification shall include -if applicable- an update of the existing ETCS and radio system compatibility checks type (ESC/RSC) (i.e. this shall not lead to the creation of a new ESC/RSC type). This notification might impact ERTMS on-board or ERTMS trackside subsystems.

For impacted ERTMS on-board subsystems: Railway Undertakings with support of the on-board manufacturers shall implement the notified (applicable) on-board error corrections in the CCS on-board subsystems in accordance with Appendix B (Table B1) of this CCS NTSN.

For impacted ERTMS trackside subsystems: Infrastructure Managers with support of the trackside manufacturers shall implement the notified (applicable) trackside error corrections in the CCS trackside subsystems on their networks in accordance with Appendix B (Table B2) of this CCS NTSN.

7.3. ~~GSM-R~~RMR SPECIFIC IMPLEMENTATION RULES

7.3.1. Trackside installations

7.3.1.1 The fitting of GSM-R or FRMCS is mandatory when:

(1) installing for the first time the radio communication part of a Control-Command and Signalling Trackside Subsystem; When FRMCS is the first class A radio system on a line, conditions in 7.3.1.3 shall be respected.

(2) upgrading the radio communication part of a Control-Command and Signalling Trackside Subsystem already in service in such a way that it changes the functions or the performance of the subsystem. This does not include the modifications deemed necessary to mitigate safety-related defects in the legacy installation;

(3) Implementation of ETCS level ~~2, level 3~~R needs data radio communication~~or~~

(4) Implementation of ETCS level 1 with radio in-fill needs data radio communication.

7.3.1.2 GSM-R may only be taken out of operation when the following conditions are fulfilled:

— Condition 1: minimum 7 years after publication of the FRMCS on-board specifications in Appendix A;

and

— Condition 2: minimum notification period of 5 years where GSM-R services shall be stopped. This notification shall be done within the RINF and these changes in RINF shall be listed in the Network Statement as part of article 27 of the Access Directive 2012/34/EU;

and

— Condition 3: FRMCS is in service;

A shorter period is allowed if this is agreed between the IM and the RU's who run services or intent to run services (at the time of establishing the agreement) on these lines. This agreement on shorter notification period shall be notified to the European Commission.

7.3.1.3 The trackside implementation of FRMCS only, without pre-existing GSM-R, is allowed if the following conditions are fulfilled:

— Condition 1: minimum 7 years after publication of the FRMCS specifications in Appendix A;

and

— Condition 2: minimum notification period of 5 years where FRMCS services shall be in operation. This notification shall be done within the RINF and these changes in RINF shall be listed in the Network Statement as part of article 27 of the Access Directive 2012/34/EU.

A shorter period is allowed if this is agreed between the IM and the RU's who run or intent to run services (at the time of establishing the agreement) on these lines. This agreement shall be notified to the European Commission.

7.3.2. On-board installations

7.3.2.1 The fitting of GSM-R in rolling stock intended for use on a line including at least one section equipped with GSM-R and not equipped with FRMCS (even if superimposed to a legacy radio communication system), is mandatory when:

(1) installing for the first time the voice radio communication part of a Control-Command and Signalling On-board Subsystem;

(2) upgrading the voice radio communication part of a Control-Command and Signalling On-board Subsystem already on the market~~in service~~ (Class B) in such a way that it changes the functions or the performance of the subsystem. This does not apply to modifications deemed necessary to mitigate safety-related defects in the legacy installation;

(3) Implementation of ETCS level ~~2, level 3~~R or level 1 with radio in~~-~~fill need data radio communication.

7.3.2.2 The fitting of FRMCS in rolling stock is mandatory for vehicles intended to operate on a line where the IM has notified the FRMCS trackside implementation:

(1) installing for the first time the voice radio communication part of a Control-Command and Signalling On-board Subsystem;

(2) upgrading the voice radio communication part of a Control-Command and Signalling On-board Subsystem already on the market (Class B or GSM-R) in such a way that it changes the functions or the performance of the subsystem. This does not apply to modifications deemed necessary to mitigate safety-related defects in the legacy installation;

(3) Implementation of ETCS level R need data radio communication.

7.4. ETCS SPECIFIC IMPLEMENTATION RULES

7.4.1. Trackside installations

Trackside ~~projects~~ shall not install and operate the Euroloop and radio infill data transmission, except on ~~already existing installations or planned projects that use those data transmission~~ projects which are listed as specific case in section 7.6.

7.4.1.1. High-speed network

It is mandatory to fit ETCS trackside when:

1. installing for the first time the train protection part of a Control-Command and Signalling Trackside Subsystem (with or without a Class B system); or

2. upgrading the existing train protection part of a Control-Command and Signalling Trackside Subsystem, where this would change the functions, performance and/or interoperability-relevant interfaces (air gaps) of the existing legacy system. This does not apply to modifications deemed necessary to mitigate safety-related defects in the legacy installation.

7.4.1.2. Set of specifications on previous versions of the CCS NTSN.

Networks that implement and operate ETCS lines according to former set #1 as in Appendix A Table A2.1 of previous versions of this TSI or NTSN before the publication date of this NTSN and with more than 1.000 km or 25% in operation or under construction in the Core Network Corridors before 31 December 2020, can exceptionally continue to use those ETCS specifications for the placing into service for 7 years after publication of this NTSN for new projects and for 10 years after publication of this NTSN for upgraded or renewal projects in the network under the following conditions:

(1) Notification of the intention to deploy former set of specifications #1 and the intended scope and plan is sent to the European Commission 2 years after the publication date of this NTSN.

(2) Infrastructure Manager shall ensure that those lines will include the implementation of all the relevant error correction measures enabling an ETCS On-board compliant with this NTSN (including on-board error correction implementation) to provide a normal service.

(3) The Infrastructure Manager shall implement the relevant error corrections and the harmonised or equivalent mitigation measures in Agency Opinions or published releases of the specifications, according to section 7.2.7.

(4) In addition, any modification performed in infrastructure compliant with former set of specifications #1 shall ensure that the previous conditions are also preserved.

7.4.1.3. ETCS System Version implementation rules

The trackside implementation can select which ETCS-functions shall be implemented from the set of specifications in Appendix A. The specifications in

Appendix A contain functions from the following system versions: 1.0, 1.1, 2.0, 2.1, 2.2 and 3.0. In accordance with the process defined in 7.4.4, the IM shall notify which lines will make use of which system version. This notification shall be done within the RINF and these changes in RINF shall be listed in the Network Statement as part of article 27 of the Access Directive 2012/34/EU.

The trackside implementation of functions requiring ETCS system version 3.0 is allowed if the following conditions are fulfilled:

— Condition 1: minimum 7 years after entry into force of this NTSN before the ETCS system version 3.0 is a mandatory on-board requirement for the vehicles operating on its network;

and

— Condition 2: minimum notification period of 5 years of the lines where ETCS system version 3.0 is a mandatory on-board requirement for the vehicles operating on its network. This notification shall be done within the RINF and these changes in RINF shall be listed in the Network Statement as part of article 27 of the Access Directive 2012/34/EU.

A shorter period is allowed if this is agreed between the IM and the RU's who run or intent to run (at the time of establishing the agreement) services on these lines. This agreement shall be notified to the European Commission.

7.4.2. On-board installations

7.4.2.1. Newly built vehicles

1. In order to be placed in service, newly built vehicles, including vehicles authorised in conformity to a type shall be equipped and ready for operation with ETCS in accordance with ~~Annex A of~~ this NTSN ~~and shall comply with set of specifications #2 or #3 referred to in Table A 2 of Annex A~~[14].

~~2. The requirement to be equipped with ETCS does not apply to:~~

~~(1) new mobile railway infrastructure construction and maintenance equipment;~~

~~(2) new shunting locomotives;~~

~~(3) other new vehicles not intended for operating on high-speed lines;~~

~~14~~

~~(a) if they are intended exclusively for national service~~

~~(b) if they are intended for cross-border service, i.e., service until the first station in the neighbouring country or to the first station where there are connections further in the neighbouring country.~~

~~3. All vehicle type authorisations granted based on conformity to set of specifications #1 referred to in Table A 2 of Annex A of this NTSN shall not remain valid for authorising new vehicles in conformity to those vehicle types (without prejudice to the application of 7.4.2.3). All vehicles already authorised according to those vehicle types are not affected.~~

7.4.2.2. ~~Upgrading and renewal of e~~Existing vehicles

When authorising existing vehicles in accordance with Article 21 of Directive (EU) 2016/797, they shall be equipped and ready for operation with ETCS in accordance with this NTSN if installing any new train protection system (from the list of CCS Class B systems) in a control-command and signalling on-board subsystem~~It is mandatory to fit ETCS on-board to existing vehicles if installing any new train protection part of a control-command and signalling on-board subsystem on existing high-speed vehicles~~.

It is mandatory to fulfil clause 7.4.2.6.1 and 7.4.2.6.2 if upgrading the existing ETCS on-board part within a vehicle.

7.4.2.3. ~~Application of the NTSN requirements for new vehicles during a transition phase~~Intentionally deleted

~~1. Some projects or contracts, which started before the date of application of this NTSN, may apply for an authorisation to place in servicea new vehicle equipped with ETCS complying with specification #1 referred to in Table A 2.1 of Annex A of this NTSN, and which do not fully comply with Section 7.4.2.1 of this NTSN. A transition phase is defined for such vehicles.~~

~~2. This transition phase applies to new vehicles authorised in conformity to a vehicle type authorised before 1 January 2019 on the basis of conformity to set of specifications #1 referred to in Table A 2 of Annex A of this NTSN up to December 31 2020.~~

~~3. The transition phase is:~~

~~(a) up to December 31 2020: In order to be placed in service, those new vehicles referred under 2 shall be equipped with ETCS in accordance with set of specifications #1, #2 or #3 referred to in Table A 2 of Annex A of this NTSN.~~

~~(b) If set of specification #1 is used, a condition for use shall be included in their authorisation to place in service requiring compliance with set specifications #2 or #3 within a period of time not exceeding 1 July 2023.~~

7.4.2.4. This provision has been left intentionally blank

7.4.2.5. Intentionally deleted.

7.4.2.6. ETCS System Version implementation rules

7.4.2.6.1 The ETCS on-board Interoperability Constituent placed on the market shall implement one of the following envelopes:

(1) envelope of legally operated ETCS system versions from 1.0 to 2.0 inclusive;

(2) envelope of legally operated ETCS system versions from 1.0 to 2.1 inclusive;

(3) envelope of legally operated ETCS system versions from 1.0 to 2.2 inclusive;

(4) envelope of legally operated ETCS system versions from 1.0 to 3.0 inclusive;

7.4.2.6.2. A vehicle type shall integrate the appropriate ETCS on-board Interoperability Constituent with the required envelope of legally operated ETCS system versions as defined in 7.4.2.6.1 . The required envelope of legally operated ETCS system versions shall be defined based on the notified system versions in RINF for the intended area of use of the vehicle type. The vehicle type shall implement the ETCS system version which complies as a minimum to the notified ETCS system version which become applicable in the next 5 years according to the timeframe in Appendix B, when:

(1) installing for the first time the ETCS part of a Control-Command and Signalling On-board Subsystem;

or

(2) upgrading the ETCS part of a Control-Command and Signalling On-board Subsystem already on the market in such a way that it changes the functions of the subsystem. This does not apply to modifications deemed necessary to implement error corrections as stated in 7.2.7;

7.4.3. This provision has been left intentionally blank

7.4.4. National Implementation Plans

~~As referred to in Article 6, the UK has produced an implementation plan~~Member States shall develop a national plan for the implementation of this NTSN in coordination with the Infrastructure Managers and Railway Undertakings concerned, considering the coherence of the entire rail system of the European Union taking into account the economic viability of the rail system. Member States shall consult the neighbouring countries for a coherent planning of the railway cross-border sections. This plan shall include all lines in scope of the NTSN including TEN-T lines and the nodes and last mile connections.

Member States shall coordinate the process between all stakeholders concerned to set up the technical and indicative financial migration strategy required for the development of this national implementation plan. Member States shall report on the needs expressed by the railway undertakings and the infrastructure managers for the CCS subsystem and report on the implementation agreements made for the expressed needs.

In the case where there is an agreement, this shall be notified to the European Commission. This agreement shall include the signatures of the stakeholders concerned.

In the case where there is no agreement possible between the stakeholders concerned, Member States shall decide on the migration strategy describing the expected overall impact for the railway system (cost-benefit analysis) and how the impact is balanced in a non-discriminatory way between the stakeholders concerned. In the case where such decision is not in line with the transition conditions stated in this CCS NTSN, article 7 of the Interoperability Directive 2016/797 shall be applied. The output of this coordination process shall be the definition of the technical and the financial migration strategy being implemented.

The national implementation plan shall provide information on all new, renewed and upgraded lines ensuring that notifications to RUs are provided at least 5 years in advance in case new mandatory on-board requirements will be required for operating on the network. This shall be notified within the RINF and these changes in RINF shall be listed in the Network Statement as part of article 27 of the Access Directive 2012/34/EU.

The national implementation plans shall cover a period of at least 20 years and shall be updated regularly, at least every five years.

Member States shall notify their national implementation plans to the Commission no later than 12 months after entry into force of the NTSN.

The Commission shall publish the national implementation plans on its website and inform Member States about them through the Committee referred to in Article 51(1) of Directive (EU) 2016/797.

The Commission shall draw up an analysis of the national implementation plans that shall encompass among others comparison of the plans and identification of needs for additional coordination measures.

The national implementation plan shall at least include the following information :

(1) Context description of the current status, including:

(a) Facts and figures on installed train protection, ATO, radio and train protection systems, including details on the benefits they provide for capacity, safety, reliability and performance aspects and including the legal references to the CCS on-board requirements;

(b) Class B systems and their remaining economic lifetime including a description of the measures taken to ensure open market conditions for its legacy Class B train protection and radio systems as set out in paragraph 7.2.3.

(2) Definition of the migration strategy (future status)

The technical migration strategy shall include information and planning of:

(1) ETCS Part: ETCS Level and System version required per line and per network;

(2) Radio Part: information on radio systems (e.g. radio circuit switching or packet switching, radio infill options for ETCS);

(3) ATO Part: information on the need for deployment of ATO;

(4) Train Detection Part: information on the migration to the NTSN compliant train detection system;

(5) Specific Cases: information on the phasing out of specific cases

Planning (network maps) providing an overview of changes in the next 20 years related to:

(1) Train Protection Part:

(a) Network map with dates when ETCS is put into service;

(b) If applicable, network map with dates when Class B operation is not allowed anymore; and if not similar, network map with dates where Class B system is taken out of service;

(2) Radio part:

(a) Network map with dates when GSM-R is put into service;

(b) If applicable, network map with dates up to when Class B Radio operation is not allowed anymore; and if not similar, network map with dates where Class B Radio system is taken out of service;

(c) Network map with dates when FRMCS is put into service;

(d) If applicable, network map with dates up when GSM-R operation is not allowed anymore; and if not similar, network map with dates where GSM-R system is taken out of service;

(3) ATO part:

(a) If applicable, network map with dates when ATO is put into service;

(4) Train Detection Part:

(a) Network map with dates when NTSN compliant train detection system is put into service.

7.4a ETCS and radio system compatibility checks implementation rules

Existing vehicles and their corresponding vehicle type equipped with ETCS and RMR shall be deemed compatible with the ETCS and radio system compatibility types of the networks on which they are operating with ETCS and RMR by 16 January 2020 without any further checks, maintaining the existing restrictions or conditions for use.

Any subsequent modification of the vehicle~~-~~, their corresponding vehicle type or the infrastructure regarding the technical or route compatibility shall be managed according to the requirements specified for ETCS and Radio system compatibility in this NTSN.

7.5. TRAIN DETECTION SYSTEMS SPECIFIC IMPLEMENTATION RULES

In the context of this NTSN, train detection system means the equipment installed trackside, which detects the presence or absence of vehicles either on an entire line of route or on a local ~~point~~ section of it.

Trackside systems (e.g. interlocking or level crossing control systems) which use information from detection equipment are not considered parts of the train detection system.

This NTSN specifies the requirements for the interface with rolling stock only to the extent necessary to ensure compatibility between NTSN-compliant rolling stock and the Control-command and Signalling Trackside.

Implementing a train detection system that is compliant with the requirements of this NTSN can be done independently of the installation of ETCS or GSM-R.

The requirements of this NTSN relating to train detection systems shall be respected when:

(1) upgrading the train detection system;

(2) renewing the train detection system, provided that respecting the requirements of this NTSN does not imply unwanted modifications or upgrades of other trackside or on-board systems;

(3) renewing the train detection system, where this is required by the upgrade or renewal of trackside systems that use information from the train detection system;

(4) removing Class B train protection systems where the train detection and train protection systems are integrated.

In the migration phase care shall be taken to ensure that installing a NTSN-compliant train detection system has a minimal negative impact on the existing non-NTSN-compliant rolling stock.

To achieve this, it is recommended that the Infrastructure Manager selects a NTSN-compliant train detection system that, at the same time, is compatible with the non-NTSN-compliant rolling stock already operating on that infrastructure.

7.6. UK SPECIFIC CASES

7.6.1. Introduction

The following special provisions are permitted in the UK specific cases below.

These UK specific cases belong to two categories: the provisions apply either permanently (case 'P') or temporarily, to be removed before 2040 (case 'T').

~~In this NTSN, temporary case 'T3' is defined as temporary cases which will still exist after 2020.~~

The UK specific cases set out in ~~points~~ section below shall be read in conjunction with the relevant ~~points~~ sections of Chapter 4 and/or specifications referenced there.

The UK specific cases replace the corresponding requirements set out in Chapter 4.

Where the requirements set out in the relevant ~~point~~ section of Chapter 4 are not subject to a UK specific case, those requirements have not been duplicated in points below and continue to apply unmodified.

The assessment of the specific cases related to basic parameters 4.2.10 and 4.2.11 where indicates in the Notes column as "applicable to vehicles" shall be assessed by Rolling Stock subsystem Notified Body

All specific cases and their relevant dates shall be re-examined in the course of future revisions of the NTSN with a view to limiting their technical and geographical scope based on an assessment of their impact on safety, interoperability, cross border services, TEN-T corridors, and the practical and economic impacts of retaining or eliminating them. Special account shall be given to availability of EU funding.

Specific cases shall be limited to the route or network where they are strictly necessary and taken account of through route compatibility procedures.

7.6.2. List of UK specific cases

7.6.2.1. This provision has been left intentionally blank

7.6.2.2. UK Specific Cases (Great Britain)

UK Specific case	Category	Notes
4.2.10 Trackside Train Detection Systems Index 77, point 3.1.2.3: The distance between first and last axle L - (b1 + b2) (Fig.1) is at least 15 000 mm	T~~3~~	Applicable on High Speed Line 1 This Specific Case is linked with the use of TVM
4.2.10 — Trackside Train Detection Systems Index 77, point 3.1.4.1: In addition to the requirements in point 3.1.4.1, sanding for traction purposes on multiple units:	T~~3~~	

UK Specific case	Category	Notes
(a) is not permitted ahead of the leading axle below 40 km/h; and (b) is only permitted where it can be demonstrated that at least a further six axles of the multiple unit are beyond the laying position		
4.2.12 ETCS DMI (Driver-Machine Interface) Index 6: It is permissible to use an alphanumeric keyboard to enter the train running number if support for alphanumeric train running numbers is required by the national technical rule.	T~~3~~	This UK specific case is needed when set of specifications 2 or 3 (see Table A2 in ~~Annex~~Appendix A) is applied, while this is an open point for set of specifications 1. There is no impact on interoperability
4.2.12 ETCS DMI (Driver-Machine Interface) Index 6: It is permissible for the ETCS DMI to display dynamic train speed information in miles per hour (and indicate 'mph') when operating on parts of the GB mainline network.	T~~3~~	This UK specific case is needed when set of specifications 2 or 3 (see Table A2 in ~~Annex~~Appendix A) is applied, while this is an open point for set of specifications 1. There is no impact on interoperability

Appendix A References

For each reference made in the basic parameters (Chapter 4 of this NTSN) the following table indicates the corresponding mandatory specifications, via the Index in Table A 2~~ (Table A 2.1, Table A 2.2, Table A 2.3)~~.

Table A 1

Reference in Chapter 4	Index number (see Table A 2)
4.1	
4.1 a	Intentionally deleted
4.1 b	Intentionally deleted
4.1 c	3, 102
4.2.1	
4.2.1 a	27~~, 78~~
4.2.2	
4.2.2 a	14
4.2.2 b	~~1,~~ 4, 13~~, 15~~, 60
4.2.2 c	31, 37b, c, d
4.2.2 d	~~18,~~ 20
4.2.2 e	6
4.2.2 f	7, 81, 82
4.2.2 g	Intentionally deleted
4.2.2 h	87
4.2.3	
4.2.3 a	14
4.2.3 b	~~1,~~ 4, 13~~, 15~~, 60
4.2.3 c	Intentionally deleted
4.2.3 d	Intentionally deleted~~18, 21~~
4.2.4	
4.2.4 a	64, 65
4.2.4 b	66

Reference in Chapter 4	Index number (see Table A 2)
4.2.4 c	67
4.2.4 d	68
4.2.4 e	73, 74
4.2.4 f	32, 33
4.2.4 g	48
4.2.4 h	69, 70
4.2.4 j	71, 72
4.2.4 k	75, 76
4.2.4 l	93, 94, 95, 99
4.2.4 m	93, 94, 95
4.2.4 n	96
4.2.4 o	97
4.2.5	
4.2.5 a	64, 65
4.2.5 b	10a, 10b, 10d, 34, 39, 40
4.2.5 c	19, 20
4.2.5 d	9, 43
4.2.5 e	16, 50
4.2.5 f	93, 94, 95
4.2.5 g	85, 86
4.2.5 h	86, 10a, ~~10c,~~ 10d, 33, 34 ~~[+ additional specifications TBD]~~
4.2.5 i	86, 10a, ~~10b,~~ 10c, 10d, ~~39, 40,~~ 92, 94, 95
4.2.5 j	~~86,~~ 10a, 10b, 10c, 10d, 92, 94, 95 ~~[+ additional specifications TBD]~~
4.2.6	
4.2.6 a	8, 25, 26, 36 c, 49, 52
4.2.6 b	29, 45
4.2.6 c	46

Reference in Chapter 4	Index number (see Table A 2)
4.2.6 d	10a,10b, 10d, 34
4.2.6 e	10a, 20
4.2.6 f	Intentionally deleted
4.2.6 g	92, ~~95,~~ 10a, 10b, 10c, 10d
4.2.6 h	87, 89
4.2.6 i	90
4.2.6 j	10a, 10d, 34
4.2.6 k	92, 10a, 10c, 10d
4.2.6 l	92, 99, 94, 95
4.2.6 m	92
4.2.7	
4.2.7 a	12
4.2.7 b	~~62,~~ 63
4.2.7 c	34, 10a, 10b, 10d
4.2.7 d	9
4.2.7 e	16
4.2.7 f	92, 10a, 10b, 10c, 10d
4.2.7 h	92, 10a, 10c, 10d
4.2.8	
4.2.8 a	10d, 11, 79, 83
4.2.9	
4.2.9 a	23
4.2.10	
4.2.10 a	77 (~~point~~ section 3.1)
4.2.11	
4.2.11 a	77 (~~point~~ section 3.2)
4.2.12	
4.2.12 a	6~~, 51~~

Reference in Chapter 4	Index number (see Table A 2)
4.2.13	
4.2.13 a	32, 33~~, 51, 80~~
4.2.13 b	93, 94
4.2.14	
4.2.14 a	5
4.2.15	
4.2.15 a	38
4.2.15 b	101
4.2.17	
4.2.17 a	103
4.2.18	
4.2.18 a	84
4.2.18 b	98
4.2.18 c	88
4.2.18 d	87
4.2.19	
4.2.19 a	84
4.2.19 b	98

Specifications

~~One of the three tables in Table A 2 (Table A 2.1, Table A 2.2, Table A 2.3) of this Annex shall be applied for the trackside subsystem. For the on-board subsystem either Table A 2.2 or Table A 2.3 shall be applied, after the transition period defined in 7.4.2.3.~~

When a document listed in Table A 2 incorporates, by copying or by reference to, a clearly identified point of another document, this point, and only this, shall be considered a part of the document listed in Table A 2.

For the purposes of this NTSN, when a document listed in Table A 2 makes a '~~"~~mandatory~~"~~' or '~~"~~normative'~~"~~ reference to a document not listed in Table A 2, the referenced document shall always be understood as an acceptable means of compliance with basic parameters (that can be used for certification of

Interoperability Constituents and Subsystems and not requiring future revisions of the NTSN) and not as a mandatory specification.

Note: specifications indicated as '~~"~~Reserved'~~"~~ in Table A 2 are also listed as open points in Appendix G when there is a need for notification of national ~~technical~~ rules to close the corresponding open points. Reserved documents not listed as open points are intended as improvements to the system.

Table A 2~~.1~~

List of mandatory specifications

Index No	~~Set of specifications # 1 (only for trackside Subsystems. For on-board subsystems not to be applied after the transition period defined in 7.4.2.3)~~ **(ETCS Baseline 4 ~~Release 1~~; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1~~2 and GSM-R Baseline 1~~)**			
	Reference	**Name of Specification**	**Version**	**Notes**
1	~~ERA/ERTMS/003204~~ Intentionally deleted	~~ERTMS/ETCS Functional requirement specification~~	~~5.0~~	
2	Intentionally deleted			
3	SUBSET-023	Glossary of Terms and Abbreviations	4.0.0~~2.0.0~~	
4	SUBSET-026	System Requirements Specification	4.0.0~~2.3.0~~	
5	SUBSET-027	F~~FF~~IS Juridical recording~~er~~ ~~downloading tool~~	4.0.0~~2.3.0~~	~~Note 1~~
6	~~SUBSET-033~~ERA_ERTMS_015560	~~FIS for man-~~ETCS Driver machine interface	4.0.0~~2.0.0~~	
7	SUBSET-034	Train Interface FIS ~~for the train interface~~	4.0.0~~2.0.0~~	
8	SUBSET-035	Specific Transmission Module FFFIS	3.2.0~~2.1.1~~	
9	SUBSET-036	FFFIS for Eurobalise	4.0.0~~2.4.1~~	
10a	SUBSET-037-1	EuroRadio FIS – Part 1 [Communication layer and coordination function]	4.0.0~~2.3.0~~	
10b	SUBSET-037-2	EuroRadio FIS – Part 2		

Index No	~~Set of specifications # 1 (only for trackside Subsystems. For on-board subsystems not to be applied after the transition period defined in 7.4.2.3)~~ **(ETCS Baseline 4 ~~Release 1~~; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1~~2 and GSM-R Baseline 1~~)**			
	Reference	**Name of Specification**	**Version**	**Notes**
		[Safety layer]		
10c	SUBSET-037-3	EuroRadio FIS – Part 3 [FRMCS interface]	4.0.0	
10d	SUBSET-146	ERTMS/ETCS End-to-End Security	4.0.0	
11	SUBSET-038	Offline key management FIS	4.0.0~~2.3.0~~	
12	SUBSET-039	FIS for the RBC/RBC handover	4.0.0~~2.3.0~~	
13	SUBSET-040	Dimensioning and Engineering rules	4.0.0~~2.3.0~~	
14	SUBSET-041	Performance Requirements for Interoperability	4.0.0~~2.1.0~~	
15	Intentionally deleted~~SUBSET-108~~	~~Interoperability related consolidation on TSI Annex A documents~~	~~1.2.0~~	
16	SUBSET-044	FFFIS for Euroloop	4.0.0~~2.3.0~~	
17	Intentionally deleted		~~-~~	
18	Intentionally deleted~~SUBSET-046~~	~~Radio infill FFFS~~	~~2.0.0~~	
19	SUBSET-047	Trackside-Trainborne FIS for Radio infill	4.0.0~~2.0.0~~	
20	SUBSET-048	Trainborne FFFIS for Radio infill	4.0.0~~2.0.0~~	
21	Intentionally deleted~~SUBSET-049~~	~~Radio infill FIS with LEU/interlocking~~	~~2.0.0~~	
22	Intentionally deleted		~~-~~	
23	SUBSET-054	Responsibilities and rules for the assignment of values to ETCS variables	~~2.1.0~~4.0.0	

Index No	~~Set of specifications # 1 (only for trackside Subsystems. For on-board subsystems not to be applied after the transition period defined in 7.4.2.3)~~ **(ETCS Baseline 4 ~~Release 1~~; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1~~2 and GSM-R Baseline 1~~)**			
	Reference	**Name of Specification**	**Version**	**Notes**
24	Intentionally deleted		~~-~~	
25	SUBSET-056	STM FFFIS Safe time layer	~~2.2.0~~4.0.0	
26	SUBSET-057	STM FFFIS Safe link layer	~~2.2.0~~4.0.0	
27	SUBSET-091	Safety Requirements for the Technical Interoperability of ETCS ~~in Levels 1 and 2~~	~~2.5.0~~4.0.0	
28	Intentionally deleted			
29	SUBSET-102	Test specification for interface “K”	~~1.0.0~~2.0.0	
30	Intentionally deleted			
31	SUBSET-094	Functional requirements for an on-board reference test facility	~~2.0.2~~ Version Published in ERA Website	
32	EIRENE FRS	GSM-R Functional requirements specification	~~8.0.0~~8.1.0	Note 10
33	EIRENE SRS	GSM-R System requirements specification	~~16.0.0~~ 16.1.0	Note 10
34	A11T6001	(MORANE) Radio Transmission FFFIS for EuroRadio	~~13.0.0~~ 14.0.0	
35	Intentionally deleted			
36 a	Intentionally deleted			
36 b	Intentionally deleted			
36 c	SUBSET-074-2	FFFIS STM Test cases document	~~1.0.0~~3.1.0	
37 a	Intentionally deleted			

Index No	~~Set of specifications # 1 (only for trackside Subsystems. For on-board subsystems not to be applied after the transition period defined in 7.4.2.3)~~ **(ETCS Baseline 4 ~~Release 1~~; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1~~2 and GSM-R Baseline 1~~)**			
	Reference	**Name of Specification**	**Version**	**Notes**
37 b	SUBSET-076-5-2	Test cases related to features	~~2.3.3~~ Version published in ERA website	
37 c	SUBSET-076-6-3	Test sequences	~~2.3.3~~ Version published in ERA website	
37 d	SUBSET-076-7	Scope of the test specifications	~~1.0.2~~ Version published in ERA website	
37 e	Intentionally deleted			
38	~~06E068~~EN 16494	Railway applications. Requirements for ERTMS Trackside Boards~~ETCS Marker board definition~~	~~2.0~~2015	
~~39~~	~~SUBSET-092-1~~	~~ERTMS EuroRadio Conformance Requirements~~	~~2.3.0~~	~~-~~
~~40~~	~~SUBSET-092-2~~	~~ERTMS EuroRadio test cases safety layer~~	~~2.3.0~~	~~-~~
~~41~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~42~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~43~~	~~SUBSET-085~~	~~Test specification for Eurobalise FFFIS~~	~~2.2.2~~	~~-~~
~~44~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~45~~	~~SUBSET-101~~	~~Interface "K" Specification~~	~~1.0.0~~	~~-~~

Index No	~~Set of specifications # 1 (only for trackside Subsystems. For on-board subsystems not to be applied after the transition period defined in 7.4.2.3)~~ **(ETCS Baseline 4 ~~Release 1~~; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1~~~~2 and GSM-R Baseline 1~~)**			
	Reference	**Name of Specification**	**Version**	**Notes**
~~46~~	~~SUBSET-100~~	~~Interface "G" Specification~~	~~1.0.1~~	~~-~~
~~47~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~48~~	~~Reserved~~	~~Test specification for mobile equipment GSM-R~~	~~-~~	~~Note 4~~
~~49~~	~~SUBSET-059~~	~~Performance requirements for STM~~	~~2.1.1~~	~~-~~
~~50~~	~~SUBSET-103~~	~~Test specification for Euroloop~~	~~1.0.0~~	~~-~~
~~51~~	~~Reserved~~	~~Ergonomic aspects of the DMI~~	~~-~~	~~-~~
~~52~~	~~SUBSET-058~~	~~FFFIS STM Application layer~~	~~2.1.1~~	~~-~~
~~53~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~54~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~55~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~56~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~57~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~58~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~59~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~60~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~61~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~62~~	~~Reserved~~	~~RBC-RBC Test specification for safe communication interface~~	~~-~~	~~-~~
~~63~~	~~SUBSET-098~~	~~RBC-RBC Safe Communication Interface~~	~~1.0.0~~	~~-~~
~~64~~	~~EN 301 515~~	~~Global System for Mobile Communication (GSM);~~	~~2.3.0~~	~~Note 2~~

Index No	~~Set of specifications # 1 (only for trackside Subsystems. For on-board subsystems not to be applied after the transition period defined in 7.4.2.3)~~ **(ETCS Baseline 4 ~~Release 1~~; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1~~~~2 and GSM-R Baseline 1~~)**			
	Reference	**Name of Specification**	**Version**	**Notes**
		~~Requirements for GSM operation on railways~~		
~~65~~	~~TS 102 281~~	~~Detailed requirements for GSM operation on railways~~	~~3.0.0~~	~~Note 3~~
~~66~~	~~TS 103 169~~	~~ASCI Options for Interoperability~~	~~1.1.1~~	~~-~~
~~67~~	~~(MORANE) P 38 T 9001~~	~~FFFIS for GSM-R SIM Cards~~	~~5.0~~	~~Note 10~~
~~68~~	~~ETSI TS 102 610~~	~~Railway Telecommunication; GSM; Usage of the UUIE for GSM operation on railways~~	~~1.3.0~~	~~-~~
~~69~~	~~(MORANE) F 10 T 6002~~	~~FFFS for Confirmation of High Priority Calls~~	~~5.0~~	~~-~~
~~70~~	~~(MORANE) F 12 T 6002~~	~~FIS for Confirmation of High Priority Calls~~	~~5.0~~	~~-~~
~~71~~	~~(MORANE) E 10 T 6001~~	~~FFFS for Functional Addressing~~	~~4.1~~	~~-~~
~~72~~	~~(MORANE) E 12 T 6001~~	~~FIS for Functional Addressing~~	~~5.1~~	~~-~~
~~73~~	~~(MORANE) F 10 T6001~~	~~FFFS for Location Dependent Addressing~~	~~4~~	~~-~~
~~74~~	~~(MORANE) F 12 T6001~~	~~FIS for Location Dependent Addressing~~	~~3~~	~~-~~
~~75~~	~~(MORANE) F 10 T 6003~~	~~FFFS for Presentation of Functional Numbers to Called and Calling Parties~~	~~4~~	~~-~~
~~76~~	~~(MORANE) F 12 T 6003~~	~~FIS for Presentation of Functional Numbers to Called and Calling Parties~~	~~4~~	~~-~~

Index No	~~Set of specifications # 1 (only for trackside Subsystems. For on-board subsystems not to be applied after the transition period defined in 7.4.2.3)~~ **(ETCS Baseline 4 ~~Release 1~~; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1~~~~2 and GSM-R Baseline 1~~)**			
	Reference	**Name of Specification**	**Version**	**Notes**
~~77~~	~~ERA/ERTMS/033281~~	~~Interfaces between CCS trackside and other subsystems~~	~~4.0~~	~~Note 7~~
~~78~~	~~Reserved~~	~~Safety requirements for ETCS DMI functions~~	~~-~~	~~-~~
~~79~~	~~Not applicable~~	~~Not applicable~~	~~-~~	~~-~~
~~80~~	~~Not applicable~~	~~Not applicable~~	~~-~~	~~-~~
~~81~~	~~Not applicable~~	~~Not applicable~~	~~-~~	~~-~~
~~82~~	~~Not applicable~~	~~Not applicable~~	~~-~~	~~-~~

~~Table A 2.2~~

~~List of mandatory specifications~~

~~Index No~~	~~Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)~~			
	~~Reference~~	~~Name of Specification~~	~~Version~~	~~Notes~~
~~1~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~2~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~3~~	~~SUBSET-023~~	~~Glossary of Terms and Abbreviations~~	~~3.1.0~~	~~-~~
~~4~~	~~SUBSET-026~~	~~System Requirements Specification~~	~~3.4.0~~	~~-~~
~~5~~	~~SUBSET-027~~	~~FIS Juridical Recording~~	~~3.1.0~~	~~-~~
~~6~~	~~ERA_ERTMS_015560~~	~~ETCS Driver Machine interface~~	~~3.4.0~~	~~-~~
~~7~~	~~SUBSET-034~~	~~Train Interface FIS~~	~~3.1.0~~	~~-~~
~~8~~	~~SUBSET-035~~	~~Specific Transmission Module FFFIS~~	~~3.1.0~~	~~-~~
~~9~~	~~SUBSET-036~~	~~FFFIS for Eurobalise~~	~~3.0.0~~	~~-~~

Index No	Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
10	SUBSET-037	EuroRadio FIS	3.1.0	-
11	SUBSET-038	Offline key management FIS	3.0.0	-
12	SUBSET-039	FIS for the RBC/RBC handover	3.1.0	-
13	SUBSET-040	Dimensioning and Engineering rules	3.3.0	-
14	SUBSET-041	Performance Requirements for Interoperability	3.1.0	-
15	Intentionally deleted	-	-	-
16	SUBSET-044	FFFIS for Euroloop	2.4.0	-
17	Intentionally deleted	-	-	-
18	Intentionally deleted	-	-	-
19	SUBSET-047	Trackside-Trainborne FIS for Radio infill	3.0.0	-
20	SUBSET-048	Trainborne FFFIS for Radio infill	3.0.0	-
21	Intentionally deleted	-	-	-
22	Intentionally deleted	-	-	-
23	SUBSET-054	Responsibilities and rules for the assignment of values to ETCS variables	3.0.0	-
24	Intentionally deleted	-	-	-
25	SUBSET-056	STM FFFIS Safe time layer	3.0.0	-
26	SUBSET-057	STM FFFIS Safe link layer	3.0.0	-
27	SUBSET-091	Safety Requirements for the Technical Interoperability of ETCS in Levels 1 and 2	3.4.0	-
28	Intentionally deleted	-	-	-
29	SUBSET-102	Test specification for interface "K"	2.0.0	-
30	Intentionally deleted	-	-	-

Index No	Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
31	SUBSET-094	Functional requirements for an onboard reference test facility	3.0.0	-
32	EIRENE FRS	GSM-R Functional requirements specification	8.0.0	Note 10
33	EIRENE SRS	GSM-R System requirements specification	16.0.0	Note 10
34	A11T6001	(MORANE) Radio Transmission FFFIS for EuroRadio	13.0.0	-
35	Intentionally deleted	-	-	-
36 a	Intentionally deleted	-	-	-
36 b	Intentionally deleted	-	-	-
36 c	SUBSET-074-2	FFFIS STM Test cases document	3.0.0	-
37 a	Intentionally deleted	-	-	-
37 b	SUBSET-076-5-2	Test cases related to features	3.2.0	-
37 c	SUBSET-076-6-3	Test sequences	3.1.0	-
37 d	SUBSET-076-7	Scope of the test specifications	3.2.0	-
37 e	Intentionally deleted	-	-	-
38	06E068	ETCS Marker-board definition	2.0	-
39	SUBSET-092-1	ERTMS EuroRadio Conformance Requirements	3.0.0	-
40	SUBSET-092-2	ERTMS EuroRadio test cases safety layer	3.0.0	-
41	Intentionally deleted	-	-	-
42	Intentionally deleted	-	-	-
43	SUBSET-085	Test specification for Eurobalise FFFIS	3.0.0	-
44	Intentionally deleted	-	-	-
45	SUBSET-101	Interface "K" Specification	2.0.0	-

Index No	Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
46	SUBSET-100	Interface "G" Specification	2.0.0	-
47	Intentionally deleted	-	-	-
48	Reserved	Test specification for mobile equipment GSM-R	-	Note 4
49	SUBSET-059	Performance requirements for STM	3.0.0	-
50	SUBSET-103	Test specification for Euroloop	1.1.0	-
51	Intentionally deleted	-	-	-
52	SUBSET-058	FFFIS STM Application layer	3.1.0	-
53	Intentionally deleted	-	-	-
54	Intentionally deleted	-	-	-
55	Intentionally deleted	-	-	-
56	Intentionally deleted	-	-	-
57	Intentionally deleted	-	-	-
58	Intentionally deleted	-	-	-
59	Intentionally deleted	-	-	-
60	SUBSET-104	ETCS System Version Management	3.2.0	-
61	Intentionally deleted	-	-	-
62	Intentionally deleted	-	-	-
63	SUBSET-098	RBC-RBC Safe Communication Interface	3.0.0	-
64	EN 301 515	Global System for Mobile Communication (GSM); Requirements for GSM operation on railways	2.3.0	Note 2
65	TS 102 281	Detailed requirements for GSM operation on railways	3.0.0	Note 3

Index No	Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
66	TS 103 169	ASCI Options for Interoperability	1.1.1	-
67	(MORANE) P 38 T 9001	FFFIS for GSM-R SIM Cards	5.0	Note 10
68	ETSI TS 102 610	Railway Telecommunication; GSM; Usage of the UUIE for GSM operation on railways	1.3.0	-
69	(MORANE) F 10 T 6002	FFFS for Confirmation of High Priority Calls	5.0	-
70	(MORANE) F 12 T 6002	FIS for Confirmation of High Priority Calls	5.0	-
71	(MORANE) E 10 T 6001	FFFS for Functional Addressing	4.1	-
72	(MORANE) E 12 T 6001	FIS for Functional Addressing	5.1	-
73	(MORANE) F 10 T6001	FFFS for Location Dependent Addressing	4	-
74	(MORANE) F 12 T6001	FIS for Location Dependent Addressing	3	-
75	(MORANE) F 10 T 6003	FFFS for Presentation of Functional Numbers to Called and Calling Parties	4	-
76	(MORANE) F 12 T 6003	FIS for Presentation of Functional Numbers to Called and Calling Parties	4	-
77	ERA/ERTMS/033281	Interfaces between CCS trackside and other subsystems	4.0	Note 7
78	Intentionally deleted	-	-	Note 6
79	SUBSET-114	KMC-ETCS Entity Off-line KM FIS	1.0.0	-

Index No	Set of specifications # 2 (ETCS Baseline 3 Maintenance Release 1 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
80	Intentionally deleted	-	-	Note 5
81	Reserved	Train Interface FFFIS	-	-
82	Reserved	FFFIS TI – Safety Analysis	-	-

Table A 2.3

List of mandatory specifications

Index No	Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
1	Intentionally deleted	-	-	-
2	Intentionally deleted	-	-	-
3	SUBSET-023	Glossary of Terms and Abbreviations	3.3.0	-
4	SUBSET-026	System Requirements Specification	3.6.0	-
5	SUBSET-027	FIS Juridical Recording	3.3.0	-
6	ERA_ERTMS_015560	ETCS Driver Machine interface	3.6.0	-
7	SUBSET-034	Train Interface FIS	3.2.0	-
8	SUBSET-035	Specific Transmission Module FFFIS	3.2.0	-
9	SUBSET-036	FFFIS for Eurobalise	3.1.0	-
10	SUBSET-037	EuroRadio FIS	3.2.0	-
11	SUBSET-038	Offline key management FIS	3.1.0	-
12	SUBSET-039	FIS for the RBC/RBC handover	3.2.0	-
13	SUBSET-040	Dimensioning and Engineering rules	3.4.0	-

Index No	Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
14	SUBSET-041	Performance Requirements for Interoperability	3.2.0	-
15	Intentionally deleted	-	-	-
16	SUBSET-044	FFFIS for Euroloop	2.4.0	-
17	Intentionally deleted	-	-	-
18	Intentionally deleted	-	-	-
19	SUBSET-047	Trackside-Trainborne FIS for Radio infill	3.0.0	-
20	SUBSET-048	Trainborne FFFIS for Radio infill	3.0.0	-
21	Intentionally deleted	-	-	-
22	Intentionally deleted	-	-	-
23	SUBSET-054	Responsibilities and rules for the assignment of values to ETCS variables	3.0.0	-
24	Intentionally deleted	-	-	-
25	SUBSET-056	STM FFFIS Safe time layer	3.0.0	-
26	SUBSET-057	STM FFFIS Safe link layer	3.1.0	-
27	SUBSET-091	Safety Requirements for the Technical Interoperability of ETCS in Levels 1 and 2	3.6.0	-
28	Intentionally deleted	-	-	-
29	SUBSET-102	Test specification for interface “K”	2.0.0	-
30	Intentionally deleted	-	-	-
31	SUBSET-094	Functional requirements for an onboard reference test facility	3.1.0	-

~~Index No~~	~~Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)~~			
	~~Reference~~	~~Name of Specification~~	~~Version~~	~~Notes~~
~~32~~	~~EIRENE FRS~~	~~GSM-R Functional requirements specification~~	~~8.0.0~~	~~Note 10~~
~~33~~	~~EIRENE SRS~~	~~GSM-R System requirements specification~~	~~16.0.0~~	~~Note 10~~
~~34~~	~~A11T6001~~	~~(MORANE) Radio Transmission FFFIS for EuroRadio~~	~~13.0.0~~	~~-~~
~~35~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~36 a~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~36 b~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~36 c~~	~~SUBSET-074-2~~	~~FFFIS STM Test cases document~~	~~3.1.0~~	~~-~~
~~37 a~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~37 b~~	~~SUBSET-076-5-2~~	~~Test cases related to features~~	~~3.3.0~~	~~-~~
~~37 c~~	~~SUBSET-076-6-3~~	~~Test sequences~~	~~3.2.0~~	~~-~~
~~37 d~~	~~SUBSET-076-7~~	~~Scope of the test specifications~~	~~3.3.0~~	~~-~~
~~37 e~~	~~Intentionally deleted~~	~~-~~	~~-~~	~~-~~
~~38~~	~~06E068~~	~~ETCS Marker board definition~~	~~2.0~~	~~-~~
39	SUBSET-092-1	ERTMS EuroRadio Conformance Requirements	3.1.0	
40	SUBSET-092-2	ERTMS EuroRadio test cases safety layer	3.1.0	
41	Intentionally deleted			
42	Intentionally deleted			
43	SUBSET 085	Test specification for Eurobalise FFFIS	3.0.0	

~~Index No~~	~~Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)~~			
	~~Reference~~	~~Name of Specification~~	~~Version~~	~~Notes~~
44	Intentionally deleted			
45	SUBSET-101	Interface “K” Specification	2.0.0	
46	SUBSET-100	Interface “G” Specification	2.0.0	
47	Intentionally deleted			
48	Reserved	Test specification for mobile equipment GSM-R		Note 4
49	SUBSET-059	Performance requirements for STM	3.1.0	
50	SUBSET-103	Test specification for Euroloop	1.1.0	
51	Intentionally deleted			
52	SUBSET-058	FFFIS STM Application layer	3.2.0	
53	Intentionally deleted			
54	Intentionally deleted			
55	Intentionally deleted			
56	Intentionally deleted			
57	Intentionally deleted			
58	Intentionally deleted			
59	Intentionally deleted			
60	SUBSET-104	ETCS System Version Management	~~3.3.0~~4.0.0	
61	Intentionally deleted			
62	Intentionally deleted			
63	SUBSET-098	RBC-RBC Safe Communication Interface	3.0.0	
64	EN 301 515	Global System for Mobile Communication (GSM); Requirements for GSM operation on railways	~~2.3.0~~3.0.0	Note 2

~~Index No~~	~~Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)~~			
	~~Reference~~	~~Name of Specification~~	~~Version~~	~~Notes~~
65	TS 102 281	Detailed requirements for GSM operation on railways	~~3.0.0~~3.1.1	Note 3
66	TS 103 169	ASCI Options for Interoperability	1.1.1	
67	(MORANE) P 38 T 9001	FFFIS for GSM-R SIM Cards	~~5.0~~6.0.0	Note 10
68	ETSI TS 102 610	Railway Telecommunication; GSM; Usage of the UUIE for GSM operation on railways	1.3.0	
69	(MORANE) F 10 T 6002	FFFS for Confirmation of High Priority Calls	5~~.0~~	
70	(MORANE) F 12 T 6002	FIS for Confirmation of High Priority Calls	5~~.0~~	
71	(MORANE) E 10 T 6001	FFFS for Functional Addressing	4.1	
72	(MORANE) E 12 T 6001	FIS for Functional Addressing	5.1	
73	(MORANE) F 10 T6001	FFFS for Location Dependent Addressing	4	
74	(MORANE) F 12 T6001	FIS for Location Dependent Addressing	3	
75	(MORANE) F 10 T 6003	FFFS for Presentation of Functional Numbers to Called and Calling Parties	4	
76	(MORANE) F 12 T 6003	FIS for Presentation of Functional Numbers to Called and Calling Parties	4	
77	ERA/ERTMS/033281	Interfaces between CCS trackside and other subsystems	~~4.0~~5.0	Note 7
78	Intentionally deleted			Note 6

~~Index No~~	~~Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)~~			
	~~Reference~~	~~Name of Specification~~	~~Version~~	~~Notes~~
79	SUBSET-114	KMC-ETCS Entity Off-line KM FIS	1.1.0	
80	Intentionally deleted			Note 5
81	SUBSET-119~~Reserved~~	Train Interface FFFIS	4.0.0	
82	Intentionally deleted~~Reserved~~	~~FFFIS TI – Safety Analysis~~	4.0.0	
83	SUBSET-137	On-line Key Management FFFIS	1.0.0	
84	SUBSET-125	ERTMS/ATO System Requirement Specification	1.0.0	
85	SUBSET-126	ATO-OB / ATO-TS FFFIS Application Layer	1.0.0	
86	SUBSET-148	ATO-OB / ATO-TS FFFIS Transport and Security Layers	1.0.0	
87	SUBSET-130	ATO-OB / ETCS-OB FFFIS Application Layer	1.0.0	
88	SUBSET-139	ATO OB / Train FFFIS Application Layer	1.0.0	
89	SUBSET-143	ATO-OB Interface Specification Communication Layers for On-board Communication	1.0.0	
90	SUBSET-147	CCS Consist network communication Layers FFFIS	1.0.0	
91	Intentionally deleted			
92	FFFIS-7950	FRMCS FFFIS	1.0.0	
93	FU-7120	FRMCS FRS	2.0.0	
94	AT-7800	FRMCS SRS	2.0.0	

Index No	Set of specifications # 3 (ETCS Baseline 3 Release 2 and GSM-R Baseline 1)			
	Reference	Name of Specification	Version	Notes
95	FIS-7970	FRMCS FIS	2.0.0	
96	Reserved	[FFFIS for FRMCS profile placeholder		
97	Reserved	[FRMCS Test specifications placeholder]		
98	SUBSET-151	ATO-OB / ATO-TS Test Specifications	Version published in ERA website	
99	TOBA-7510	On-board FRMCS FRS	2.0.0	
100	Intentionally deleted			
101	21E089	Engineering rules for harmonised marker boards	1.0	
102	13E154	ERTMS/ATO Glossary	1.0.0	
103	TD/011REC1028	ESC/RSC technical document	Version published in ERA website	

Note 1: only the functional description of information to be recorded is mandatory, not the technical characteristics of the interface

Note 2: the points of the specifications listed in point 2.1 of EN 301 515 which are referenced in Index 32 and Index 33 as ‘“MI’” are mandatory.

Note 3: the change requests (CRs) listed in table 1 and 2 of TS 102 281 which affect points referenced in Index 32 and Index 33 as ‘“MI’” are mandatory.

Note 4: Index 48 refers only to test cases for GSM-R mobile equipment. It is kept ‘“reserved’” for the time being. When agreed in a future revision of the NTSN, the catalogue of available harmonised test cases for the assessment of mobile equipment and networks, according to the steps indicated in point section 6.1.2 of this NTSN, will be introduced in these tables.

Note 5: the products which are on the market are already tailored to the needs of the RU related to GSM-R Driver Machine Interface and fully interoperable so there is no need for a standard in the CCS NTSN.

Note 6: information that was intended for index 78 is now incorporated in Index 27 (SUBSET-091).

Note 7: this document is ETCS, RMR and GSM-RATO baseline independent.

Note 8: Intentionally deleted.

Note 9: Intentionally deleted.

Note 10: Only the (MI) requirements are mandated by CCS NTSN.

Note 11: Intentionally deleted.

Note 12: Intentionally deleted.

Note 13: Intentionally deleted.

Note 14: Intentionally deleted.

Table A 3

List of mandatory standards

The application of the version of the standards listed in the table below, and their subsequent amendments when published as harmonised standard in the certification process is an appropriate means to fully comply to the risk management process as set out in Annex I of the Common Safety Method for Risk Evaluation and Assessment, without prejudice for the provisions of chapter 4 and chapter 6 of this NTSN.

No	Reference	Document name and comments	Version	Note
A1	EN 50126-1	Railway applications —The specification and demonstration of reliability, availability, maintainability and safety (RAMS) – Part 1: Generic RAMS Process	2017 ~~1999~~	1~~,2~~
A2	EN 50128	Railway applications — Communication, signalling and processing systems — Software for railway control and protection systems	2011	
A3	EN 50129	Railway applications — Communication, signalling and processing systems — Safety related electronic systems for signalling	2018 ~~2003~~	
A4	EN 50159	Railway applications — Communication, signalling and processing systems	2010	
A5	EN 50126-2	Railway Applications — The specification and demonstration of reliability, availability, maintainability and safety (RAMS) – Part 2: Systems Approach to Safety	2017	1, 3

Note 1: This has been left intentionally blank.

Note 2: ~~this version of the standard may be used during the transitional period defined in the updated version of the standard.~~Intentionally deleted

Note 3: To be used in combination with EN 50126-1:~~ (~~2017~~)~~.

Table A 4

List of mandatory standards for accredited laboratories

No	Reference	Document name and comments	Version	Note
A6	ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories	2017	

Appendix B ~~Intentionally deleted~~

B.1 CHANGES OF REQUIREMENTS AND TRANSITION REGIMES FOR ON-BOARD SUBSYSTEM

Table B1

Transition Regime for CCS On-Board Subsystem

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
CCS On-Board Error corrections							
1	Appendix A + clause 7.2.7.3	No mandatory implementation of error corrections published in technical opinions	CCS Subsystems with mandatory implementation of error corrections	If one or more errors are identified for the area of use specified in the authorisation of the vehicle: For error correction specifications published before 1st January 2025: the CCS subsystem integrated into a vehicle shall implement these identified error corrections from the NTSN specifications the latest 2 years after the publication of the IM-decision; For error correction specifications published after 1st January 2025 onwards: the CCS subsystem integrated into a vehicle shall implement the full set of error corrections from the NTSN specifications the latest 2 years after the publication of the IM-decision;			

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
				Note: if no errors are identified as being applicable for the concerned area of use, these will be mandatory implemented according to the transition regime linked to the clause of partial fulfilment.			
ETCS On-Board implementation							
2	Clauses 7.4.2.1, and 7.4.3	7.4.2.1 point 2. and 7.4.3. point (2) grants exemptions for new vehicles to be equipped with ETCS	7.4.2.1 point 2. and Clause 7.4.3 point (2) deleted. All newly built vehicles shall be equipped with ETCS. Newly built vehicles are vehicle types and/or vehicles authorised following a first authorisation.	Directly applicable Note: design phase not started here relates to 'RST design phase not started' for vehicles without ETCS.	Applicable from 1st January 2028 Note: design phase started here relates to 'RST design phase started' for vehicles without ETCS.	Applicable from 1st January 2030 Note: production phase here related to 'RST production phase' for vehicles without ETCS.	Not applicable
3	Clause 7.4.2.2	7.4.2.2 only applicable to upgrade of existing high-speed vehicles	7.4.2.2 applicable to vehicle type and/or vehicles	Directly applicable	Applicable from 1st January 2028 Note: remains directly applicable to high-speed vehicles	Not applicable	Not applicable

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
			requiring a new authorisation		according to previous CCS NTSN.		
4	Clause 7.4.2.4 (point 3)	7.4.2.4 extension area of use: exemptions to install ETCS in point (3)	7.4.2.4 extension area of use: exemptions deleted in point (3)	Not applicable	Not applicable	Not applicable	Applicable from 1st January 2030
ETCS system versions							
5	Appendix A - 7.4.2.6.1 and 7.4.2.6.2 for envelope of legally operated ETCS system versions from 1.0 up to 2.1	No possibility to mandate ETCS system version 2.1 (ETCS with GPRS) instead of using ETCS system version 2.0.	On-board implementation of notified ETCS functions from system version 2.1.	Design phase started after notification from IM and notification is done after 1st January 2023: the ETCS system version 2.1 is directly applicable. Design phase started before notification from IM or notification is done before 1st January 2023: the ETCS system version 2.1 is applicable if the design phase is not ended	The ETCS system version 2.1 is applicable if the design phase is not ended within the latest date between following dates: - 1st January 2028; - 5 years after the notification date from the IM;	Not applicable	Not applicable

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
				within the latest date between following dates: - 1st January 2028; - 5 years after the notification date from the IM;			
6	Appendix A - 7.4.2.6.1 and 7.4.2.6.2 for envelope of legally operated ETCS system versions	Not applicable	On-board implementation of notified ETCS functions from system version 2.2.	Design phase started after notification from IM and notification is done after 1st January 2025: the ETCS system version 2.2 is directly applicable.	The ETCS system version 2.2 is applicable if the design phase is not ended within the latest date between following dates: - 1st January 2030; - 5 years after the notification date from the IM;	Not applicable	Not applicable

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
	from 1.0 up to 2.2.			Design phase started before notification from IM or notification is done before 1st January 2025: the ETCS system version 2.2 is applicable if the design phase is not ended within the latest date between following dates: - 1st January 2030; - 5 years after the notification date from the IM;			
7	Appendix A - 7.4.2.6.1 and 7.4.2.6.2 for envelope of legally operated	Not applicable	On-board implementation of notified ETCS functions from system version 3.0.	Design phase started after notification from IM and notification is done after 1st January 2025: the ETCS system version 3.0 is directly applicable.	The ETCS system version 3.0 is applicable if the design phase is not ended within the latest date between following dates: - 1st January 2030;	Note: the notified ETCS system version 3.0 is mandatory when required for compatibility with the ETCS trackside implementation (see clause 7.2.6.1 point (5)).	Note: the notified ETCS system version 3.0 is mandatory when required for compatibility with the ETCS trackside implementation (see clause 7.2.6.1 point (5)).

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
	ETCS system versions from 1.0 up to 3.0			Design phase started before notification from IM or notification is done before 1st January 2025: the ETCS system version 3.0 is applicable if the design phase is not ended within the latest date between following dates: - 1st January 2030; - 5 years after the notification date from the IM;	- 5 years after the notification date from the IM;		
8	4.2.2 point (4) b – Cold Movement Detection	CMD Optional	CMD Mandatory only on newly developed vehicle designs requiring a first authorisation as defined in Article 14 clause 1(a) of Commission	Directly applicable in case of newly developed vehicle designs requiring a first authorisation as defined in Article 14 clause 1(a) of Commission Implementing Regulation 2018/545	Applicable 7 years after entry into force of the NTSN in case of newly developed vehicle designs requiring a first authorisation as defined in Article 14 clause 1(a) of Commission	Not applicable	Not applicable

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
			Implementing Regulation 2018/545.		Implementing Regulation 2018/545		
9	Appendix A –7.4.2.4 (7)	Mandatory use of system version 2.0 or higher in case of extension of area	Legal enforcement to mandatory use system version 2.0 or higher in case of extension of area of use	Directly applicable	Directly applicable	Not applicable	Not applicable
ATO On-Board implementation							
10	4.2.18 + Clause 7.2.6.2	Not applicable	ATO on-board specification and implementation requirements	Design phase started after notification from IM and notification is done after 1st January 2025: ATO on-board implementation is directly applicable.	ATO on-board implementation is applicable if the design phase is not ended within the latest date between following dates: - 1st January 2030; - 5 years after the notification date from the IM;	Not applicable	Not applicable
				Design phase started before notification from IM or notification is done before 1st January 2025:			

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
				ATO On-board implementation is applicable if the design phase is not ended within the latest date between following dates: - 1st January 2030; - 5 years after the notification date from the IM;			
CCS On-Board Modularity							
11	Clause 5.2.2.2	Not applicable	New requirement in case of grouping of Interoperability Constituents defined in table 5.1	Applicable 2 years after entry into force of the NTSN only on newly developed vehicle designs requiring a first authorisation as defined in Article 14 clause 1(a) of Commission Implementing Regulation 2018/545.	Applicable 7 years after entry into force of the NTSN only on newly developed vehicle designs requiring a first authorisation as defined in Article 14 clause 1(a) of Commission Implementing Regulation 2018/545.	Not applicable	Not applicable

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
12	Appendix A – CCS and RST interfaces Indexes 81, 82, 88, 90	Not applicable	Mandatory application of on-board interfaces between CCS subsystem and RST subsystem	Applicable 2 years after entry into force of the NTSN only on newly developed vehicle designs requiring a first authorisation as defined in Article 14 clause 1(a) of Commission Implementing Regulation 2018/545.	Applicable 7 years after entry into force of the NTSN only on newly developed vehicle designs requiring a first authorisation as defined in Article 14 clause 1(a) of Commission Implementing Regulation 2018/545.	Not applicable	Not applicable
FRMCS On-Board implementation:							

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
13	Clause 7.3.2.2	Not applicable	FRMCS on-board implementation	Design phase started after notification from IM and notification is done after 2 years of the publication of the FRMCS on-board specifications v2.0.0: FRMCS on-board implementation is directly applicable.	FRMCS on-board is applicable if the design phase is not ended within the latest date between following dates: - 7 years after publication of the FRMCS on-board specifications v2.0.0; - 5 years after the notification date from the IM;	Note: the FRMCS on-board implementation is mandatory when required for compatibility with FRMCS only trackside implementation	Note: the FRMCS on-board implementation is mandatory when required for compatibility with FRMCS only trackside implementation
				Design phase started before notification from IM or notification is done before 2 years after publication of the FRMCS on-board specifications v2.0.0: see transition regime in column 'Design phase started before NTSN set into force'.			

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN set into force	Design phase started before NTSN set into force	Production phase	Vehicle in operation
Partial fulfilment							
14	Not applicable	Clauses 6.1.1.3 and 6.4.3	It is no longer possible to exclude mandatory functionalities (incl. error corrections), interfaces or performance on new designs.	2 years after the entry into force of the NTSN. If partial fulfilment is used, a condition for use shall be included in their authorisation to put on the market enforcing compliance within 7 years after the entry into force.	7 years after the entry into force of the NTSN.	Not applicable	Not applicable

B.2 Changes of requirements and transition regimes for CCS Trackside Subsystem

Table B2

Transition Regime for CCS Trackside Subsystem

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime
CCS Trackside Errors				

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime
1	Appendix A + Clauses 7.4.1.2 and 7.2.7.3	Set 1, 2 and 3 of specifications without error corrections	Table A2 includes the maintenance of the set 1 (former Table A2.1), the set 2 (former Table A2.2) and set 3 (former Table A2.3) into 1 single set of specifications (new A2).	CCS Trackside Subsystems, which are in advanced stage of development or in operation, shall implement the identified unacceptable errors as described in section 7.2.7.1 within 2 years after the entry into force of the NTSN. CCS Trackside Subsystems placed into service after the entry into force of this NTSN, which are not in advanced stage of development, shall directly comply with the maintained set of specifications of this NTSN.
CCS Trackside Enhancements				
2	ETCS: Appendix A; + clause 7.4.1.3	Not applicable	New ETCS functions from system version 2.2 and 3.0	If implemented (optional trackside function), directly applicable for ETCS equipped lines
3	ETCS: Appendix A; Table A.2 - Index 38, 101	Marker-board definition based on 06E068	EN 16494 and engineering rules for harmonised marker boards	Directly applicable if: - Marker Boards are installed for the first time in a line being equipped with ERTMS, even when a Class B system is also installed at the same time; or - Marker Boards are installed during renewal or upgrading of the infrastructure subsystem in a line equipped with ERTMS; Detailed provisions for applicable requirements for fitting the harmonised

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime
				Marker Boards are stated in the Appendix A – Table A.2 – Index 101 document.
4	4.2.19	No specifications	ATO Trackside Implementation	If implemented (optional trackside function), directly applicable for ATO GoA1/2 implementation on ETCS equipped lines
5	FRMCS radio system	No specifications	New set of FRMCS specifications	If implemented (optional trackside function), directly applicable for FRMCS projects when FRMCS specifications are included in NTSN CCS

B.3 Changes of Interoperability Constituent requirements and transition regimes for CCS Subsystem

Table B3

Transition Regime for CCS Interoperability Constituents

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime
1	Appendix A + clause 4.2.20.1 + clause 7.2.7.2	Technical opinions on Art. 10 errors are not legally binding	Implementation of error corrections into ERTMS on-board Interoperability Constituents for existing CCS subsystems	If one or more errors are identified for the area of use specified in the authorisation of the vehicle: a) For error correction specifications published before 1st January 2025: ERTMS on-board Interoperability Constituents being integrated into a vehicle shall implement the error corrections within the area of use specified in the authorisation, the latest 1 year after the publication of the IM-decision; b) For error correction specifications published after 1st January 2025 onwards: ERTMS on-board Interoperability Constituents being

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime
				integrated into a vehicle shall comply with the maintained set of specifications of this NTSN 1 year after the publication of the IM-decision; Note: if no errors are identified as being applicable for the concerned area of use, these will be mandatory implemented according to the transition regime linked to the clause of partial fulfilment.
2	Appendix A + clause 4.2.20.1 + clause 7.2.7.2	Technical opinions on Art. 10 errors are not legally binding	Implementation of error corrections into ERTMS Trackside Interoperability Constituents for new CCS trackside projects	ERTMS Trackside Interoperability Constituents, being integrated into a CCS Trackside Subsystem for which the project is not in advanced stage of development, shall directly comply with the maintained set of specifications of this NTSN.
3	Appendix A + clause 4.2.20.1 + clause 7.2.7.2	Technical opinions on Art. 10 errors are not legally binding	Implementation of error corrections into ERTMS Trackside Interoperability Constituents for existing CCS trackside projects (i.e. trackside subsystem in advanced stage of deployment or in operations)	ERTMS Trackside Interoperability Constituents, being integrated into a CCS Trackside Subsystem for which the project is in advanced stage of development or being integrated in a CCS Trackside Subsystem in operation, shall implement the identified set of corrections for the unacceptable trackside errors for the area of use specified in the authorisation within 1 year after the publication of the IM-decision.
4	Appendix A, Table A.2, Index 90	N/A	Implementation of Ethernet based CCS Consist network communication layers	The ETCS on-board Interoperability Constituent shall implement the Ethernet based CCS Consist network communication layers as specified in Index 90 when implementing the ETCS system version 2.2 or 3.0.

No	NTSN clause(s)	NTSN clauses(s) in previous version	Explanation on NTSN change	Transition regime
5	Clause 6.2.4.1, Index 31, 37b,c,d	Subset 076 only available for ETCS on-board Interoperability Constituent supporting SV 2.0 or 2.1 with version of the previous NTSN	New version of subset 076 depending on the System version available on ERA Website	New version of subset 076 shall be used for the certification of ETCS on-board Interoperability Constituent 6 months after the publication of the documents on ERA website.

Appendix C ~~Intentionally deleted~~

In this Appendix the templates for the different ESC/RSC (Interoperability Constituent) Statement are provided.

C.1 ESC Statement template

TEMPLATE FOR ETCS SYSTEM COMPATIBILITY STATEMENT

ETCS SYSTEM COMPATIBILITY STATEMENT

ETCS System Compatibility Statement document *[Document number]*

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following subsystem:

[Name/short description of the subsystem, relevant configuration, unique identification of the subsystem]

to which this statement refers has been subject to the relevant verifications that corresponds to the following ESC Type:

[Reference to: ESC Type Identifier as published in the Agency Technical Document]

has been assessed by the following Notified body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

The following conditions of use and other restrictions apply:

[Reference to document with the list of conditions of use and other restrictions]

The following ESC Interoperability Constituent Statements has been considered:

[Indicate use of ESC Interoperability Constituent Statements]

Reference to former ETCS System Compatibility Statement (where applicable)

[Yes/No]

Done on:

[date DD/MM/YYYY]

Signature of Applicant First Name, Surname

C.2 ESC Interoperability Constituent Statement template

TEMPLATE FOR ETCS INTEROPERABILITY CONSTITUENT SYSTEM COMPATIBILITY INTEROPERABILITY CONSTITUENT STATEMENT

ETCS SYSTEM INTEROPERABILITY CONSTITUENT COMPATIBILITY STATEMENT

ETCS Interoperability Constituent System Compatibility Statement document *[Document number]*

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following subsystem:

[Name/short description of the interoperability constituent, relevant configuration, unique identification of the interoperability constituent]

to which this statement refers has been subject to the relevant verifications that corresponds to the following ESC Type:

[Reference to: ESC Type Identifier as published in the Agency Technical Document]

has been assessed by the following Notified body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

The following conditions of use and other restrictions apply:

[Reference to document with the list of conditions of use and other restrictions]

Reference to former ETCS Interoperability Constituent System Compatibility Statement (where applicable)

[Yes/No]

Done on:

[date DD/MM/YYYY]

Signature of Applicant First Name, Surname

C.3 RSC Statement template

TEMPLATE FOR RADIO SYSTEM COMPATIBILITY STATEMENT

RADIO SYSTEM COMPATIBILITY STATEMENT

Radio System Compatibility Statement document *[Document number]*

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following subsystem:

[Name/short description of the subsystem, relevant configuration, unique identification of the subsystem]

to which this statement refers has been subject to the relevant verifications that corresponds to the following RSC Type:

[Reference to: RSC Type Identifier as published in the Agency Technical Document]

has been assessed by the following Notified body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

The following conditions of use and other restrictions apply:

[Reference to document with the list of conditions of use and other restrictions]

The following RSC Interoperability Constituent Statements has been considered:

[Indicate use of RSC Interoperability Constituent Statements]

Reference to former Radio System Compatibility Statement (where applicable)

[Yes/No]

Done on:

[date DD/MM/YYYY]

Signature of Applicant First Name, Surname

C.4 RSC Interoperability Constituent Statement template

TEMPLATE FOR RADIO INTEROPERABILITY CONSTITUENT SYSTEM COMPATIBILITY INTEROPERABILITY CONSTITUENT STATEMENT

RADIO SYSTEM INTEROPERABILITY CONSTITUENT COMPATIBILITY STATEMENT

Radio Interoperability Constituent System Compatibility Statement document *[Document number]*

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following Interoperability Constituent:

[Name/short description of the interoperability constituent, relevant configuration, unique identification of the interoperability constituent]

to which this statement refers has been subject to the relevant verifications that corresponds to the following RSC Type(s):

[Reference to: RSC Type Identifier as published in the Agency Technical Document]

has been assessed by the following Notified body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

The following conditions of use and other restrictions apply:

[Reference to document with the list of conditions of use and other restrictions]

Reference to former Radio Interoperability Constituent System Compatibility Statement (where applicable)

[Yes/No]

Done on:

[date DD/MM/YYYY]

Signature of Applicant First Name, Surname

C.5 Combined ESC/RSC Statement template

TEMPLATE FOR ETCS AND RADIO SYSTEM COMPATIBILITY STATEMENT

ETCS AND RADIO SYSTEM COMPATIBILITY STATEMENT

ETCS and RSC System Compatibility Statement document *[Document number]*

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following subsystem:

[Name/short description of the subsystem, relevant configuration, unique identification of the subsystem]

to which this statement refers has been subject to the relevant verifications that corresponds to the following ESC and RSC Types:

[Reference to: ESC Type and RSC Type identifiers as published in the Agency Technical Document]

has been assessed by the following Notified body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

The following conditions of use and other restrictions apply:

[Reference to document with the list of conditions of use and other restrictions]

The following ESC and RSC Interoperability Constituent Statements has been considered:

[Indicate use of ESC and RSC Interoperability Constituent Statements]

Reference to former ETCS and RSC System Compatibility Statement (where applicable)

[Yes/No]

Done on:

[date DD/MM/YYYY]

Signature of Applicant First Name, Surname

C.6 Combined ESC/RSC Interoperability Constituent Statement template

TEMPLATE FOR ETCS AND RADIO INTEROPERABILITY CONSTITUENT SYSTEM COMPATIBILITY STATEMENT

ETCS AND RADIO INTEROPERABILITY CONSTITUENT SYSTEM COMPATIBILITY STATEMENT

ETCS and Radio Interoperability Constituent System Compatibility Statement document *[Document number]*

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following Interoperability Constituent:

[Name/short description of the interoperability constituent, relevant configuration, unique identification of the interoperability constituent]

to which this statement refers has been subject to the relevant verifications that corresponds to the following ESC and RSC Type:

[Reference to: ESC Type and RSC Type Identifiers as published in the Agency Technical Document]

has been assessed by the following Notified body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

The following conditions of use and other restrictions apply:

[Reference to document with the list of conditions of use and other restrictions]

Reference to former ESC and Radio Interoperability Constituent System Compatibility Statement (where applicable)

[Yes/No]

Done on:

[date DD/MM/YYYY]

Signature of Applicant First Name, Surname

~~Appendix B~~Appendix D ~~*Intentionally deleted*~~

In this Appendix the template for description of conditions, restrictions and added functions is provided.

The document describing the template and its use is in the Agency Web page in the ERTMS section.

~~Appendix C~~Appendix E *Intentionally deleted*

~~Appendix D~~Appendix F *Intentionally deleted*

~~Appendix E~~Appendix G Open Points

Open Point	Notes
~~Braking aspects~~	~~It only applies to ETCS Baseline 2 (see Annex A, Table A 2, Index 15).~~ ~~Resolved for ETCS Baseline 3 (see Annex A, Table A 2, Indexes 4 and 13).~~
Reliability/availability requirements	Frequent occurrences of degraded situations caused by failures of control-command and signalling equipment will decrease the system safety. See ~~Annex~~Appendix A, 4.2.1.2
~~Characteristics of sand applied to tracks~~	~~See Annex A, Table A 2, Index 77~~ ~~This is not an open point for 1 520 mm.~~

~~Characteristics of flange lubricators~~	~~See Annex A, Table A 2, Index 77~~
~~Combination of rolling stock characteristics influencing shunting impedance~~	~~See Annex A, Table A 2, Index 77~~
~~Conducted interference:~~ ~~— Vehicle impedance~~ ~~— Substation impedance (for DC networks only)~~ ~~— Out-band limits~~ ~~— Interference current limits attributed to the substations and attributed to the rolling stock~~ ~~— Measurement, test and evaluation specification~~	~~See Annex A, Table A 2~~