National Technical Specification Notice Control, Command and Signalling (CCS)

Issue 2

Date of publication: 2nd May 2025

Rail Interoperability – The Railways (Interoperability) Regulations 2011

Notice to all:

- Manufacturers and distributors of railway equipment
- Infrastructure managers and railway undertakings
- Railway infrastructure and train: builders, designers, operators, owners and managers
- Certifying authorities, approved bodies, designated bodies, recognised organisations and railway consultants

This Notice has been published by the Secretary of State for Transport pursuant to regulation 3B of the Railways (Interoperability) Regulations 2011 (RIR 2011).

Summary

1. Objectives and target outcomes of rail interoperability in Great Britain

RIR 2011 supports the railway to function as one modern integrated system through rail equipment meeting common baseline requirements of technical compatibility, reliability and availability, accessibility, environmental protection, health, and safety (See Schedule 2 to RIR 2011 'Essential Requirements' for further details). By taking a long-term whole-system view, it seeks to progressively improve Britain's railway in the following ways:

- More consistently reliable, efficient and accessible services for rail customers;
- Reduced technical barriers for the railway to adapt to meet changing customer demand for passenger and freight services;
- Increased choice of potential rolling stock and service routes for operators;
- Reduced industry production, delivery and maintenance costs through use of standardised products and economies of scale;
- An open and competitive supply chain for rail projects;
- Increased potential for international passenger and international and domestic freight services;
- Reduced environmental impact.

2. Function of this National Technical Specification Notice (NTSN)

RIR 2011 requires new, upgraded or renewed rail vehicles, infrastructure and some components to meet minimum specifications linked to the six 'Essential Requirements' of interoperability: i.e. technical compatibility, reliability and availability, accessibility, environmental protection, health, and safety. NTSNs set these minimum specifications for different 'subsystems' of Great Britain's (GB) rail system, and key components defined as 'interoperability constituents'. In some cases, NTSNs codify international standards (e.g. European Standards set by CEN-CENELEC) or refer out to supplementary National Technical Rules to set these minimum requirements. NTSNs also set rules for third party assessment of conformity to the 'Essential Requirements', the placing of interoperability constituents on the GB market, and operation and maintenance of railway 'subsystems'.

This NTSN covers the trackside and on-board control-command and signalling (CCS) 'subsystems' and associated 'interoperability constituents' (See article 1 'Scope' for details). See Table 3.1 in the Annex of this NTSN for a breakdown of the basic parameters corresponding to each of the six 'Essential Requirements'.

3. How this NTSN should be read

This NTSN consists of two parts: the Articles and the Annex. The Articles set out information concerning scope, application and key definitions. The Annex sets the technical specifications, codified standards and assessment criteria for meeting the 'Essential Requirements' of RIR 2011.

Rail projects that concern trackside or on-board CCS on the GB railway should check article 1 'Scope' and article 2 'Application' of this NTSN to identify whether they are legally obliged to apply requirements in the Annex. Projects in scope should review the applicable requirements in the Annex at the earliest stage of project development and factor these into cost benefit analysis on designs and procurements specifications so that implementation, or a need for an exemption to apply alternative measures, can be planned accordingly (See Summary subsection 7 'Exemptions from this NTSN').

4. Changes from Issue 1 published on 1 January 2021

NTSNs were created for EU Exit to take the place of EU regulations called Technical Specifications for Interoperability (TSIs). Issue 1 of the CCS NTSN substantially reproduced Commission Regulation (EU) No 2016/919 – the CCS TSI – which applied in Britain until 31 December 2020.

Changes from Issue 1 to 2 of this NTSN primarily focus on sections where the technical content of the CCS TSI changed when Commission Regulation (EU) No 2016/919 was repealed and replaced in 2023 by Commission Implementing Regulation (EU) 2023/1695

and sections where the British rail sector or Government identified a need for change and agreed solutions. Changes to technical content, including decisions on whether to maintain alignment with the CCS TSI, were made on the principles that mandatory requirements in NTSNs should be strictly necessary for achieving interoperability in GB, outcome focused where appropriate, supported by GB-focused analysis, and tested with those who will be obliged to apply them. To support use of this NTSN in line with these principles, Issue 2 also contains a substantial redraft of the Summary and Articles section to improve clarity, reflect Government NTSN policy, and align application with the objectives and target outcomes of rail interoperability in GB.

The core structure and format of the NTSN has not changed in this Issue 2 and still reflects that of the CCS TSI. It still contains parts labelled as 'Open Points' or 'Specific Cases' where the 'Essential Requirements' are to be met either through application of bespoke requirements, supplementary National Technical Rules, or a choice of NTSN or National Technical Rule specifications.

There are also various provisions that are still labelled 'left intentionally blank'. This has been done to preserve consistency of clausal reference points within this NTSN and with other interfacing NTSNs, recognising that the changes from Issue 1 to 2 were limited to specific sections.

5. Relationship with rail safety obligations

Conformity to this NTSN to meet obligations under RIR 2011 does not guarantee that safety obligations under the Railways and Other Guided Transport Systems (Safety) Regulations 2006, the Health and Safety at Work Act 1974, or other legislation pertaining to rail safety are met. Some NTSN specifications are intended to fulfill the safety 'Essential Requirement' of interoperability, ensuring a common baseline of safe design. However, meeting these requirements alone does not mean that a railway subsystem is safe. Rail safety law, which focuses on controlling risk 'as low as reasonably practicable' (ALARP) to assure system safety, requires entities making significant changes to the railway to apply the Common Safety Method for Risk Evaluation and Assessment in determining risk controls, and in all cases to identify hazards and apply appropriate mitigations for the circumstance. This may identify that additional or alternative measures to the standardised safety 'Essential Requirements' are needed to ensure the safety of the subsystem.

6. Relationship with other rail standards

Entities that are obliged to apply this NTSN may have other obligations concerning the application of standards covering the same topics. Within the context set out in article 1 'Scope' and article 2 'Application', this NTSN's mandatory requirements take precedence over all other rail technical standards covering the same topics, including those set by individual companies or cross-industry bodies, unless otherwise indicated within the

NTSN's Annex (e.g. there is an applicable UK Specific Case or transitional provision), the National Implementation Plan for this NTSN, a formal exemption granted by the Department for Transport as 'competent authority' (See Summary subsection 7 'Exemptions from this NTSN', or – in the case of international rail services – the Convention Concerning International Carriage by Rail (COTIF) Uniform Technical Prescriptions (UTPs) apply.

7. Exemptions from this NTSN

The UK Government recognises that the specifications set in the Annex may not always be the most effective way of achieving the 'Essential Requirements' of RIR 2011 or its objectives and target outcomes. For example, cost benefit analysis, customer insights and safety risk assessments may identify that alternatives more appropriate to the project budget, value for money, customer need, and identified safety hazards and risks, can deliver the same intended result as an applicable NTSN provision. Government also recognises that technology may change faster than standardised requirements, necessitating flexibility to benefit from innovation.

Under regulation 14 of RIR 2011 'Exemption from need to conform with NTSNs (exemptions)', the Department for Transport as 'Competent Authority' has the power to exempt rail projects in scope of RIR 2011 from NTSN requirements in the following circumstances:

- The project is at an advanced stage of development (i.e. its "…*planning or construction stage has reached a point where the impact of a change in technical specifications would present a significant legal, contractual, economic, financial, social or environmental impediment to the project concerned*") or the project is the subject of a contract in the course of performance when the applicable NTSN is published.
- The project concerns the renewal or upgrading of an existing subsystem, where the loading gauge, track gauge, space between tracks or electrification voltage in the applicable NTSN is not compatible with those of the existing subsystem.
- Any proposed renewal, extension or upgrading of an existing subsystem where the application of an applicable NTSN would compromise the economic viability of the project or the compatibility of the project with the rail system.
- Following an accident or natural disaster, where the conditions for the rapid restoration of the network do not economically or technically allow for partial or total application of an applicable NTSN.
- A project which employs innovative solutions which either do not comply with the relevant NTSNs or to which the assessment methods in those NTSNs cannot be applied.

Under regulation 13 of RIR 2011 'Authorisation requirements for the renewal or upgrading of subsystems', the Department also has the power to decide whether authorisation

to place into service is needed for an upgraded or renewed subsystem, and the extent to which NTSN requirements apply for authorisation.

Where projects identify that alternatives to this NTSN's requirements may better deliver this NTSN's intended outcomes in their circumstance without compromising safety or the interoperability of the railway, and one of the above circumstances applies, they should contact the Department to enquire whether an exemption may be possible. Exemption requests should be made in writing using the template published on Gov.uk and sent to interoperability@dft.gov.uk.

Requests must cover the mandatory criteria in regulation 14A of RIR 2011 'Application for exemptions' and offer an evidence-based explanation of how proposed alternative arrangements would be at least as effective as the NTSN requirements in meeting the NTSN's objectives. They must also give due consideration to the 'Essential Requirements', objectives and target outcomes of GB's rail interoperability framework. Where requests concern safety requirements, they must be accompanied by risk assessment evidence.

Requests should be made at the earliest phase of a rail project, and not after completion of the design phase. In order to permit equal levels of due diligence, including consultation as appropriate, to make informed and balanced policy decisions on exemptions, applicants should allow four months for a decision from the Department for Transport.

Control, Command and Signalling

National Technical Specification Notice

Articles

Article 1

Scope

1. The geographic scope of this NTSN is the GB railway system (including conventional and high-speed mainline networks) and the UK section of the Channel Tunnel, except for parts named on the approved list of exclusions published by the Secretary of State pursuant to regulation 3(2) or described in regulation 3(5) of RIR 2011. TSIs continue to have direct effect in Northern Ireland.

2. This NTSN covers the trackside and on-board CCS subsystems of the railway, and associated interoperability constituents.

3. The trackside and on-board CCS subsystems, as defined in Schedule 3 to RIR 2011 'Subsystems', includes all the trackside and on-board equipment required to ensure safety and to command and control movements of trains authorised to travel on the network. Chapter 2 of the Annex provides further detail on the elements of these subsystems covered by this NTSN.

4. The interoperability constituents for the trackside and on-board CCS subsystems are:

    - ETCS on-board
    - Odometry equipment
    - Standardised interface STM
    - GSM-R voice cab radio
    - GSM-R Data Radio
    - GSM-R SIM card
    - ATO On-Board
    - FRMCS on-Board voice application
    - On-board FRMCS
    - FRMCS Profile
    - RBC
    - Radio infill unit
    - Eurobalise
    - Euroloop
    - LEU Eurobalise
    - LEU Euroloop
    - Axle Counter

- Marker Board
- ATO Trackside

See Chapter 5 of the Annex for further details.

Article 2

Application

1. This NTSN principally applies to rail projects that require an authorisation to be placed into service as per regulation 4 of RIR 2011 'Requirement for authorisation'.

2. Compliance with this NTSN is mandatory for rail projects that will place new trackside or on-board CCS subsystems in service after 2nd May 2025, without prejudice to any transitional arrangements specified in the Annex or exemptions granted by the Department for Transport.

3. Compliance is also mandatory for rail projects meeting the definitions of 'upgrading' (i.e. any major modification work on a subsystem or part of a subsystem which improves the overall performance of the subsystem) or 'renewal' (any major substitution work on a subsystem or part of a subsystem which does not change the overall performance of the subsystem) under regulation 2 of RIR 2011 'Interpretation', or otherwise specified in the list published by the Secretary of State pursuant to regulation 12 of RIR 2011 'List of projects for the renewal or upgrading of subsystems', that will seek authorisation to place into service after 2nd May 2025, without prejudice to any transitional arrangements specified in the Annex or exemptions granted by the Department for Transport. Point 7.2.2 'Changes to an existing On-Board subsystem' of the Annex shall apply to all changes to an existing on-board CCS subsystem.

4. Additionally, this NTSN shall apply to existing trackside and on-board CCS subsystems that have one of the following characteristics:

    (a) the area of use of a vehicle is extended, in which case point 7.4.2.3 'Rules for the extension of the area of use for the existing vehicle' of this CCS NTSN shall apply, unless no installation of ETCS is indicated in the Network Statement for the subsequent ten years in the new area of use.

    (b) the subsystem is subject to the specification maintenance requirements set out in point 7.2.10 'Specifications maintenance (error corrections)' of this NTSN.

5. Operators of trackside or on-board CCS subsystems that were authorised to be placed into service against this NTSN are required to operate and maintain the subsystems in conformity with this NTSN or subsequent updated versions, as per regulation 20 of RIR 2011 'Continuing duty on operator in relation to standards'.

6. Issue 1 of the CCS NTSN published on 1 January 2021 shall continue to apply to subsystems authorised in accordance with that NTSN that do not fall under the scope

of this NTSN. The respective chapters/tables/documents of the CCS NTSN published on 1 January 2021 shall continue to apply to subsystems and interoperability constituents to the extent and for as long as a transition regime is provided for these chapters/tables/documents in accordance with Appendix B of this NTSN. Operators of trackside or on-board CCS subsystems authorised against Issue 1 of this NTSN or a version of the CCS TSI that preceded it may voluntarily choose to apply this NTSN to their operation and maintenance of the subsystem, unless otherwise specified in the Annex of this NTSN or the corresponding national implementation plan.

7. For the purpose of this NTSN, until the national implementation plan referred to in point 7.4.4 'National Implementation Plans' of the Annex is published, the implementation plan published in December 2018 continues to apply.

Article 3

Verification of conformity to this NTSN

1. A trackside or on-board CCS subsystem's conformity to the requirements of this NTSN shall be confirmed by a UK Declaration of Verification following the procedure set out in Schedule 4 to RIR 2011 'UK verification assessment procedure for subsystems'.

2. The procedures specific to this NTSN for assessment of conformity, suitability for use and UK verification are set out in Chapter 6 of the Annex, and shall be based on the modules established in the NTSN concerning modules for the procedures for assessment of conformity or suitability for use and UK verification (the 'Modules NTSN'). Chapter 6 of the Annex specifies the modules from the 'Modules NTSN' that can be applied to assess conformity to this NTSN.

3. It is the responsibility of the applicant for an authorisation to place a subsystem into service to choose the conformity assessment module(s) that should be applied by the Approved Body from the options listed in Chapter 6 of the Annex. The applicant should consider which module is most proportionate and cost effective for the project.

4. Without prejudice to paragraph 5 of this Article, an interoperability constituent's conformity to the requirements of this NTSN shall be confirmed by a UK declaration of conformity or suitability for use. This is required for placing these constituents on the market in Great Britain.

5. Where interoperability constituent specifications in the CCS TSI are equivalent to those of this NTSN, an EC declaration of conformity or suitability for use is valid for demonstrating compliance with this NTSN and for placing these interoperability constituents on the market.

6. Where a 'UK Specific Case' applies to an interoperability constituent, additional assessment may be needed against the Specific Case requirements. See point 7.7 'UK

Specific Cases' of the Annex to this NTSN, and the NTSN concerning the further assessment of interoperability constituents which hold an EC declaration of conformity or suitability for use for further details.

Article 4

Class B systems

1. The functionality, performance and interfaces of the Class B systems shall remain as currently specified, except where modifications are needed to mitigate safety-critical errors in those systems.

Article 5

Error corrections

1. The European Union Agency for Railways, as System Authority for ERTMS, analyses all requests made to it for changes to the system. It prioritises change requests that it categorises as errors that potentially prevent the normal service of the rail system.

2. The European Union Agency for Railways regularly provides a maintenance release of the specifications according to the specification maintenance procedure set out in the CCS TSI. These are made mandatory in GB through publication by the Competent Authority either through this CCS NTSN, a variation to the CCS NTSN, or other document published by the Competent Authority.

Article 6

Train-detection compatibility

1. Infrastructure Managers shall update the values of the required interference current limits/ frequencies from the frequency management for NTSN-compliant train-detection systems as specified in sections ERA/ERTMS/033281 rev 5.0 for their relevant networks in the relevant parameters of the register of infrastructure.

<u>ANNEX</u>

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 running 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 RIR 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 RIR 2011as:

(a)   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) 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) 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) the interfaces;

(3) 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;

(5) automated train operation[3]

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

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

---

[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 the ERTMS/ATO specifications which is the Class A automated train operation.

[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, RMR and ATO and 'ETCS' is indicated as 'ERTMS/ETCS'.

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

For 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.

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

— GW ATP

— RETB

— TPWS

— TVM 430

— Mechanical Trainstops

— KVB

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

(3)   the Class A automated train operation;

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

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].

---

[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.

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

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 Appendix A, Table A 1, 4.1 c.

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 RIR 2011.

The essential requirements are:

(1)   Safety;

(2)   Reliability and Availability;

(3)   Health;

(4)   Environmental Protection;

(5)   Technical compatibility;

(6)   Accessibility.

The essential requirements for Class A systems are described 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 Schedule 2 to the RIR 2011 , taken into account by the basic parameters defined in Chapter 4 of this NTSN.

---

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.

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
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

Basic Parameter Section	Basic Parameter Title	Safety	Reliability-Availability	Health	Environmental protection	Technical compatibility
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
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 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 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 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 3.2.2 (Reliability and Availability).

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 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 4.5 shall be respected.

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 are interfaced with the Operation and Traffic Management Subsystem in order that operational interoperability is achieved. This category is described in Chapter 4.

3.2.3.1.   Engineering Compatibility

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.

3.2.3.1.2.   Railway Internal Electromagnetic Compatibility

The basic parameter related to electromagnetic compatibility between Rolling Stock and Control-Command and Signalling trackside equipment is described in point 4.2.11 (Electromagnetic Compatibility between Rolling Stock and Control-Command and Signalling trackside equipment).

3.3.   ESSENTIAL REQUIREMENTS NOT DIRECTLY COVERED BY THIS NTSN

3.3.1.   Safety

The 'Essential Requirement' 1.1.2 in Schedule 2 to the RIR 2011 is not within the scope of this NTSN.

The 'Essential Requirement' 1.1.4 in Schedule 2 to the RIR 2011. for the Control-Command Signalling trackside subsystems is covered by the applicable national provisions in force.

3.3.2. Health

In accordance with national legislation, care shall be taken to ensure that the materials used 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 Schedule 2 to the RIR 2011. The 'Essential Requirement' 1.3.2 in Schedule 2 to the RIR 2011 for the Control-Command Signalling trackside subsystems is covered by the applicable 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 Schedule 2 to the RIR 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 Schedule 2 to the RIR 2011.

(3) the Control-Command and Signalling equipment shall be subject to 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 Schedule 2 to the RIR 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 Schedule 2 to the RIR 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 Schedule 2 to the RIR 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 Schedule 2 to the RIR 2011 is not within 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 safety characteristics relevant to interoperability (point 4.2.1)

(2) On-Board ETCS functionality (point 4.2.2)

(3) Trackside ETCS functionality (point 4.2.3)

(4) Mobile communication functions for railways RMR (point 4.2.4)

(5) RMR, ETCS and ATO air gap interfaces (point 4.2.5)

(6) On-Board Interfaces Internal to Control-Command and Signalling (point 4.2.6)

(7) Trackside Interfaces Internal to Control-Command and Signalling (point 4.2.7)

(8) Key Management (point 4.2.8)

(9) ETCS-ID Management (point 4.2.9)

(10) Trackside Train Detection Systems (point 4.2.10)

(11) Electromagnetic Compatibility between Rolling Stock and Control-Command and Signalling trackside equipment (point 4.2.11)

(12) ETCS DMI (Driver-Machine Interface) (point 4.2.12)

(13) RMR DMI (Driver-Machine Interface) (point 4.2.13)

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

(15) Trackside Control-Command and Signalling objects (point 4.2.15)

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

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

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

(19) Trackside ATO functionality (point 4.2.19)

(20) Technical documentation for Maintenance (point 4.2.20)

4.1.2. Overview of the requirements

All requirements in point 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 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

point 7.2.9 of this NTSN and in the specifications referred to in Appendix A and these texts also state how the functions are classified.

Appendix A, Table A 1, 4.1 c provides the Glossary of ETCS and ATO terms and definitions, which are used in the specifications referred to in Appendix A.

4.1.3.   Parts of Control-command and Signalling Subsystems

According to point 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
	Automated 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
	Automated 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 3.2.1 (Safety) and point 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 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 rate (THR) shall be 10^{-9} h^{-1} for random failures of the on-board ETCS and 10^{-9} h^{-1} for random failures of the trackside ETCS. See Appendix A, Table A 1, 4.2.1 a.

To achieve interoperability, the on-board ETCS shall fully respect all requirements specified in Appendix A, Table A 1, 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 regulation 5 and Schedule 1 to the Railways and Other Guided Transport Systems (Safety) Regulations 2006;

(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.

Additionally, the correct application of the risk management process as set out in Annex I to 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 Implementing Regulation (EU) No 402/2013. The CSM Assessment Body shall be accredited or recognised according to the requirements in Annex II to Implementing Regulation (EU) No 402/2013 in the fields of 'Control-Command and Signalling' sub-system .

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 subsystem, or ETCS Interoperability Constituent, within its direct physical, functional, environmental, operational and maintenance context.

The application of the standards as referred to in 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 standards from the ones referred to in Appendix A, Table A 3 are applied, at least equivalence shall be proven.

Whenever for an ETCS subsystem or an ETCS Interoperability Constituent the standards as referred to in 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 to the 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 Appendix A, Table A 3 shall be carried out by a CSM assessment body accredited or recognized as specified in the point 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 4.2.20 (Technical documentation for Maintenance) shall be respected.

4.2.2. On-Board ETCS functionality

The basic parameter for ETCS on-board functionality describes all 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 Appendix A, Table A 1, 4.2.2 b and their performance shall conform to Appendix A, Table A 1, 4.2.2 a.

The requirements for tests are specified in Appendix A, Table A 1, 4.2.2 c.

The main functionality is supported by other functions, to which Appendix A, Table A 1, 4.2.2 a and 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 4.2.5.2 (Eurobalise communication with the train for ERTMS applications).

   (b)   Euroloop data transmission. See point 4.2.5.3 (Euroloop communication with the train for ERTMS applications). This functionality is optional on-board .

   (c)   Radio data transmission for radio infill. See Appendix A, Table A 1, 4.2.2 d, point 4.2.5.1 (RMR air gap interface), point 4.2.6.2 (Interface between RMR Radio Data Communication and ETCS) and point 4.2.8 (Key Management). This functionality is optional on-board .

   (d)   Radio data transmission. See point 4.2.5.1 (RMR air gap interface), point 4.2.6.2 (Interface between RMR Radio Data Communication and ETCS) and point 4.2.8 (Key Management). This radio data transmission is optional unless operating on an ETCS level 2 (formerly ETCS level 2 or level 3) line.

(2)   Communicating with the driver. See Appendix A, Table A 1, 4.2.2 e, point 4.2.12 (ETCS DMI (Driver-Machine Interface)).

(3) Communicating with the STM. See point 4.2.6.1 (ETCS and Class B train protection). 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:

   (a) completeness of the train— 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.

(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.

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

(7) Forwarding information/orders and receiving state information from rolling stock to/from the train interface unit. See Appendix A, Table A 1, 4.2.2 f

   Note: The ETCS on-board shall be compliant with the train FFFIS only on newly developed vehicle designs requiring a vehicle type authorisation and/or vehicle authorisation for placing in service issued by the authorising entity for a new vehicle type, and, where applicable, the first vehicle of a type.

(8) Forwarding information/ orders and receiving state information from ATO on-board. See Appendix A, Table A 1, 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 functionalities are:

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

(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 Appendix A, Table A 1, 4.2.3 b and their performance shall conform to Appendix A, Table A 1, 4.2.3 a.

The main functionality is supported by other functions, to which Appendix A, Table A 1, 4.2.3 a and 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 4.2.5.2 (Eurobalise communication with the train for ERTMS applications) and point 4.2.7.4 (Eurobalise/ LEU);

   (b) Euroloop data transmission. See point 4.2.5.3 (Euroloop communication with the train for ERTMS applications) and point 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 point 4.2.5.1.2.1 (GSM-R air gap interface for the ETCS application), point 4.2.7.3.1.1 (GSM-R/trackside ETCS) and point 4.2.8 (Key Management). Radio infill is only relevant in level 1, in which it is optional;

   (d) Radio data transmission. See point 4.2.5.1 (RMR air gap interface), point 4.2.7.3 (RMR/trackside ETCS and RMR/trackside ATO) and point 4.2.8 (Key Management). Radio data transmission is only relevant to ETCS level 2.

(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 ETCS level 2). See point 4.2.7.1 (Functional interface between RBCs) and point 4.2.7.2 (RBC/RBC).

4.2.4.   Mobile communication functions for railways 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

4.2.4.1.1.   GSM-R Basic communication function

The general requirements are specified in Appendix A, Table A 1, 4.2.4 a.

In addition, the following specifications shall be respected:

(1)   ASCI features; Appendix A, Table A 1, 4.2.4 b;

(2)   SIM card; Appendix A, Table A 1, 4.2.4 c;

(3)   location-dependent addressing; Appendix A, Table A 1, 4.2.4 e.

4.2.4.1.2.   FRMCS Basic communication function

The general requirements are specified in Appendix A, Table A 1, 4.2.4 l

In addition, the following specifications shall be respected:

(1)   FRMCS Profile; Appendix A, Table A 1, 4.2.4 n;

4.2.4.2.   Voice and operational communication applications

4.2.4.2.1.   GSM-R Voice and operational communication applications

The general requirements are defined in Appendix A, Table A 1, 4.2.4 f.

The requirements for tests are specified in Appendix A, Table A 1, 4.2.4 g.

In addition, the following specifications shall be respected:

(1)   confirmation of high priority calls; Appendix A, Table A 1, 4.2.4 h;

(2)   functional addressing; Appendix A, Table A 1, 4.2.4 j;

(3)   presentation of functional numbers; Appendix A, Table A 1, 4.2.4 k;

(4)   User-to-User Signalling; Appendix A, Table A 1, 4.2.4 d.

4.2.4.2.2.   FRMCS Voice and operational communication applications

The general requirements are defined in Appendix A, Table A 1, 4.2.4 m.

The requirements for tests are specified in Appendix A, Table A 1, 4.2.4 o.

4.2.4.3.   *Data communication applications for ETCS and ATO*

4.2.4.3.1.   Data communication for ETCS

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 ETCS.

4.2.4.3.1.1.   *GSM-R data communication for ETCS*

The general requirements are defined in Appendix A, Table A 1, 4.2.4 f.

The requirements for tests are specified in Appendix A, Table A 1, 4.2.4 g.

This functionality is mandatory only in the case of ETCS level 2 and radio infill applications.

4.2.4.3.1.2.   *FRMCS data communication for ETCS*

The general requirements are defined in Appendix A, Table A 1, 4.2.4 m.

The requirements for tests are specified in Appendix A, Table A 1, 4.2.4 o.

This functionality is mandatory in the case of ETCS level 2 applications.

4.2.4.3.2.   Data communication for ATO

4.2.4.3.2.1.   *GSM-R data communication for ATO*

The general requirements are defined in Appendix A, Table A 1, 4.2.4 f.

The requirements for tests are specified in Appendix A, Table A 1, 4.2.4 g.

4.2.4.3.2.2.   *FRMCS data communication for ATO*

The general requirements are defined in Appendix A, Table A 1, 4.2.4 m.

The requirements for tests are specified in Appendix A, Table A 1, 4.2.4 o.

4.2.5. RMR, ETCS and 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 RMR equipment, as specified in point 4.2.6 (On-Board Interfaces Internal to Control-Command and Signalling) and point 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. RMR air gap interface

4.2.5.1.1. RMR general air gap interface

4.2.5.1.1.1. GSM-R air gap interface

The air gap interface shall comply with the requirements specified in Appendix A, Table A 1, 4.2.5 a and 4.2.4 f.

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

Note 2: On-Board Control-command and Signalling Subsystems shall be protected against interference, fulfilling the requirements specified in Appendix A, Table A 1, 4.2.4 f.

4.2.5.1.1.2. FRMCS air gap interface

The air gap interface shall comply with the requirements specified in Appendix A, Table A 1, 4.2.5 f.

4.2.5.1.2. RMR air gap interface for ETCS application

4.2.5.1.2.1. GSM-R air gap interface for the ETCS application

The data communication protocols shall comply with Appendix A, Table A 1, 4.2.5 b.

Where radio infill is implemented, the requirements stated in Appendix A, Table A 1, 4.2.5 c shall be respected in addition.

4.2.5.1.2.2.   *FRMCS air gap interface for the ETCS application*

The data communication protocols shall comply with Appendix A, Table A 1, 4.2.5 j.

4.2.5.1.3.   **RMR air gap interface for ATO application**

4.2.5.1.3.1.   *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 Appendix A, Table A 1, 4.2.5 h.

The use of other wireless communication networks, e.g. operated by a public or private Mobile Network Operator, is allowed for the ATO application, however it is considered out of scope of this NTSN.

The use of these networks shall not interfere with GSM-R voice and data communications.

4.2.5.1.3.2.   *FRMCS air gap interface for ATO application*

The data communication protocols shall comply with Appendix A, Table A 1, 4.2.5 i.

4.2.5.2.   *Eurobalise communication with the train for ERTMS applications*

Eurobalise communication interfaces shall comply with Appendix A, Table A 1, 4.2.5 d.

4.2.5.3.   *Euroloop communication with the train for ERTMS applications*

Euroloop communication interfaces shall comply with Appendix A, Table A 1, 4.2.5 e.

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

This Basic Parameter consists of 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 shall be managed with 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, Table A 1, 4.2.6 a.

Appendix A, Table A 1, 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 Appendix A, Table A 1, 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 Appendix A, Table A 1, 4.2.6 b.

Furthermore, if Interface 'K' is implemented, the on-board transmission channel functionality must be able to handle the properties of Appendix A, Table A 1, 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 Appendix A, Table A 1, 4.2.6 a, the method used shall not impose any additional requirements on the Control-Command and Signalling Trackside Subsystem.

4.2.6.2.   *Interface between RMR Radio Data Communication and ETCS/ ATO-applications*

4.2.6.2.1.   Interface between RMR Data Communication and ETCS

4.2.6.2.1.1.   *Interface between GSM-R Data Communication and ETCS*

The requirements for the interface between the on-board GSM-R and the on-board ETCS functionality are specified in Appendix A, Table A 1, 4.2.6 d.

Where radio infill is implemented the requirements stated in Appendix A, Table A 1, 4.2.6 e shall be respected.

4.2.6.2.1.2.   *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, Table A 1, 4.2.6 g.

4.2.6.2.2. Interface between RMR Data Communication and ATO

4.2.6.2.2.1. 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, Table A 1, 4.2.6 j.

4.2.6.2.2.2. 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, Table A 1, 4.2.6 k.

4.2.6.2.3. Interface between FRMCS on-board voice application and on-board FRMCS

The requirements for the interface between FRMCS on-board voice application and on-board FRMCS are specified in Appendix A, Table A 1, 4.2.6 l.

4.2.6.3. Odometry

There are no specific requirements for the odometry interface.

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 Appendix A, Table A 1, 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, Table A 1, 4.2.6 i unless otherwise specified. This interface is only applicable on newly developed vehicle designs requiring a vehicle type authorisation and/or vehicle authorisation for placing in service issued by the authorising entity for a new vehicle type, and, where applicable, the first vehicle of a type.

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 Appendix A, Table A 1, 4.2.7 a.

4.2.7.2.   *RBC/RBC*

This is the technical interface between two RBCs. The requirements are specified in Appendix A, Table A 1, 4.2.7 b.

4.2.7.3.   *RMR/trackside ETCS and RMR/trackside ATO*

4.2.7.3.1.   RMR/trackside ETCS

4.2.7.3.1.1.   *GSM-R/trackside ETCS*

The requirements for the interface between GSM-R and the trackside ETCS functionality are specified in Appendix A, Table A 1, 4.2.7c.

4.2.7.3.1.2.   *FRMCS/trackside ETCS*

The requirements for the interface between FRMCS and the trackside ETCS functionality are specified in Appendix A, Table A 1, 4.2.7 f.

4.2.7.3.2.   RMR/trackside ATO

4.2.7.3.2.1.   *GSM-R/trackside ATO*

The requirements for the interface between GSM-R and the trackside ATO functionality are specified in Appendix A, Table A 1, 4.2.7 g.

4.2.7.3.2.2.   *FRMCS/trackside ATO*

The requirements for the interface between FRMCS and the trackside ATO functionality are specified in Appendix A, Table A 1, 4.2.7 h.

4.2.7.4.   *Eurobalise/LEU*

This is the interface between Eurobalise and the LEU. The requirements are specified in Appendix A, Table A 1, 4.2.7 d.

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

4.2.7.5.   *Euroloop/LEU*

This is the interface between Euroloop and the LEU. The requirements are specified in Appendix A, Table A 1, 4.2.7 e.

This interface contributes to this Basic Parameter only when Euroloop and LEU are supplied as separate interoperability constituents (see point 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 Appendix A, Table A 1 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 Appendix A, Table A 1, 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 Appendix A, Table A 1 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 Appendix A, Table A 1 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 by the driver. See Appendix A, Table A 1, 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. RMR DMI (Driver-Machine Interface)

This basic parameter describes the information provided from RMR to the driver and entered into the RMR on-board by the driver.

It includes:

(1) ergonomics (including visibility);

(2) RMR functions to be displayed;

(3) call-related information outgoing;

(4) call-related information incoming.

4.2.13.1. *GSM-R DMI (Driver Machine Interface)*

See Appendix A, Table A 1, 4.2.13 a for GSM-R.

4.2.13.2. *FRMCS DMI (Driver Machine Interface)*

See Appendix A, Table A 1, 4.2.13 b for FRMCS.

4.2.14. Interface to Data Recording for Regulatory Purposes

This basic parameter describes the data exchange between the on-board ETCS and the rolling stock recording device;

See Appendix A, Table A 1, 4.2.14a.

4.2.15. 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;

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

For 1) and (2) see Appendix A, Table A 1, 4.2.15 a.

For (3) see Appendix A, Table A 1, 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 Appendix A, Table A 2 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.

4.2.17.1. *ETCS System Compatibility*

ETCS System Compatibility (ESC) 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 at 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 of the findings and conditions of the ESC Check Report(s) on the results of the ESC checks passed (defined in one or more ESC Type), 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 ApBo assessment Report according to 6.2.4.3 (ETCS and radio system compatibility checks for Interoperability Constituent).

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 GB 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 ApBo Assessment Report according to 6.3.3.1 (ETCS and radio system compatibility checks).

4.2.17.2. *Requirements for ETCS System Compatibility*

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

The list of ESC Types and ESC Checks are published and maintained by the Competent Authority, or entities it designates, in the GB ESC/RSC technical document. The ESC Types shall only be used when published with status "Valid" in this document.

Infrastructure Managers, with the support of the ETCS suppliers for their network, shall submit to the Competent Authority, or entities it designates, 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. The validity of the previous ESC Types shall also be indicated.

Infrastructure Managers shall classify the ETCS lines according to ESC Types and register the ESC Types in the register of infrastructure referred to in regulation 35 of the RIR 2011.

Infrastructure Manager shall provide the necessary means, laboratory or access to the infrastructure, to perform the checks.

Infrastructure Managers shall submit to the Competent Authority, or entities it designates, 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 point on 7.2.3.4 (Impact on the technical compatibility between on-board and trackside parts of the CCS subsystems) 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.

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 compliance with the equivalent part of the new ESC without the need to execute these checks again. If not fully equivalent, the IM shall indicate a transition period as mentioned in point (7) above.

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 an Approved Body in accordance with points 6.2.4.3 (ETCS and radio system compatibility checks for Interoperability Constituent) or 6.3.3.1 (ETCS and radio system compatibility checks).

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) is the recording of technical compatibility between voice or data radio on-board and the trackside parts of 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 checks passed (defined in one or more RSC Type), which are valid independently from the specific configuration parameters of the on-board Interoperability Constituent and can therefore be used in every applicable 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 ApBo assessment Report according to 6.2.4.3 (ETCS and radio system compatibility checks for Interoperability Constituent).

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 GB 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 ApBo Assessment Report according to 6.3.3.1 (ETCS and radio system compatibility checks).

4.2.17.4. *Requirements for Radio System Compatibility*

The Infrastructure Manager is responsible for defining the RSC type(s). All sections of the GB 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 Competent Authority, or entities it designates, in the GB ESC/RSC technical document. The RSC Types shall only be used when published with status "Valid" in this document.

Infrastructure Managers, with the support of the RMR suppliers for their network, shall submit to the Competent Authority, or entities it designates, 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. The validity of the previous RSC Types shall also be indicated.

Infrastructure Managers shall classify their lines according to RSC Types for voice and, if applicable, ETCS data. This RSC type classification shall be registered in the register of infrastructure referred to in regulation 35 of the RIR 2011.

Infrastructure Manager shall provide the necessary means, laboratory or access to the infrastructure, to perform the checks.

Infrastructure Managers shall submit to the Competent Authority, or entities it designates, 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, point 7.2.3.4 (Impact on the technical compatibility between on-board and trackside parts of the CCS subsystems) 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.

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.

The 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 an Approved Body in accordance with points 6.2.4.3 (ETCS and radio system compatibility checks for Interoperability Constituent) or 6.3.3.1 (ETCS and radio system compatibility checks).

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.

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, Table A 1, 4.2.18 a in addition to those required in point 4.2.2 (On-Board ETCS functionality).

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 point 4.2.5.1 (RMR air gap

interface), point 4.2.6.2 (Interface between RMR Data Communication and ETCS/ATO-applications).

(2) Communicating with the driver. See Appendix A, Table A 1, 4.2.2 e and 4.2.12 a (ETCS DMI).

(3) Forwarding information/orders and receiving state information from rolling stock. See Appendix A, Table A 1, 4.2.18 c.

(4) Forwarding information/orders and receiving state information from on-board ETCS. See Appendix A, Table A 1, 4.2.18 d.

The requirements for tests are specified in Appendix A, Table A 1, 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 in point 4.2.3 (Trackside ETCS functionality), the functions shall be implemented according to Appendix A, Table A 1, 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, point 4.2.5.1 (RMR air gap interface) and point 4.2.7.3 (RMR/trackside ETCS and RMR/trackside ATO).

The requirements for tests are specified in Appendix A, Table A 1, 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.

4.2.20.1.   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

49

maintenance, decommissioning, etc.) For further details on error corrections see points 6.5 (Management of errors) and 7.2.10 (Specifications maintenance (error corrections);

(2) all requirements and procedures (test methods and tools, the required professional competence and the evaluation of the impact of the updated Interoperability Constituent on 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 5 of this NTSN applicable to the subsystems;

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

(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;

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

(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).

4.2.20.2. *Responsibility of the applicant for subsystem verification*

The applicant shall:

(1) ensure that the maintenance requirements as described in point 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 point 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 its subsystems.

4.2.20.3. *System identifier*

The ERTMS (ETCS, RMR, ATO) functionality of an Interoperability Constituent or a subsystem shall be described with a 'system identifier', which is 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.

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	
Trackside Control-Command and Signalling objects	4.2.15	Requirements for signal and line-side marker sighting	4.2.2.8	
Train braking performance and characteristics	4.2.2	Train braking	4.2.2.6	
Use of sanding equipment	4.2.10	Driver's Rule book	4.2.1.2.1	

Interface with Operation and Traffic Management NTSN				
Reference CCS NTSN			**Reference Operation and Traffic Management NTSN**	
Parameter	**Point**	**Parameter**	**Point**	
On-board flange lubrication Use of composite brake blocks				
Interface to Data Recording for Regulatory Purposes	4.2.14	Data recording	4.2.3.5	
ETCS DMI (Driver-Machine Interface)	4.2.12	Format of train running number	4.2.3.2.1	
RMR DMI (Driver-Machine Interface)	4.2.13	Format of 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 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	LOC&PAS NTSN	4.2.3.3.1.1

Interface with Rolling Stock NTSNs				
Reference CCS NTSN		**Reference Rolling Stock NTSNs**		
Parameter	**Point**	**Parameter**		**Point**
		systems based on track circuits	Wagon NTSN	4.2.3.3
		Rolling stock characteristics to be compatible with train detection systems based on axle counters	LOC&PAS NTSN	4.2.3.3.1.2
			Wagon NTSN	4.2.3.3
		Rolling stock characteristics to be compatible with loop equipment	LOC&PAS NTSN	4.2.3.3.1.3
			Wagon NTSN	4.2.3.3
Electromagnetic compatibility between rolling stock and Control-Command and Signalling trackside equipment	4.2.11	Rolling stock characteristics to be compatible with train detection systems based on track circuits	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	LOC&PAS NTSN	4.2.3.3.1.2
			Wagon NTSN	4.2.3.3
Train braking performance	4.2.2 4.2.18	Braking performance	LOC& PAS NTSN - Emergency braking	4.2.4.5.2

Interface with Rolling Stock NTSNs				
Reference CCS NTSN		**Reference Rolling Stock NTSNs**		
Parameter	**Point**	**Parameter**		**Point**
and characteristics			LOC& PAS NTSN - 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	LOC&PAS NTSN	4.2.3.1
			Wagon NTSN	none
Isolation of on-board ETCS functionality	4.2.2	Operating rules	LOC&PAS NTSN	4.2.12.3
			Wagon NTSN	none
Trackside Control-Command and Signalling objects	4.2.15	External visibility Head lights	LOC&PAS NTSN	4.2.7.1.1
			Wagon NTSN	None
		Driver's external field of view	LOC&PAS NTSN - line of sight	4.2.9.1.3.1
			LOC& PAS NTSN - windscreen	4.2.9.2
			Wagon NTSN	None

Interface with Rolling Stock NTSNs				
Reference CCS NTSN		**Reference Rolling Stock NTSNs**		
Parameter	**Point**	**Parameter**		**Point**
Interface to data recording for regulatory purposes	4.2.14	Recording device	LOC&PAS NTSN	4.2.9.6
			Wagon NTSN	none
ETCS on-board: Forwarding information/orders and receiving state information from rolling stock	4.2.2	Separation sections	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
			LOC&PAS NTSN	4.2.9.1.6

Interface with Rolling Stock NTSNs				
Reference CCS NTSN		**Reference Rolling Stock NTSNs**		
Parameter	**Point**	**Parameter**		**Point**
		Driver's desk — Ergonomics	Wagon NTSN	None
		Requirements for management of ETCS modes: sleeping mode	LOC&PAS NTSN	4.2.9.3.8.1
			Wagon NTSN	None
		Requirements for management of ETCS modes: passive shunting	LOC&PAS NTSN	4.2.9.3.8.2
			Wagon NTSN	None
		Requirements for management of ETCS modes: non leading	LOC&PAS NTSN	4.2.9.3.8.3
			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
ATO on-board: Forwarding information/orders and receiving state information from rolling stock	4.2.18	Interface requirements with Automated Train Operation onboard	LOC&PAS NTSN	4.2.13
			Wagon NTSN	None
Emergency braking command	4.2.2	Emergency braking command	LOC&PAS NTSN	4.2.4.4.1

Interface with Rolling Stock NTSNs					
Reference CCS NTSN		**Reference Rolling Stock NTSNs**			
Parameter	**Point**	**Parameter**			**Point**
			Wagon NTSN	none	
Construction of equipment	4.2.16	Material requirements	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 NTSNs					
Reference CCS NTSN		**Reference Infrastructure NTSNs**			
Parameter	**Clause**	**Parameter**			**Clause**
Eurobalise communication (space for installation)	4.2.5.2	Structure gauge	INF NTSN	4.2.3.1	
Euroloop communication (space for installation)	4.2.5.3	Structure gauge	INF NTSN	4.2.3.1	
Trackside Control-Command and Signalling objects	4.2.15	Structure gauge	INF NTSN	4.2.3.1	

4.3.4. Interfaces to Energy Subsystem

Interface with Energy NTSNs				
Reference CCS NTSN		**Reference Energy NTSNs**		
Parameter	**Clause**	**Parameter**		**Clause**
Commands to rolling stock equipment	4.2.2 4.2.3	Phase separation sections System separation points	ENE NTSN	4.2.15 4.2.16

4.4. OPERATING RULES

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

The harmonised text indications and messages displayed on the ETCS Driver Machine Interface are listed under Appendix E.

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. The preparation of these rules shall be done with the assistance of the requirements in 4.2.20 (Technical documentation for Maintenance).

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 RIR 2011. *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. for the Control-Command and Signalling On-board Subsystem;

(2)   Table 5.2. 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.

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, Table A 1, 4.2.6 i:

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

(2)   Interface between ATO On-Board and GSM-R data radio On-Board interface as specified in Appendix A, Table A 1, 4.2.6 j;

(3)   Interface between On-board FRMCS and the CCS applications (ETCS in Appendix A, Table A 1, 4.2.6 g and ATO in Appendix A, Table A 1, 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 section of Chapter 4.

Table 5.1

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

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 4.2.1.2 4.2.20.1
		On-board ETCS functionality (excluding odometry) System identifier	4.2.2 4.2.20.3
		ETCS air gap interfaces RBC (Radio data transmission optional) Radio infill unit (functionality optional) Eurobalise air gap Euroloop air gap (functionality optional)	4.2.5 4.2.5.1.2 4.2.5.1.2.1 4.2.5.2 4.2.5.3
		Interfaces STM (implementation of interface K optional) GSM-R Data Radio On-Board FRMCS Key management ETCS ID Management ETCS Driver-Machine Interface Train interface (see note below) On-board recording device ATO interface	 4.2.6.1 4.2.6.2.1.1 4.2.6.2.1.2 4.2.8 4.2.9 4.2.12 4.2.2 4.2.14 4.2.6.4 4.2.6.5.1

No	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
		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.	
		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
			
			4.2.20.1

		On-board ETCS functionality: only Odometry	4.2.2
		Construction of equipment	4.2.16
3	Standardised interface STM	Interfaces On-board ETCS	4.2.6.1

4	GSM-R voice cab radio
	Note: SIM card, antenna, connecting cables and filters are not part of this
		Reliability, Availability, Maintainability, (RAM):
		    Availability / Reliability
		    Maintainability
			4.2.1.2
			4.2.20.1

		Basic communication functions	4.2.4.1.1
		Voice and operational communication applications	4.2.4.2.1 4.2.20.3

No	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4

	interoperability constituent	Interfaces
		    GSM-R air gap
		    GSM-R Driver-Machine Interface
			4.2.5.1.1.1
			4.2.13.1

		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3 4.2.17.4

5	GSM-R Data 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

		Basic communication functions	4.2.4.1.1
		ETCS data communication applications System identifier	4.2.4.3.1.1 4.2.20.3

		Interfaces
		    On-board ETCS
		    On-board ATOGSM-R air gap
		    GSM-R air gap for ETCS
		    GSM-R air gap for ATO
			4.2.6.2.1.1
			4.2.6.2.2.1
			4.2.5.1.1.1
			4.2.5.1.2.1
			4.2.5.1.3.1

		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3 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	Basic communication functions System identifier	4.2.4.1.1 4.2.20.3
		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3 4.2.17.4

No	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
	SIM cards to be inserted in GSM-R terminal equipment		
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) System identifier	4.2.18 4.2.20.3
		ATO air gap interfaces	4.2.5.1.3
		Interfaces GSM-R Data Radio On-Board FRMCS Train interface ETCS interface CCS Consist network communication layers	4.2.6.2.2.1 4.2.6.2.2.2 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): Availability / Reliability Maintainability	4.2.1.2 4.2.20.1
		Basic communication functions	4.2.4.1.2
		Voice and operational communication applications System identifier	4.2.4.2.2 4.2.20.3
		Interfaces On-board FRMCS	4.2.6.2.3

No	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
		FRMCS Driver-Machine Interface	4.2.13.2
		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 System identifier	4.2.4.1.2 4.2.20.3
		Interfaces FRMCS on-board voice application FRMCS air gap FRMCS air gap for ETCS application FRMCS air gap for ATO application On-board ETCS On-board ATO CCS Consist network communication layers	 4.2.6.2.3 4.2.5.1.1.2 4.2.5.1.2.2 4.2.5.1.3.2 4.2.6.2.1.2 4.2.6.2.2.2 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 network operator to ensure that the FRMCS profile is	Basic communication functions System identifier	4.2.4.1.2 4.2.20.3
		Construction of equipment	4.2.16
		Radio System Compatibility (RSC) (optional)	4.2.17.3 4.2.17.4

No	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
	made available to the subscribers.		

Table 5.2

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 4.2.1.2 4.2.20.1
		Trackside ETCS functionality (excluding communication via Eurobalises, radio infill and Euroloop) System identifier	4.2.3 4.2.20.3
		RMR, ETCS and ATO air gap interfaces: only radio communication with train GSM-R air gap interface for ETCS FRMCS air gap interface for ETCS	4.2.5.1.2.1 4.2.5.1.2.2

1	2	3	4
No	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
		Interfaces	
		Neighbouring RBC	4.2.7.1, 4.2.7.2
		GSM-R Data radio communication	4.2.7.3.1.1
		FRMCS Trackside	4.2.7.3.1.2
		Key management	4.2.8
		ETCS-ID Management	4.2.9
		Construction of equipment	4.2.16

2	Radio infill unit	Reliability, Availability, Maintainability, Safety (RAMS):
		     Safety
		     Availability / Reliability
		     Maintainability
			4.2.1.1
			 4.2.1.2
			 4.2.20.1

		Trackside ETCS functionality (excluding communication via Eurobalises, Euroloop and level 2 functionality) System identifier	4.2.3 4.2.20.3
		RMR, ETCS and ATO air gap interfaces: only radio communication with train GSM-R air gap interface for ETCS	4.2.5.1.2.1

		Interfaces
		     GSM-R Data radio communication
		     Key management
		     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
3	Eurobalise	Reliability, Availability, Maintainability, Safety (RAMS): Safety	4.2.1.1 4.2.1.24.2.20.1

1	2	3	4
No	Interoperability constituent IC	Characteristics	Specific requirements to be assessed by reference to Chapter 4
		Availability / Reliability Maintainability	
		ETCS and RMR air gap interfaces: only Eurobalise communication with train System identifier	4.2.5.2 4.2.20.3
		Interfaces LEU — Eurobalise	4.2.7.4
		Construction of equipment	4.2.16

4	Euroloop	Reliability, Availability, Maintainability, Safety (RAMS):
		
		    Safety
		
		    Availability / Reliability
		
		    Maintainability
			4.2.1.1
			
			4.2.1.2
			
			4.2.20.1

		ETCS and RMR air gap interfaces: only Euroloop communication with train System identifier	4.2.5.3 4.2.20.3
		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
			4.2.1.1
			
			4.2.1.2
			
			4.2.20.1

		Trackside ETCS functionality (excluding communication via radio in-fill, Euroloop and level 2 functionality) System identifier	4.2.3 4.2.20.3

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
			4.2.1.1
			4.2.1.2
			4.2.20.1

		Trackside ETCS functionality (excluding communication via radio in-fill, Eurobalise and level 2 functionality) System identifier	4.2.3 4.2.20.3
		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
		System identifier	4.2.20.3
		RMR, ETCS and ATO air gap interfaces: only radio communication with train	
		GSM-R air gap interface for ATO	4.2.5.1.3.1
		FRMCS air gap interface for ATO	4.2.5.1.3.2
		Interfaces:	
		GSM-R Data radio communication	4.2.7.3.2.1
		FRMCS Trackside	4.2.7.3.2.2
		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 6.2.1, 6.2.2, 6.2.3, 6.2.4);

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

In case of changes to existing subsystems, the requirements in point 7.2.2 for on-board subsystems and 7.2.3 for trackside subsystems shall be considered in the assessment.

6.1.1.2. Partial fulfilment of NTSN requirements

An on-board subsystem may, if fulfilling both conditions below, not implement all mandatory functionalities specified in this NTSN:

(3)   the functionalities are listed in Appendix G;

(4)   the Infrastructure Manager has indicated in the register of infrastructure referred to in regulation 35 of the RIR 2011 that the partial fulfilment of the listed requirement does not prevent an optimal and safe operation on its network;

Where a control-command and signalling interoperability constituent or subsystem does not implement all functionalities specified in this NTSN, the relevant conditions for use shall reflect it in accordance with points 6.5.1 and 6.5.2.

6.1.2. Principles for testing ETCS, ATO and 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 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 test 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 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 its authorised representative shall draw up a 'UK' declaration of conformity in accordance with regulation 25 of and Schedule 7 to the RIR 2011 .

The assessment procedure shall be carried out using one of the modules specified in point 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[7].

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 its authorised representative may choose:

---

7 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)   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 its representative may choose Module 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:

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

(2)   the activities shown in Table 6.1.1 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 an Approved 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 6.1.1 and by application of modules for UK Conformity according to point 6.2.2. This information shall be provided by the

manufacturer with corresponding references to the technical documentation relating to the existing EC or UK certificate. The manufacturer shall justify and document that applicable requirements are met at interoperability constituent level, which shall be assessed by an Approved 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 6.1.1

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 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
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

No	Aspect	What to assess	Supporting evidence
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 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 eliminate systematic failures	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) 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

No	Aspect	What to assess	Supporting evidence
			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:
			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;

No	Aspect	What to assess	Supporting evidence
			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).
6	Technical documentation for maintenance	Check compliance with maintenance requirements – point 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.

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 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 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[8] and the standards referred to in Appendix A, Table A 4 to carry out tests with the use of the test architecture and the procedures specified in Appendix A Table A 1:

   (a)   For on-board ETCS supporting up to system version 2.1: 4.2.2 c.

   (b)   For on-board ETCS supporting up to system version 2.2 and 3.0: not included, see previous point (1).

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.   *Class B interfaces*

It shall be verified that the Class B systems and their interfaces to the ETCS onboard Interoperability constituent conform to national requirements.

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 6.1.1, they are not required for issuing an interoperability constituent certificate.

If ESC/RSC checks are executed at Interoperability Constituent level, the task of the ApBo with regards to the ESC/RSC Interoperability Constituent statement(s) and associated report is to verify the correctness and completeness of the ESC/RSC

---

8 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.

check report for the Interoperability Constituent, according to the requirements in this point.

 The Approved Body performing this assessment may be a different one from the Approved Body performing the UK conformity or suitability procedure for the interoperability constituent.

Table 6.1.2

ApBo 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 document(s) published by the Competent Authority [1]. Assess that the Interoperability Constituent check report clearly indicates which checks have been verified from the ESC/RSC Type.	Evaluation of the ESC/RSC Check Report.
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.
[1] This includes the documents referred to in the GB ESC/RSC Technical Document.			

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 RIR 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 RIR 2011.

The content of the "UK" declaration of verification shall conform to Schedule 5 to the RIR 2011.

The assessment procedure shall be carried out using the modules specified in point 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 4.2 of Module SB (type-examination), design review is requested.

With reference to point 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 6.2.1 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,

(3)   the update due to specifications maintenance of an already integrated Interoperability Constituent will not require additional verification by a subsystem Approved Body if the Interoperability Constituent Approved 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 6.2.1

Conformity assessment requirements for an On-board Subsystem or for groups of Parts

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 the characteristics of the subsystem and of the environment	Analysis by document check
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

No	Aspect	What to assess	Supporting evidence
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 4.2.20.3	Document check
3	Integration of parts in the subsystem	Check the interfaces and integration between the different parts of the subsystem – Table 4.1 and Basic parameter 4.2.6.	Impact analysis by document checks
4a	Integration with rolling stock	Check the correct installation of equipment — Basic Parameters 4.2.2, 4.2.4, 4.2.14, 4.2.18 and conditions for installation of equipment, as specified by the manufacturer	Results of checks (according to specifications referenced in the Basic Parameters and the manufacturer's installation rules)
4b		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

No	Aspect	What to assess	Supporting evidence
			characteristics of rolling stock)
4c		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)
5a	Integration with Class B depending on ETCS on-board and Class B interface	Check that the standardised interface 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
5b		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
5c		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[9]

---

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

No	Aspect	What to assess	Supporting evidence
5d		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
6a	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.
6b		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 supporting evidence.
6c		Check that the equipment can handle a RMR call for voice and data (if applicable) – Basic Parameter 4.2.5	Test with a certified RMR network. The ability to set up, maintain and disconnect a connection is the supporting evidence.
7a	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

No	Aspect	What to assess	Supporting evidence
			Evaluation and Assessment.
7b		Check that the quantitative reliability target is met — Basic Parameter 4.2.1	Calculations
7c		Check the compliance with requirements about maintenance – point 4.2.20.2	Documents check
8	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 a Signalling Subsystem is compatible wit the rolling stock environment – basic parameter 4.2.16 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 RMR voice equipment. Note: Indicate in the certificate which conditions have been tested and which standards have been applied.	Reports of test runs.

6.3.3.1.   ETCS and radio system compatibility checks

The task of the ApBo 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 point.

Since the ESC/RSC checks are not required in Table 6.2.1, 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 in conjunction with relevant ESC/RSC checks in the register of infrastructure referred to in regulation 35 of the RIR 2011. Where no specific ESC/RSC check is required to demonstrate technical compatibility this will be identified by the IM as ESC-GB-0 or RSC- GB-0 in the register of infrastructure referred to in regulation 35 of the RIR 2011.

Table 6.2.2

ApBo 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 document(s) published by the Competent Authority. Assess that all required ESC/RSC checks of that ESC/RSC type have been evaluated;	Evaluation of the ESC/RSC Check Report.
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 has been performed and recorded using the template provided in Appendix D.	Evaluation of the ESC/RSC Check Report.

No	Aspect	What to assess	Supporting evidence
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.

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

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 NTSN 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.

(3)   the update due to specifications maintenance of an already integrated Interoperability Constituent will not require additional verification by a subsystem Approved Body if the Interoperability Constituent Approved 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

No	Aspect	What to assess	Supporting evidence
2a	Integration of interoperability constituents in the subsystem Note: Only those with a specific assessment at subsystem level.	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 Interoperability Constituent axle counter and Marker Boards)	Checks according to specifications
2b		Check that additional functions (not specified in this NTSN) do not impact the mandatory ones (N/A for Interoperability Constituent 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 Interoperability Constituent axle counter and Marker Boards)	Check of design specifications
2d		For IC axle counters (only): The integration of the Interoperability Constituent in the subsystem has to be verified: Check index 77 document Chapter 4, table 16 "conformity assessment". 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.	Document check

No	Aspect	What to assess	Supporting evidence
		In case of modification of the functional or realisation part of the system identifier, that the modification corresponds to the definition – Basic Parameter 4.2.20.3	
3	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 meet their intended operational purpose) – Basic parameter 4.2.15	Design documentation, results of tests or test runs with NTSN compliant rolling stock
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	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)

No	Aspect	What to assess	Supporting evidence
5b	(not applicable for train detection part)	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
6a	Integration with Control-Command and Signalling On-board Subsystems	Check the 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.

No	Aspect	What to assess	Supporting evidence
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) (excluding train detection)	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
8b		Check that quantitative reliability targets are respected — Basic Parameter 4.2.1.2	Calculations
8c		Check the compliance with requirements about maintenance – point 4.2.20.2	Document check
9	Integration with Control-Command and Signalling On-board Subsystems and rolling stock: tests under conditions representing	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,	Reports of test runs.

No	Aspect	What to assess	Supporting evidence
	the intended operation.	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.	
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.	Document check of the envisaged ESC/RSC types in case they are new or modified. OR The technical compatibility checks for ESC and RSC Type are published as 'Valid' in the GB ESC/RSC technical document, if they remain unchanged.

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

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

Pursuant to regulation 17 of the RIR 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 2.2 (Scope) of this NTSN, the trackside and on-board control-command and signalling subsystems contain parts, as specified in point 4.1 (Introduction), and this section only relates to those defined parts.

A UK certificate of verification may be issued for each part or for a combination of parts specified in this NTSN.

Regardless of which module is chosen, the approved body shall check that the requirements (all relevant requirements as specified in Table 6.2.1) are fulfilled for:

(1)   the part in question; and

(2)   its interfaces to the unchanged parts of the subsystem; and

(3)   the integration with the unchanged parts of the subsystem.

For the CCS on-board subsystem: In any case of assessment of parts the UK certificate(s) of verification issued by the Approved Body(ies) shall consider one of the following options:

(1)   A UK certificate of verification of the CCS on-board subsystem covering all parts, or

(2)   A UK certificate of verification for each of the following groups of parts:

(a)   Train protection, data radio communication and automated train operation parts, and

(b)   Voice radio communication part.

The UK certificate of verification shall state and provide evidence on the fulfilment of all requirements in Table 6.2.1, and on possible interfaces between parts or absence thereof, in one of the following ways:

(1)   the absence of interfaces with the other part/group of parts; or

(2)   in case of interfaces with the other part/group of parts, the absence of the conditions and limits of use of the other part/group of parts.

In case of interfaces that require conditions and limits of use in line with the requirements specified in Table 6.2.1 of this NTSN and that export constraints to the other part/group of parts, there shall be a UK subsystem certificate; or

(3)   In case the subsystem consists of only one part/group of parts, no additional assessment on subsystem level is necessary if the assessment of the part/group of parts covers all NTSN requirements for that part/group of parts. In this case the UK certificate of verification for the part replaces the subsystem UK certificate of verification.

6.4.2.   Intermediate Statement of Verification

If conformity is assessed for subsystems specified by the applicant and different from the parts allowed in Table 4.1 and the assessment process is different from the process described in point 6.4.1 (Assessment of parts of control-command and signalling subsystems) 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.

The applicants and/or suppliers may be applying their own solution to the identified error once the error related change request has been validated. For ERTMS the European Union Agency for Railways ('the Agency') as the system authority defines, publishes, and applies the procedure for managing requests for changes to the ERTMS specifications. To that end, the Agency maintains and

updates a register of requests for changes to ERTMS specifications and their status, accompanied by the relevant justifications.

Any such temporary solution to the identified error, that does not export constraints to the other subsystem, may be applied until the agreed error correction is adopted in a new version of CCS NTSN. Once a solution to the identified error is adopted in a new NTSN version the applicants and/or suppliers shall apply the adopted solution to the existing vehicles according to the earlier of the following conditions:

(a)   If implementation of error correction does not require authorisation: at the next occasion when error correction is mandatory by virtue of table B1.1 row 1 and in any case not before 1.1.2026.

(b)   If implementation of error correction requires authorisation: at the next reauthorisation resulting from another change to the vehicle train protection (ETCS) system

(c)   At the next upgrade to a higher system version of the vehicle train protection part.

Note: For Interoperability constituents for which the result of the information to be provided as described in point 7.2.10.1 indicates that there is no impact regarding safety, operation and interoperability, an update is not required.

Error corrections might impact the CCS trackside and CCS on-board subsystems. The Agency organises 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 UK certificates

The approved bodies shall describe the restrictions and conditions for use of interoperability constituents and subsystems in the relevant UK certificates.

In the accompanying technical file issued by the ApBo the template of Appendix D shall be used.

6.5.2.   Content of UK declarations

The interoperability constituent's manufacturer or the subsystem applicant shall describe in the UK declaration of conformity or verification the restrictions and conditions for use.

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

7. IMPLEMENTING THE NTSN CONTROL-COMMAND AND SIGNALLING

7.1. INTRODUCTION

This Chapter outlines the 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 NTSNs.

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 2.2 (Scope).

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

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

7.2.2. Changes to an existing On-Board subsystem

This point defines the principles to be applied by the entities managing the change and authorising entities in line with the UK verification procedure described in regulation 17 and Schedule 4 of the RIR 2011 and the Modules NTSN.

This point applies in case of any change(s) to an existing on-board subsystem or on-board subsystem type, including renewal or upgrade. It does not apply in case of changes that do not introduce a deviation from the technical files accompanying the EC or UK declarations for verification for the subsystems.

7.2.2.1. *Rules to manage changes in on-board CCS subsystems*

(1) Parts, as defined in Table 4.1 of this NTSN, and basic parameters of the on-board subsystem that are not affected by the change(s) are exempt from conformity assessment against the provisions in this NTSN. The list of parts

and basic parameters affected by the change is to be provided by the entity managing the change.

(2) The entity managing the change shall inform an Approved Body of all changes affecting the conformity of the subsystem with the requirements of the relevant NTSN(s) requiring new checks in accordance with the Modules NTSN and by application of modules SB, SD/SF or SH1 for the UK verification. This information shall be provided by the entity managing the change with corresponding references to the technical documentation relating to the existing EC or UK certificate.

(3) The entity managing the change has to justify and document that applicable requirements remain consistent at subsystem level, and this has to be assessed by an Approved Body.

(4) The changes impacting the Basic Design Characteristics of the on-board subsystem are defined in Table 7.1 (Basic Design Characteristics) and shall be classified as a change in the basic design characteristics of the vehicle type that does not require an authorisation under the Railways (Interoperability) Regulations 2011 or a change that requires a new authorisation under the Railways (Interoperability) Regulations 2011, and in accordance with Table 7.1 (Basic Design Characteristics) changes not impacting but related to the Basic Design Characteristics shall be classified by the entity managing the change as changes that introduce a deviation from the technical files accompanying the UK declarations for verification for the subsystems which may require new checks and therefore require verification according to the applicable conformity assessment modules but which do not have any impact on the basic design characteristics of the vehicle type and do not require a new authorisation according to the Railways (Interoperability) Regulation 2011.

(5) Changes not covered by point 7.2.2.1(4) above are deemed not to have any impact on the basic design characteristics. They shall be classified by the entity managing the change as a change that does not require a new authorisation according to the RIR 2011.

(6) All changes shall remain compliant with the applicable NTSNs regardless of its classification.

Table 7.1

Basic Design Characteristics

1. NTSN Point	2. Related basic design characteristic(s)	3. Changes not impacting the basic design characteristics	4. Changes impacting the basic design characteristic but not requiring an authorisation to place in service	5. Changes impacting the basic design characteristic and requiring an authorisation to place in service
4.2.2 On-Board ETCS functionality	ETCS equipment on-board and the set of specification of CCS NTSN Appendix A	Not applicable	Not applicable	Use another Appendix A set of specifications.
	Envelope of legally operated ETCS system versions	Not applicable	Not applicable	Installation or start the operational use of ETCS; Modification of the envelope of legally operated ETCS system versions from set of specifications in Appendix A.
	ETCS On-board implementation	Fulfilling all the conditions in point 7.2.2.2 (change of realisation identifier)	Not applicable	Not fulfilling all the conditions in point 7.2.2.2 (change of functional identifier)
	Managing information about the completeness	Not applicable	Adding or removing train	Not applicable

	of the train (not from driver)		integrity supervision	
	Safe consist length information from on-board necessary to access the line and SIL	Not applicable	Adding or removing safe consist length information	Not applicable
4.2.17.1 ETCS System Compatibility	ETCS System Compatibility	Not applicable	Adding or removing an ESC statement fulfilling all the conditions in point 7.2.2.4.	Adding or removing an ESC statement not fulfilling all the conditions in point 7.2.2.4.
4.2.4 Mobile communication functions for railways RMR 4.2.4.2.1 GSM-R Voice and operational communication applications	GSM-R Radio voice on board and its Baseline	Usage of another Baseline fulfilling all the conditions in point 7.2.2.3	Not applicable	Installation or start the operational use of GSM-R cab radio; Usage of another Baseline not fulfilling all the conditions in point 7.2.2.3.
	GSM-R Voice and operational communication implementation	Fulfilling all the conditions in point 7.2.2.3 (change of realisation identifier)	Not applicable	Not fulfilling all the conditions in point 7.2.2.3 (change of functional identifier)
	GSM-R Voice SIM Card support of Group ID 555	Not applicable	Change the SIM Card support of Group ID 555	Not applicable
4.2.17.3 Radio System Compatibility	Radio Voice System Compatibility	Not applicable	Adding or removing an RSC statement fulfilling all the	Adding or removing an RSC statement not fulfilling all

			conditions in point 7.2.2.4.	the conditions in point 7.2.2.4.
4.2.4 Mobile communication functions for railways RMR 4.2.4.3.1.1 GSM-R data communication for ETCS	GSM-R Radio Data communication on board and its Baseline	Usage of another Baseline fulfilling all the conditions in point 7.2.2.3.	Not applicable	Installation or start the operational use of GSM-R EDOR; Usage another Baseline not fulfilling all the conditions in point 7.2.2.3.
4.2.4.3.2.1 GSM-R data communication for ATO	GSM-R Data communication for ETCS and ATO implementation	Fulfilling all the conditions in point 7.2.2.3 (change of realisation identifier)	Not applicable	Not fulfilling all the conditions in point 7.2.2.3 (change of functional identifier)
4.2.17.3 Radio System Compatibility	Radio Data System Compatibility	Not applicable	Adding or removing an RSC statement fulfilling all the conditions in point 7.2.2.4.	Adding or removing an RSC statement not fulfilling all the conditions in point 7.2.2.4.
4.2.4 Mobile communication functions for railways RMR 4.2.4.1.1 GSM-R Basic communication function	Voice SIM Card GSM-R Home Network	Not applicable	Replacement of an NTSN compliant GSM-R SIM Card by another NTSN compliant GSM-R SIM Card with a different GSM-R Home Network	Not applicable
	Data SIM Card GSM-R Home Network	Not applicable	Replacement of an NTSN compliant	Not applicable

			GSM-R SIM Card by another NTSN compliant GSM-R SIM Card with a different GSM-R Home Network	
4.2.18 On-Board ATO functionality	On-board ATO system version	Not applicable	Change of the ATO system version fulfilling all the conditions in point 7.2.2.3.	Add or remove the ATO part of the CCS on-board subsystem; Start the operational use of ATO. Or change of the ATO system version not fulfilling all the conditions in point 7.2.2.3.
	On-board ATO implementation	Fulfilling all the conditions in point 7.2.2.3 (change of realisation identifier)	Not applicable	Not fulfilling all the conditions in point 7.2.2.3 (change of functional identifier)
7.2.5 Legacy systems	Class B or other train protection, control and warning legacy systems installed (system and, if applicable, version)	The requirements for Class B system are the responsibility of the Competent Authority.	The requirements for Class B system are the responsibility of the Competent Authority.	Add or remove Class B train protection systems. The requirements for Class B system are the responsibility of the

				Competent Authority.
	Class B or other radio legacy systems installed (system and, if applicable, version)	The requirements for Class B system are the responsibility of the Competent Authority.	The requirements for Class B system are the responsibility of the Competent Authority.	Add or remove Class B radio legacy systems. The requirements for Class B system are the responsibility of the Competent Authority.

(7) In order to establish the UK certificate of verification, the Approved Body may refer to:

    (a) The original EC or UK certificate of verification for parts of the design that are unchanged or those that are changed but do not affect the conformity of the subsystem, as far as it is still valid.

    (b) Amendments to the original EC or UK certificate of verification for modified parts of the design that affect the conformity of the subsystem with the applicable TSI or NTSN version used for the EC or UK verification.

(8) In any case, the entity managing the change shall ensure that the technical documentation which is relating to the UK or EC certificate is updated accordingly.

(9) The updated technical documentation, related to the UK or EC certificate is referred to in the technical file accompanying the UK declaration of verification issued by the entity managing the change for on-board subsystem declared as conformant to the modified type.

7.2.2.2. *Conditions for a change in the On-board ETCS functionality that does not impact the basic design characteristics*

(1) The target functionality[10] remains unchanged or is set to the state already expected during the original certification or authorisation. Target

---

[10] Target functionality refers to the ETCS functionality that has been evaluated in the subsystem UK or EC certificate. Published error corrections for the NTSN are considered to define the functionality state already expected during the original certification or authorisation.

functionality is considered unchanged when applying the specification maintenance (error correction) process described in point 7.2.10 which includes the implementation of error corrections or the implementation of mitigation measures.

(2)   The interfaces relevant for safety & technical compatibility remain unchanged or are set to the state already expected during the original certification or authorisation.

(3)   The result of the safety judgement (e.g. safety case according to EN 50126) remains unchanged.

(4)   No new safety related application conditions (SRAC) or interoperability constraints have been added due to the change.

(5)   A CSM assessment body (CSM RA) as specified in point 4.2.1 has independently assessed the applicant's risk assessment and within it the demonstration that the change does not adversely affect safety. The applicant's demonstration shall include the evidence that the change actually corrects the causes of the initial deviation of the functionality.

(6)   Depending on the type of change:

(a)   In the case where the change is made due to a product error: The change is performed under a quality management system approved by an approved body. For other modules it shall be justified that the verification performed remains valid[11].

(b)   In the case where the change is made due to the specification maintenance process (there are updated specifications in Appendix A Table A 2 with the descriptions of the error correction): an updated UK or EC design examination or UK or EC type examination certificate for the Interoperability Constituents or Subsystem with the implementation of error corrections is needed. In this case the provisions of point 6.3.3 (3) apply.

(7)   The individual configuration management defines a 'system identifier' (as defined in 4.2.20.3) and the 'functional identifier' of the 'system identifier' has not been changed after the change.

(8)   The change shall be part of the configuration management as defined in 7.2.3.1 (6).

---

[11] All activities required for a modification which are performed outside a quality management system approved by an approved body might require additional examinations or tests by the approved body.

7.2.2.3. Conditions for a change in the on-board mobile communication functions for railways or in the ATO on-board functionality that does not impact the basic design characteristics

(1) The target functionality[12] remains unchanged or is set to the state already expected during the original certification or authorisation. Target functionality is considered unchanged when applying the specification maintenance (error correction) process described in point 7.2.10, which includes either the implementation of error corrections or the implementation of mitigation measures.

(2) The interfaces relevant for technical compatibility remain unchanged or are set to the state already expected during the original certification or authorisation

(3) Depending on the type of change:

    (a) In the case where the change is made due to a product error: The change is performed under a quality management system approved by an approved body. For other modules it shall be justified that the verification performed remains valid[13].

    (b) In the case where the change is made due to the specification maintenance process (there are updated specifications in Appendix A Table A 2 with the descriptions of the error correction): an updated UK or EC design examination or UK or EC type examination certificate for the Interoperability Constituents or Subsystem with the implementation of error corrections is needed. In this case the provisions of point 6.3.3(3) apply.

(4) The change shall be part of the configuration management as defined in 7.2.3.1 (6).

---

[12] Target functionality refers to the mobile communication functionality that has been evaluated in the subsystem UK or EC certificate. Published error corrections for the NTSN are considered to define the functionality state already expected during the original certification or authorisation.

[13] All activities required for a modification which are performed outside a quality management system approved by an approved body might require additional examinations or tests by the approved body.

7.2.2.4. Conditions for a change in the on-board subsystem regarding ETCS or Radio system compatibility that does not impact the basic design characteristics

(1) No safety related application conditions (SRAC) or interoperability constraints related to the technical compatibility with the network have been added or removed due to the addition or removal of an ESC or RSC statement.

(2) No interoperability constraints (restrictions or conditions for use) related to the technical compatibility with the network have been added or removed due to the ESC or RSC statement.

7.2.3. Upgrade or renewal of existing trackside subsystem

This point defines the principles to be applied by the entities managing the change and authorising entities in line with the UK verification procedure described in regulation 17 and Schedule 4 of the RIR 2011 and the Modules NTSN.

7.2.3.1. Rules to manage upgrade or renewal of existing trackside CCS subsystems

In the event of upgrading or renewing the Control-Command and Signalling Subsystems bearing an EC or UK certificate of verification the following rules apply:

(1) The changes require new authorisation if they impact basic parameters as defined in Table 7.2.

Table 7.2

Trackside basic parameters modifications which require a new authorisation

Basic Parameter		Modification which requires a new authorisation
4.2.3	Trackside ETCS functionality	Not fulfilling all the conditions in point 7.2.3.2
4.2.4 4.2.4.2	Mobile communication functions for railways RMR Voice and operational communication applications	Not fulfilling all the conditions in point 7.2.3.3
4.2.4 4.2.4.3	Mobile communication functions for railways RMR	Not fulfilling all the conditions in point 7.2.3.3

	Data communication applications for ETCS and ATO	
4.2.19	Trackside ATO functionality	Not fulfilling all the conditions in point 7.2.3.3

(2)   The changes are permitted to be dealt with by only re-assessing those modifications that affect the conformity of the subsystem with the applicable TSI or NTSN version used for the EC or UK verification. The entity managing the change has to justify and document that applicable requirements remain consistent at subsystem level, and this has to be assessed by an Approved Body.

(3)   The entity managing the change shall inform the Approved Body of all changes that may affect the conformity of the subsystem with the requirements of the relevant TSI(s) or NTSN(s), or the conditions for validity of the certificate.

This information shall be provided by the entity managing the change with corresponding references to the technical documentation relating to the existing EC or UK certificate.

(4)   A UK Certificate reflecting the changes that affect the conformity to the NTSN shall be established by an Approved Body. In order to establish the UK certificate, the Approved Body may to refer to:

(a)   The original EC or UK certificate for parts of the design that are unchanged or those that are changed but do not affect the conformity of the subsystem, as far as it is still valid.

(b)   Additional EC or UK certificate (amending the original certificate) for modified parts of the design that affect the conformity of the subsystem with the applicable TSI or NTSN version used for the EC or UK verification.

(5)   In any case, the entity managing the change shall ensure that the technical documentation which is relating to the UK or EC certificate is updated accordingly.

(6)   'Configuration management' means a systematic organisational, technical and administrative process put in place throughout the lifecycle of a CCS subsystem to ensure that the consistency of the documentation and the traceability of the changes are established and maintained so that:

(a)   requirements from relevant national rules are met;

(b)   changes are controlled and documented either in the technical files or in the file accompanying the issued authorisation;

(c)   information and data is kept current and accurate;

(d)   relevant parties are informed of changes, as required.

7.2.3.2.   Conditions for an upgrade or renewal in the trackside ETCS functionality that, if not fulfilled, requires new authorisation for placing in service

(1)   The target functionality[14] of the basic parameter 4.2.3 remains unchanged or is set to the state already expected during the original certification or authorisation. Target functionality is considered unchanged when applying the specification maintenance (error correction) process described in point 7.2.10, which includes the implementation of error corrections or the implementation of mitigation measures.

(2)   The interfaces of the basic parameter 4.2.3 relevant for safety & technical compatibility remain unchanged or are set to the state already expected during the original certification or authorisation.

(3)   The result of the safety judgement (e.g. safety case according to EN 50126) remains unchanged.

(4)   No new safety related application conditions (SRAC) or interoperability constraints have been added due to the change.

(5)   When required in point 4.2.1, a CSM assessment body (CSM RA) has independently assessed the applicant's risk assessment and within it the demonstration that the change does not adversely affect safety. In the case where the change is due to product error, the applicant's demonstration shall include the evidence that the change actually corrects the causes of the product error.

(6)   Depending on the type of change:

(a)   In the case where the change is made due to a product error: The change is performed under a quality management system approved by

---

[14] Target functionality refers to the ETCS functionality that has been evaluated in the subsystem UK or EC certificate. Published error corrections for the NTSN are considered to define the functionality state already expected during the original certification or authorisation.

an approved body. For other modules it shall be justified that the verification performed remains valid[15]

(b) In the case where the change is made due to the specification maintenance process (there are updated specifications in Appendix A Table A 2 with the descriptions of the error correction solution): an updated UK or EC certificate for the Interoperability Constituents or Subsystem with the implementation of error corrections is needed. In this case the provisions of point 6.3.4 (3) apply.

(7) The individual configuration management defines a 'system identifier' (as defined in 4.2.20.3) and the 'functional identifier' of the 'system identifier' has not been changed after the change.

(8) The change shall be part of the configuration management as defined in 7.2.3.1 (6).

7.2.3.3. Conditions for an upgrade or renewal in the trackside mobile communication for railways or trackside ATO functions that, if not fulfilled, requires a new authorisation for placing in service

(1) The target functionality[16] of basic parameters 4.2.4.2, 4.2.4.3 and 4.2.19 remain unchanged or is set to the state already expected during the original certification or authorisation. Target functionality is considered unchanged when applying the specification maintenance (error correction) process described in point 7.2.10, which includes either the implementation of error corrections or the implementation of mitigation measures.

(2) The interfaces of basic parameters 4.2.4.2, 4.2.4.3 and 4.2.19 relevant for technical compatibility remain unchanged or are set to the state already expected during the original certification or authorisation.

(3) Depending on the type of change:

(a) In the case where the change is made due to a product error: The change is performed under a quality management system approved by an approved body (e.g. according to modules CH1, SH1, CD, SD). For

---

[15] All activities required for a modification which are performed outside a quality management system approved by an approved body might require additional examinations or tests by the approved body, as described in the Modules NTSN.

[16] Target functionality refers to the mobile communication functionality that has been evaluated in the subsystem UK or EC certificate. Published error corrections for the NTSN are considered to define the functionality state already expected during the original certification or authorisation.

other modules (e.g. CF, SF, SG) it shall be justified that the verification performed remains valid[17].

(b)   In the case where the change is made due to the specification maintenance process (there are updated specifications in Appendix A Table A 2 with the descriptions of the error correction solution): an updated UK or EC certificate for the Interoperability Constituents or Subsystem with the implementation of error corrections is needed. In this case the provisions of point 6.3.4 (3) apply.

(4)   The change shall be part of the configuration management as defined in 7.2.3.1 (6).

7.2.3.4.   *Impact on the technical compatibility between on-board and trackside parts of the CCS subsystems*

Infrastructure managers shall ensure that changes to an existing trackside subsystem allow the continuation of the operation of NTSN compliant[18] on-board subsystems in operation on the lines concerned by the changes.

This requirement is not applicable when the changes are due to the implementation of a new level application trackside, by requirements defined in 7.2.9.1 (1) and (4), or by requirements of an incompatible application (e.g. change to a new X of M_VERSION as defined in 7.4.2.4).

7.2.4.   UK type or design examination certificates

7.2.4.1.   *CCS On-Board Subsystem*

7.2.4.1.1.   Definitions

(1)   Initial assessment framework for CCS On-Board Subsystem

The initial assessment framework is the CCS NTSN applicable at the beginning of the design phase when the approved body for the CCS on-board Subsystem is contracted by the applicant.

(2)   Certification framework for CCS On-Board Subsystem

---

[17] All activities required for a modification which are performed outside a quality management system approved by an approved body might require additional examinations or tests by the approved body.

[18] On-Board subsystems with conditions and restrictions of use or non-detected deficiencies are not considered compliant regarding this clause.

The certification framework is the CCS NTSN applicable at the time of issuing the UK type or design examination certificate. It is the initial assessment framework amended with the revisions of NTSNs that came into force during the design phase, and applicable as per the transition regime described in Appendix B.

(3) Design phase for CCS On-Board Subsystem

The design phase for the CCS subsystem is the period starting once an approved body, which is responsible for UK verification, is contracted by the applicant and ending when the UK type or design examination certificate is issued.

(4) Production phase for CCS On-Board Subsystem

The production phase is the period during which the CCS on-board subsystem may be placed in service on the basis of a UK declaration of verification referring to a valid UK type or design examination certificate.

(5) Vehicle in operation

The vehicle is in operation when it is registered with 'Valid' registration code '00', in the National Vehicle Register in accordance with Commission Decision 2007/756/EC or in the European Vehicle Register in accordance with Commission Implementing Decision (EU) 2018/1614 and maintained in a safe state of running in accordance with Commission Implementing Regulation (EU) 2019/779.

7.2.4.1.2.   Rules related to the UK type or design examination certificate

(1) The approved body shall issue the UK type or design examination certificate referring to the certification framework

(2) When a revision of this NTSN comes into force during the design phase, the approved body shall issue the UK type or design examination certificate according to the following rules:

For changes in the NTSNs that are not referenced in Appendix B, conformity with the initial assessment framework leads to conformity to the certification framework. The Approved Body shall issue the UK type or design examination certificate referring to the certification framework without additional assessment.

For changes in the NTSNs that are referenced in Appendix B, their application is mandatory according to the transition regime defined in this Appendix B.

During the defined transition period, the Approved Body may issue the UK type or design examination certificate referring to the certification framework without additional assessment. The Approved Body shall list in the UK type or design examination certificate all the points (from Table B1.1) assessed according to the initial assessment framework.

(3)   When several revisions of this NTSN come into force during the design phase, the paragraph (2) above shall apply to all revisions successively.

(4)   It is always permissible (but not mandatory) to use a most recent version of any NTSN, either totally or for particular points, unless explicitly otherwise specified in the revision of these NTSNs; in case of application limited to particular points, the applicant has to justify and document that applicable requirements remain consistent, and this has to be approved by the approved body.

7.2.4.1.3.   Validity of the UK type or design examination certificate

When a revision of this NTSN comes into force, the UK type or design examination certificate for the subsystem remains valid unless it is required to be revised according to the specific transition regime of an NTSN change as defined in Appendix B of this NTSN.

7.2.4.2.   CCS Trackside Subsystem

The CCS Trackside Subsystem shall comply with the NTSN in force at the time of the request for authorisation of placing in service.

When a revision of this NTSN comes into force, the UK type or design examination certificate for the subsystem remains valid unless it is required to be revised according to the transition regime of a NTSN change as defined in Appendix B (Table B2) of this NTSN.

7.2.4.3.   Interoperability constituents

UK design or type certificates of interoperability constituents already placed on the market based on a previous version of this NTSN and EC design or type certificates of interoperability constituents already placed on the market based on a previous version of the CCS TSI remain valid even if a revision of this NTSN comes into force, unless a requirement is applicable at CCS subsystem level which impacts the interoperability constituent (as specified in Table B1.1 or Table B2 of Appendix B) or unless explicitly otherwise specified in the revision of this NTSN within Table B3 of Appendix B.

During this time, these interoperability constituents are permitted to be placed on the market without a new design or type examination.

7.2.5. 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.

7.2.6. Availability of Specific Transmission Modules and interfaces to Class B on-board

If trackside that fall within the scope of this NTSN are not equipped with the Class A train protection system, the Competent Authority, or entities it designates, shall ensure the availability of a Specific Transmission Module (STM) or products and/or specifications that would allow the integration of its legacy Class B train protection system with the Class A on-board system. For lines equipped with more than one Class B system, the requirement applies to at least one of these Class B systems.

The Competent Authority, or entities it designates, shall publish within one year of the entry into force of the NTSN, the Class B system (s) for which the requirement is met.

The Class B on-board and its interface, for existing products that have already demonstrated integration with Class A NTSN compliant products, shall correspond to any of the technical possibilities defined in point 4.2.6.1. In the case where there is no system available that has already demonstrated integration with Class A NTSN compliant on-board system, the solution made available shall be with standardised interface (STM).

The Competent Authority, or entities it designates, shall publish the specifications of the interfaces between class A and class B on-board train protection systems within 1 year after entry into force of the NTSN.

If for a particular class B system, the only solution available in the market is Class B and Class A integrated within the same equipment, the holders of the Class B specifications (e.g. supplier, railway undertaking, infrastructure manager) shall provide the specifications, for the parts they hold, necessary for integration of this Class B system with a compliant ETCS on-board. Any relevant intellectual property they hold shall be made available on a FRAND (fair, reasonable and non-discriminatory) terms basis. The holders of the specifications shall ensure the information provided is sufficient to allow other manufacturers to integrate class B with any ETCS on-board in existing rolling stock.

In this context, due regard is to be given to ensuring an open market for Class B and STM under fair commercial conditions. If, for technical or economic reasons, including applicable intellectual property rights, the availability of an STM or a Class B with its complete interface specifications to a class A system cannot be ensured,

the Competent Authority, or entities it designates, shall publish the underlying reasons for the problem and of the mitigation measures that it intends to put into place in order to allow operators — and in particular foreign operators — access to its infrastructure.

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

On a line equipped with ETCS and/or 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 phase.

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

7.2.8. Vehicle with Class A and Class B equipment

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 Class B system is not installed trackside.

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.

For vehicle equipped with class A, class B train protection systems may be implemented according to requirements defined in point 4.2.6.1 and following the requirements in point 7.2.6.

7.2.9. 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 point 7.2.9.1 to 7.2.9.3. The trackside implementation of one of these optional functions which leads to a new mandatory on-board requirement on specific lines shall be notified a minimum of 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 register of infrastructure referred to in regulation 35 of the RIR 2011 and these changes shall be listed in the Network Statement produced under regulation 13 of the Railway (Access, Management and Licensing of Railway Undertakings) Regulations 2016. A notification period shorter than 5 years is only allowed if this is agreed between the IM and RUs who run services or intend 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 Competent Authority.

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

7.2.9.1. ETCS

(1) An ETCS Level 2 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 confirmed train length information as specified in Appendix A, Table A 2, index 27.

(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).

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

(4) When ETCS trackside needs a specific ETCS system version, the on-board shall be equipped according to the implementation requirements listed in 7.4.2.4.2.

7.2.9.2. 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.

Note: Where ATO GoA1/2 functionality is implemented over Class B trackside, the specifications of ATO trackside in Appendix A of this NTSN should be applied in order to facilitate the future migration to ATO on lines to be equipped with ETCS.

(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 the register of infrastructure referred to in regulation 35 of the RIR 2011 the services requiring mandatory ATO on-board implementation.

Note: Where ATO GoA1/2 functionality is implemented over Class B trackside, the ATO on-board implementation is based on contractual agreements between the IM and RUs and as such there are no mandatory ATO GoA1/2 implementation requirements until ATO trackside and Class B trackside lines are migrated to a fully compliant ETCS including ATO trackside specifications in Appendix A of this NTSN.

7.2.9.3. *RMR*

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

7.2.10. Specifications maintenance (error corrections)

7.2.10.1. *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 next legal release of this NTSN, errors are classified as preventing normal service or as not preventing normal service.

For the errors preventing normal service, on-board manufacturers, operators, e.g. providing input on the occurrence of the error during normal service, and infrastructure managers with the necessary input from the trackside manufacturers shall describe their products and system implementations with respect to the situation identified 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 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 NTSN compliant network.

The Agency publishes the results of the ERA questionnaires in a transparent manner.

7.2.10.2. *On-board and Trackside Manufacturer responsibilities*

After the publication of the error corrections in a legal release, manufacturers shall update their Interoperability Constituents accordingly and are responsible for maintaining the Interoperability Constituents as requested in point 4.2.20.1 (including maintaining the associated EC or UK Certificates) and according to the transition requirements in Appendix B (Table B3). These updated Interoperability Constituents (including the associated EC or UK Certificates) shall be made available for integration in the concerned subsystems according to Appendix B (Table B3).

Note: For Interoperability constituents for which the information previously provided as described in point 7.2.10.1 indicates that there is no impact regarding safety, operation and interoperability, an update is not required.

7.2.10.3. *Infrastructure Manager and Railway Undertaking responsibilities*

7.2.10.3.1. **Infrastructure Manager responsibilities**

In case the impact of one of the errors as described in point 7.2.10.1 is identified as unacceptable on the Infrastructure Manager's network, the Infrastructure Manager, based on the information previously provided by on-board manufacturers within the ERA questionnaires, shall identify the ERTMS vehicles authorised to run on its network or being authorised to run on its network that have not implemented a solution which mitigates the interoperability or safety problem caused by the specification error. In case of significant impact on existing vehicles running on its network reported by on-board manufacturers (with the support of operators), the Infrastructure Manager can voluntarily decide to evaluate the implementation of temporary trackside mitigation measures in order to facilitate existing vehicles to continue their services until on-board error corrections are implemented.

The Infrastructure Manager shall register in the related register of infrastructure parameter which error corrections are applicable (i.e. the errors preventing normal service in the network) for the on-board. This shall be registered at the latest 12 months after the entry into force of the NTSN or shall be registered in case of new or upgrade trackside implementation within its network.

For impacted ERTMS trackside subsystems, Infrastructure Managers shall implement the relevant trackside error corrections enabling an NTSN compliant CCS on-board (including on-board error correction implementation) to provide a normal service, in accordance with appendix B (Table B2) of this CCS NTSN.

This Infrastructure Manager shall update -if applicable- 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).

7.2.10.3.2. Railway Undertakings responsibilities

The Railway Undertakings shall compare the error corrections registered in the register of infrastructure referred to in regulation 35 of the RIR 2011for the area of use of the vehicle with the information previously provided as described in point 7.2.10.1 to identify the necessary error corrections to be implemented in the vehicles.

For impacted ERTMS on-board subsystems, Railway Undertakings with support of the on-board manufacturers shall implement the necessary error corrections in the CCS on-board subsystems in accordance with appendix B (Table B1.1) of this CCS NTSN.

7.3. 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 needs data radio communication.

(4)   Implementation of ETCS level 1 with radio infill needs GSM-R 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 notification period of 5 years where GSM-R services shall be stopped. This notification shall only be done when FRMCS on-board Interoperability Constituents' specifications, as listed in Table 5.1 and Appendix A, are completed and published with an amendment of this CCS NTSN which allows the tendering of the complete FRMCS on-board equipment. This notification shall be done within the register of infrastructure referred to in regulation 35 of the RIR 2011 and these changes shall be listed in the Network Statement produced under regulation 13 of the Railway (Access, Management and Licensing of Railway Undertakings) Regulations 2016.

and

—   Condition 2: 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 Competent Authority.

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

Minimum notification period of 5 years where FRMCS services shall be in operation. This notification can only be done when FRMCS on-board Interoperability Constituents' specifications, as listed in Table 5.1 and Appendix A, are completed and published with an amendment of this CCS NTSN which allows the tendering of the complete FRMCS on-board equipment. This notification shall be done within the register of infrastructure referred to in regulation 35 of the RIR 2011 and these changes shall be listed in the Network Statement produced under regulation 13 of the Railway (Access, Management and Licensing of Railway Undertakings) Regulations 2016.

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 shall be notified to the Competent Authority.

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 or on a line including at least one RBC not supporting 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 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 or level 1 with radio infill 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 2 need data radio communication.

7.4.   ETCS SPECIFIC IMPLEMENTATION RULES

7.4.1.   Trackside installations

Euroloop and radio infill data transmission shall not be installed, nor operated .

The trackside installations shall comply with the harmonised engineering rules referenced under index 13 (subset 40) and shall be operated without restriction under the operating rules set out in the Appendix A of the OPE NTSN. The Safety Authority shall confirm compliance.

Infrastructure Manager shall communicate through the register of infrastructure referred to in regulation 35 of the RIR 2011 to operators the time and date when authorised ERTMS trackside installations will be put in operation.

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 from 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 NTSN before the entry into force of this NTSN and with more than 1000 km or 25% in operation or under construction before 31 December 2020, can 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 entry into force of this NTSN for upgraded or renewal projects in the network under the following conditions:

(1)   *This provision has been left intentionally blank*

(2)   The 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 documents published by the Competent Authority or published releases of the specifications, according to point 7.2.10.

(4)   In addition, any modification performed in infrastructure compliant with former set of specifications #1 shall ensure that the previous conditions (2) and (3) are also preserved.

Networks that implement and operate ETCS lines according to former set #2 and set #3 as in Appendix A, Table A2.2 and Table A2.3 of previous versions of this NTSN before the entry into force of this NTSN, can continue to use those specifications

for the placing into service for 7 years after publication of this NTSN for new projects and for 10 years after entry into force of this NTSN for upgraded or renewal projects in the network under the following conditions:

(1)   The 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.

(2)   The Infrastructure Manager shall implement the relevant error corrections and the harmonised or equivalent mitigation measures in documents published by the Competent Authority or published releases of the specifications, according to point 7.2.10.

(3)   In addition, any modification performed in infrastructure compliant with former set of specifications #2 and #3 shall ensure that the previous conditions (1) and (2) 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, 2.3 and 3.0. In accordance with the process defined in 7.4.4, the IM shall notify which lines make use of which system version. This notification shall be done within the register of infrastructure referred to in regulation 35 of the RIR 2011 and these changes shall be listed in the Network Statement produced under regulation 13 of the Railway (Access, Management and Licensing of Railway Undertakings) Regulations 2016.

The trackside implementation leading to ETCS on-board system version 3.0 is allowed if the following condition is fulfilled:

Minimum notification period of 5 years for the lines where ETCS system version 3.0 is a mandatory on-board requirement for the vehicles operating on its network. The notification of lines for which ETCS on-board system version 3.0 is required both for vehicles being authorised and for vehicles operating on its network can only become mandatory applicable after an amendment of this CCS NTSN (see Table B1.1). 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.

7.4.2. On-board installations

7.4.2.1. Newly built vehicles

1. In order to be placed in service, newly built vehicles shall be equipped and ready for operation with ETCS in accordance with this NTSN.

7.4.2.2. Existing vehicles

When authorising existing vehicles in accordance with regulation 7 of the RIR 20211, they shall be equipped and ready for operation with ETCS (Class A train protection system) in accordance with this NTSN if installing any new Class B train protection system in a control-command and signalling on-board subsystem.

It is mandatory to fulfil points 7.4.2.4.1 and 7.4.2.4.2 if upgrading the existing ETCS on-board part within a vehicle.

It is not needed to fulfil points 7.4.2.4.1 and 7.4.2.4.2 if correcting the existing ETCS on-board functionality within a vehicle.

7.4.2.3. Rules for the extension of the area of use for existing vehicle

The following rules apply to existing vehicles in operation and registered in the National Vehicle Register in accordance with regulation 36 of the RIR 2011, or in the European Vehicle Register in accordance with Implementing Decision (EU) 2018/1614, when requesting an extension of the area of use:

(1) Vehicles shall comply with relevant special provisions applicable in the specific cases referred to in point 7.7 of this Annex and with relevant national technical rules.

(2) Vehicles already equipped with ETCS, GSM-R or FRMCS do not need to be upgraded, except where required for technical compatibility with ETCS, GSM-R or FRMCS.

(3) Vehicles that are not equipped with ETCS shall install ETCS and comply with sets of specifications referred to in Table A 2 of Appendix A. It is mandatory to fulfil points 7.4.2.4.1 and 7.4.2.4.2.

(4) When the vehicle is intended for use on a network where at least one section is equipped with Class A RMR, vehicles that are not yet equipped with a Class A RMR voice radio shall install a Class A RMR voice cab radio which is technically compatible with the radio network, except if this network is superimposed to a legacy Class B radio communication system compatible with the class B already installed in the vehicle. In such a case, the Class A

RMR voice radio shall comply with the specifications referred to in Table A 2. of Appendix A.

(5)   When the vehicle is required to install ETCS in accordance with point (3) and it is intended to operate in a network in the extended area of use that is equipped with ETCS Level 2, vehicles that are not yet equipped with the Class A RMR data communication, shall install at least one of the Class A RMR data radio which is technically compatible with the radio network. In such case, the Class A RMR data radio shall comply with the specifications referred to in Table A 2 of Appendix A.

(6)   Where an authorised vehicle benefited from non-application of NTSNs or part of them pursuant to regulation 14 of the RIR 2011, the applicant shall seek exemption(s) for the extended area of use in accordance with regulation 14 of the RIR 2011.

(7)   When the request for extending the area of use is combined with a request for new authorisation upgrading the existing CCS on-board subsystem train protection part, it is mandatory to fulfil point 7.4.2.4.1 and 7.4.2.4.2.

7.4.2.4.   ETCS System Version implementation rules

7.4.2.4.1. 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 2.1 inclusive;

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

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

7.4.2.4.2. 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 7.4.2.4.1[19]. The required envelope of legally operated ETCS system versions shall be defined based on the notified system versions in the register of infrastructure[20] for the intended area of use of the vehicle type specified in its authorisation. The vehicle type shall implement the ETCS system version

---

[19] If set of specification #1 is used based on clause 7.4.2.3 point 3 (b) from the CCS NTSN published on 1 January 2021, the requirement remains applicable to enforce compliance with set specifications #2 or #3 within a period of time not exceeding 1 July 2023

[20] The changes of the notified system versions in the register of infrastructure shall be listed in the Network Statement produced under regulation 13 of the Railway (Access, Management and Licensing of Railway Undertakings) Regulations 2016

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 7.2.10.

7.4.3. *This provision has been left intentionally blank*

7.4.4. National Implementation Plans

The Competent Authority shall direct a national plan for the implementation of this NTSN, considering the coherence, economic viability, interoperability and safety of the GB rail systems, to be developed in consultation with affected parties and published.

The national implementation plan shall be updated regularly, as appropriate, with an ambition to progressively include the following information [unless agreed with the Competent Authority]:

(1) General migration strategy including the assessment of the needs expressed by the railway undertakings and the infrastructure managers

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

(a) Facts and figures on installed train protection, ATO, radio and train detection 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 point 7.2.6.

(c) On-board CCS subsystems, based on the available information.

(3) 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, with detailed information on cross border sections and nodes. If applicable, information on the baseline and levels update strategy;

(2) Radio Part: information on radio systems (e.g. radio circuit switching, 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

(6) On-board CCS subsystems.

Appropriate network maps shall be provided giving an indicative view over the next 20 years of the above.

7.5. 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.

7.6. 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 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.

7.7.   UK SPECIFIC CASES

7.7.1.   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 (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 below shall be read in conjunction with the relevant points 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 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.

7.7.2. List of UK specific cases

7.7.2.1.   This provision has been left intentionally blank

7.7.2.2.   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	T3	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: Requirements for the amount of sand dispensed from sanding systems and the installation positions of sanding systems on rolling stock are set out in National Technical Rules	T3	
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.	T3	There is no impact on interoperability

UK Specific case	Category	Notes
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.	T3	There is no impact on interoperability
4.2.6.1. ETCS and Class B train protection When an ERTMS/ETCS fitted train enters or is operating in Level NTC Shunting mode, the associated Class B onboard train protection function shall remain active.	T3	This addresses a conflict with Railway Safety Regulations (SI 1999/2244, regulation 3)

Appendix A   [21]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 1

References between basic parameters and mandatory specifications

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
4.2.2	
4.2.2 a	14
4.2.2 b	4, 13, 60, 104
4.2.2 c	31, 37 b, 37 c, 37 d
4.2.2 d	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	4, 13, 60
4.2.4	
4.2.4 a	64, 65

---

[21] In former versions of the TSI and NTSN this was named Annex A. In some of the documents of Table A 2 the references to CCS TSI Annex A or CCS NTSN Annex A shall be read as CCS NTSN Appendix A.

Reference in Chapter 4	Index number (see Table A 2)
4.2.4 b	66
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 i	Intentionally deleted
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	Intentionally deleted
4.2.5 h	86, 10a, 10d, 33, 34
4.2.5 i	86, 10a, 10c, 10d, 92, 94, 95
4.2.5 j	10a, 10b, 10c, 10d, 39, 40, 92, 94, 95
4.2.6	
4.2.6 a	8, 25, 26, 36 c, 49, 52
4.2.6 b	29, 45

Reference in Chapter 4	Index number (see Table A 2)
4.2.6 c	46
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, 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, 93, 99, 94, 95
4.2.7	
4.2.7 a	12
4.2.7 b	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 g	34, 10a, 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 3.1)
4.2.11	
4.2.11 a	77 (point 3.2)

Reference in Chapter 4	Index number (see Table A 2)
4.2.12	
4.2.12 a	6
4.2.13	
4.2.13 a	32, 33
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, 85
4.2.18 b	98
4.2.18 c	88
4.2.18 d	87
4.2.19	
4.2.19 a	84, 85
4.2.19 b	98

Specifications

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 F 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

List of mandatory specifications

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 1			
	Reference	Name of Specification	Version	Notes
1	Intentionally deleted			
2	Intentionally deleted			
3	SUBSET-023	Glossary of Terms and Abbreviations	4.0.0	
4	SUBSET-026	System Requirements Specification	4.0.0	
5	SUBSET-027	FIS Juridical Recording	4.0.0	
6	ERA_ERTMS_015560	ETCS Driver machine interface	4.0.0	
7	SUBSET-034	Train interface FIS	4.0.0	
8	SUBSET-035	Specific Transmission Module FFFIS	4.0.0	
9	SUBSET-036	FFFIS for Eurobalise	4.0.0	
10a	SUBSET-037-1	EuroRadio FIS – Part 1 [Communication layer and coordination function]	4.0.0	
10b	SUBSET-037-2	EuroRadio FIS – Part 2	4.0.0	

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 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	
12	SUBSET-039	FIS for the RBC/RBC handover	4.0.0	
13	SUBSET-040	Dimensioning and Engineering rules	4.0.0	
14	SUBSET-041	Performance Requirements for Interoperability	4.0.0	
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	4.0.0	
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	4.0.0	

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 1			
	Reference	**Name of Specification**	**Version**	**Notes**
		values to ETCS variables		
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	4.0.0	
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	
32	EIRENE FRS	GSM-R Functional requirements specification	8.1.0	Note 7
33	EIRENE SRS	GSM-R System requirements specification	16.1.0	Note 7
34	A11T6001	(MORANE) Radio Transmission FFFIS for EuroRadio	14.0.0	
35	Intentionally deleted			
36 a	Intentionally deleted			

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 1			
	Reference	Name of Specification	Version	Notes
36 b	Intentionally deleted			
36 c	SUBSET-074-2	FFFIS STM Test cases document	4.0.0	
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	EN 16494	Railway applications. Requirements for ERTMS Trackside Boards	2015	
39	SUBSET-092-1	ERTMS EuroRadio Conformance Requirements	4.0.0	
40	SUBSET-092-2	ERTMS EuroRadio test cases safety layer	4.0.0	
41	Intentionally deleted			
42	Intentionally deleted			
43	SUBSET 085	Test specification for Eurobalise FFFIS	4.0.0	
44	Intentionally deleted			
45	SUBSET-101	Interface "K" Specification	2.0.0	
46	SUBSET-100	Interface "G" Specification	2.0.0	

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 1			
	Reference	Name of Specification	Version	Notes
47	Intentionally deleted			
48	Reserved	Test specification for mobile equipment GSM-R		Note 3
49	SUBSET-059	Performance requirements for STM	4.0.0	
50	SUBSET-103	Test specification for Euroloop	1.1.0	
51	Intentionally deleted			
52	SUBSET-058	FFFIS STM Application layer	4.0.0	
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	4.0.0	
61	Intentionally deleted			
62	Intentionally deleted			
63	SUBSET-098	RBC-RBC Safe Communication Interface	4.0.0	
64	EN 301 515	Global System for Mobile Communication	3.0.0	Note 1

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 1			
	Reference	Name of Specification	Version	Notes
		(GSM); Requirements for GSM operation on railways		
65	TS 102 281	Detailed requirements for GSM operation on railways	3.1.1	Note 2
66	TS 103 169	ASCI Options for Interoperability	1.1.1	
67	(MORANE) P 38 T 9001	FFFIS for GSM-R SIM Cards	6.0.0	Note 7
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	
70	(MORANE) F 12 T 6002	FIS for Confirmation of High Priority Calls	5	
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	

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 1			
	Reference	Name of Specification	Version	Notes
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	5.0	Note 6
78	Intentionally deleted			Note 5
79	SUBSET-114	KMC-ETCS Entity Off-line KM FIS	4.0.0	
80	Intentionally deleted			Note 4
81	SUBSET-119	Train Interface FFFIS	4.0.0	
82	SUBSET-120	Train Interface - Safety requirements	4.0.0	
83	SUBSET-137	On-line Key Management FFFIS	4.0.0	
84	SUBSET-125	ERTMS/ATO System Requirement Specification	1.0.0	

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 1			
	Reference	Name of Specification	Version	Notes
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 / Rolling Stock FFFIS Application Layer	1.0.0	
89	SUBSET-143	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	Note 8
93	FU-7120	FRMCS FRS	1.0.0	Note 9
94	AT-7800	FRMCS SRS	1.0.0	Note 9
95	FIS-7970	FRMCS FIS	1.0.0	Note 8
96	Reserved	[FFFIS for FRMCS profile placeholder		
97	Reserved	[FRMCS Test specifications placeholder]		

Index No	ETCS Baseline 4 Release 1; RMR: GSM-R Baseline 1 Maintenance Release 1 + FRMCS Baseline 0; ATO Baseline 1 Release 1			
	Reference	Name of Specification	Version	Notes
98	SUBSET-151	ATO-OB / ATO-TS Test Specifications	Reserved	
99	TOBA-7510	On-board FRMCS FRS	1.0.0	Note 9
100	Intentionally deleted			
101	21E089	Engineering rules for harmonised marker boards	1-	
102	13E154	ERTMS/ATO Glossary	2-	
103	*Intentionally left blank*			
103(GB)		GB ESC/RSC technical document	Version published on the Competent Authority website	
104	SUBSET-153	Exceptions for on-board reduced envelopes of system versions	Reserved	

Note 1: 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 2: 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 3: 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 6.1.2 of this NTSN, will be introduced in these tables.

Note 4: 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 5: Information that was intended for index 78 is now incorporated in Index 27 (SUBSET-091).

Note 6: This document is ETCS, RMR and ATO baseline independent.

Note 7: Only the (MI) requirements are mandated by CCS NTSN.

Note 8: These specifications, as regards to ETCS and ATO on-board equipment, shall be fully implemented.

Note 9: These specifications, in their current version, as regards to FRMCS on-board equipment, are not considered complete for the purpose of tendering the on-board equipment.

Table A 3

List of standards

The application of the version of the standards listed in the table below, and their subsequent amendments can be used to support the risk management process as set out in Annex I of the Common Safety Method for Risk Evaluation and Assessment, without prejudice to 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 +A1:2024	
A2	EN 50128	Railway applications — Communication, signalling and processing systems — Software for railway control and protection systems	2011 +A2:2020	
A3	EN 50129	Railway applications — Communication, signalling and processing systems — Safety related electronic systems for signalling	2018 +AC:2019	
A4	EN 50159	Railway applications — Communication, signalling and processing systems	2010 +A1:2020	
A5	EN 50126-2	Railway Applications — The specification and demonstration of reliability, availability, maintainability and safety (RAMS) – Part 2: Systems Approach to Safety	2017	2

Note 2: 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

B.1   Changes of requirements and transition regimes for On-Board Subsystems

Table B1.1

Transition Regime[22] for CCS On-Board Subsystem

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
CCS On-Board Error corrections							
1	Appendix A + point 7.2.10.3	No mandatory implementation of error corrections published in technical opinions	CCS Subsystems with mandatory implementation of registered error corrections for functionality ETCS up to system version 2.1 and GSM-R.	For legal releases (with maintenance of specifications) published before 1 January 2026: If one or more registered errors are identified for the area of use for which a new authorisation is required: the CCS subsystem integrated into a vehicle type shall implement the necessary error corrections at the latest 6 months after the update of the concerned interoperability constituents. Note: If one or more registered errors are identified for the area of use for which no new authorisation is required, the CCS subsystem		For legal releases (with maintenance of specifications) published before 1 January 2026: If one or more registered errors are identified for the area of use: the CCS subsystem integrated into a vehicle shall implement the necessary error corrections the latest - 1 year after the update of the concerned interoperability constituents (as defined in Table B3) in the case no new authorisation is required;	

<hr>

[22] Definition of phases provided in point 7.2.4.1.1

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
				integrated into a vehicle type is considered compliant with the update of the concerned interoperability constituents (as defined in Table B3).		or - 1 year after the update of the vehicle type in the case a new authorisation is required;	
				For legal releases (with maintenance of specifications) published after 1 January 2026: If one or more registered errors are identified for the area of use for which a new authorisation is required: the CCS subsystem integrated into a vehicle type shall implement the full maintenance package of error corrections at the latest 6 months after the update of the concerned interoperability constituents. Note: If one or more registered errors are identified for the area of use for which no new authorisation is required, the CCS subsystem integrated into a vehicle type is considered compliant with the update of the concerned interoperability constituents (as defined in Table B3).		For legal releases (with maintenance of specifications) published after 1 January 2026: If one or more registered errors are identified for the area of use: the CCS subsystem integrated into a vehicle shall implement the full maintenance package of error corrections the latest - 1 year after the update of the concerned interoperability constituents (as defined in Table B3) in the case no new authorisation is required; or - 1 year after the update of the vehicle type in the case a new authorisation is required;	
ETCS On-Board implementation							

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
2	Points 7.4.2.1, and 7.4.3	7.4.2.1.2. and 7.4.3(2) grants exemptions for new vehicles to be equipped with ETCS	7.4.2.1.2. and point 7.4.3(2) deleted. All newly built vehicles shall be equipped with ETCS.	Directly applicable Note: Design phase started after NTSN enters into force here relates to 'RST design phase' for vehicles without ETCS. For special vehicles applicable from 1 January 2026 with respect to 7.4.3.2.	Applicable from 1 January 2028 Note: Design phase started before NTSN enters into force here relates to 'RST design phase' for vehicles without ETCS. For special vehicles applicable from 1 January 2030 with respect to 7.4.3.2.	Applicable from 1 January 2030 Note: Production phase here related to 'RST production phase' for vehicles without ETCS.	Not applicable
3	Point 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 requiring a new authorisation	Directly applicable For special vehicles applicable from 1 January 2026.	Applicable from 1 January 2028 Note: Remains directly applicable to high-speed vehicles according to previous CCS NTSN. For special vehicles applicable from 1 January 2030.	Not applicable	Not applicable
4	Point 7.4.2.3 (3)	7.4.2.4 extension area of use:	7.4.2.4 extension area of use:	Not applicable	Not applicable	Not applicable	Applicable from 1 January 2030

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
		exemptions to install ETCS in point (3)	exemptions deleted in point (3)				
ETCS system versions							
5	Appendix A - 7.4.2.4.1 and 7.4.2.4.2 for envelope of legally operated ETCS system versions from 1.0 up to 2.1	The minimum reduced on-board envelope is the envelope up to ETCS system version 2.0.	The minimum reduced on-board envelope is the envelope up to ETCS system version 2.1.	Applicable 3 years after entry into force of the NTSN	Applicable from 1 January 2030	Applicable on newly built vehicles from 1 January 2030	Not applicable
6	Appendix A - 7.4.2.4.1 and 7.4.2.4.2 for envelope of legally operated ETCS system versions from 1.0 up to 2.2.	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 1 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: - 1 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 1 January 2025:			

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
				the ETCS system version 2.2 is applicable if the design phase is not ended within the latest date between following dates: - 1 January 2030; - 5 years after the notification date from the IM;			
7	Appendix A - 7.4.2.4.1, 7.4.2.4.2 and 7.4.1.3 for envelope of legally operated ETCS system	Not applicable	On-board implementation of notified ETCS functions from system version 3.0[23]	Not applicable. Note: Transition regime after entry into force of CCS NTSN amendment[24]: Design phase started after notification from IM and notification is done after 2 years of the CCS NTSN amendment:	Not applicable. Note: Transition regime after entry into force of CCS NTSN amendment[23]: The ETCS system version 3.0 is applicable if the design phase has not	Not applicable. Note: Transition regime after entry into force of CCS NTSN amendment[23]: the notified ETCS system version 3.0 is mandatory when	Not applicable. Note: Transition regime after entry into force of CCS NTSN amendment: the notified ETCS system version 3.0 is mandatory

---

[23] Note: If the Competent Authority has agreed with the stakeholders to implement the new ETCS system version 3.0 (see clause 7.4.4), the IM shall notify the dates when the ETCS on-board system version 3.0 shall be a mandatory on-board requirement according to clause 7.4.1.3. All vehicles using these lines shall need to implement the ETCS on-board system version 3.0.

[24] This concerns CCS NTSN new legal release with full FRMCS and DAC readiness specifications

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
	versions from 1.0 up to 3.0			the ETCS system version 3.0 is directly applicable. Design phase started before notification from IM or notification is done before entry into force of CCS NTSN amendment: see transition regime in column 'Design phase started before NTSN set into force'.	ended within the latest date between following dates: - 5 years after the CCS NTSN amendment; - 5 years after the notification date from the IM	required for compatibility with the ETCS trackside implementation of ETCS TS 3.0	when required for compatibility with the ETCS trackside implementation of ETCS TS 3.0
8	Appendix A – 7.4.2.3 (7)	Mandatory use of system version 2.0 or higher in case of extension of area	Legal enforcement to mandatory use system version 2.1 or higher in case of extension of area of use only when the extending area of use is combined with a request for new authorisation	Directly applicable	Directly applicable	Not applicable	Not applicable
Former sets of specifications #2 and #3							

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
9	Appendix A - Table A 2	Appendix A - Table A 2 2 – Set of specification #2	The specifications in Appendix A - Table A 2 does not include ETCS system version 2.0, since the minimum reduced on-board envelope is the envelope up to ETCS system version 2.1.	Applicable 3 years after entry into force of the NTSN In any case the error correction provisions in point 7.2.10 shall be respected with its corresponding transition period. No constraint shall be exported to the other subsystem.	Applicable from 1 January 2030 In any case the error correction provisions in point 7.2.10 shall be respected with its corresponding transition period. No constraint shall be exported to the other subsystem.	Applicable on newly built vehicles from 1 January 2030 In any case the error correction provisions in point 7.2.10 shall be respected with its corresponding transition period. No constraint shall be exported to the other subsystem.	Not applicable In any case the error correction provisions in point 7.2.10 shall be respected with its corresponding transition period. No constraint shall be exported to the other subsystem.
10	Appendix A - Table A 2	Appendix A - Table A 2 3 – Set of specification #3	The specifications in Appendix A - Table A 2 have the agreed error corrected version of former set #3	Applicable 3 years after entry into force of the NTSN In any case the error correction provisions in point 7.2.10 shall be respected with its corresponding transition period.	Applicable from 1 January 2030 In any case the error correction provisions in point 7.2.10 shall be respected with its corresponding transition period. No constraint shall be exported to the other subsystem.	Applicable on newly built vehicles from 1 January 2032 In any case the error correction provisions in point 7.2.10 shall be respected with its corresponding transition period.	Not applicable In any case the error correction provisions in point 7.2.10 shall be respected with its corresponding transition period. No constraint shall be exported

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
				No constraint shall be exported to the other subsystem.		No constraint shall be exported to the other subsystem.	to the other subsystem.
CMD							
11	4.2.2 (b) – Cold Movement Detection	CMD Optional	CMD Mandatory	Directly applicable when ETCS is installed for the first time into a vehicle design.	Applicable from 1 January 2028 when ETCS is installed for the first time into a vehicle design.	Applicable on newly built vehicles placed in service from 1 January 2030.	Not applicable
ATO On-Board implementation							
12	4.2.18 + Point 7.2.9.2	Not applicable	ATO on-board specification and implementation requirements	Design phase started after notification from IM and notification is done after 1 January 2025: ATO on-board requirements are directly applicable. Design phase started before notification from IM or notification is done before 1 January 2025: ATO On-board requirements are applicable if the design	ATO on-board requirements are applicable if the design phase is not ended within the latest date between following dates: - 1 January 2030; - 5 years after the notification date from the IM;	Not applicable	Not applicable

153

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
				phase is not ended within the latest date between following dates: - 1 January 2030; - 5 years after the notification date from the IM;			
CCS On-Board Modularity							
13	Index 90 + point 5.2.2.2	Not applicable	Mandatory implementation of Ethernet based platform New requirement in case of grouping of Interoperability Constituents defined in table 5.1	Applicable 2 years after entry into force of the NTSN on newly developed vehicle designs requiring first authorisation	Applicable 7 years after entry into force of the NTSN on newly developed vehicle designs requiring first authorisation	Not applicable	Not applicable
14	Appendix A – CCS and RST interfaces Indexes 81, 82, 88, 90	Not applicable	Mandatory implementation of on-board interfaces between CCS subsystem and RST subsystem	Applicable 2 years after entry into force of the NTSN on newly developed vehicle designs requiring first authorisation	Applicable 7 years after entry into force of the NTSN on newly developed vehicle designs requiring first authorisation	Not applicable	Not applicable

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
FRMCS On-Board implementation:							
15	Point 7.3.2.2	Not applicable	FRMCS on-board implementation[25]	Not applicable. Note: Transition regime after NTSN amendment: Design phase started after notification from IM and notification is done after 2 years of the entry into force of CCS NTSN amendment: FRMCS on-board implementation is directly applicable.	Not applicable. Note: Transition regime after NTSN amendment: FRMCS on-board is applicable if the design phase is not ended within the latest date between following dates: - 5 years after the CCS NTSN amendment; - 5 years after the notification date from the IM;	Not applicable. Note: The FRMCS on-board implementation is mandatory when required for compatibility with FRMCS only trackside implementation	Not applicable. Note: The FRMCS on-board implementation is mandatory when required for compatibility with FRMCS only trackside implementation
				Design phase started before notification from IM: see transition regime in column 'Design phase started before NTSN set into force'.			
Partial fulfilment							

[25] Note: If the Member State has agreed with the stakeholders to implement FRMCS (see clause 7.4.4), the IM shall notify the dates when the FRMCS on-board system shall be a mandatory on-board requirement according to clause 7.3.1. All vehicles using these lines shall need to implement the FRMCS on-board system.

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	Design phase started before NTSN enters into force	Production phase	Vehicle in operation
16	Point 6.1.1.2	Points 6.1.1.3 and 6.4.3 are deleted.	With respect to 6.1.1.2 it is no longer possible to exclude mandatory functionalities, interfaces or performance except if listed in Appendix G	3 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 place in service enforcing compliance at the next upgrade of the vehicle train protection part.	7 years after the entry into force of the NTSN.	Not applicable	Not applicable
DMI indication translation							
17	Appendix E	No mandatory harmonised translation of DMI indications	Harmonised translation of DMI indications.	Directly applicable	7 years after the entry into force of the NTSN.	Not applicable	Not applicable

Table B1.2

Transition Regime[26] for RST Subsystem

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime			
				Design phase started after NTSN enters into force	**Design phase started before NTSN enters into force**	**Production phase**	**Vehicle in operation**
1	Index 77	V4 - Frequency management not fully defined for the vehicle	V5 – Frequency management fully defined for the vehicle	Directly applicable with the exception of point 3.2.2. This point is applicable 2 years after the entry into force of the NTSN on newly developed vehicle designs requiring the vehicle type authorisation and/or the vehicle authorisation for placing in service issued by the authorising entity for a new vehicle type and, where applicable, the first vehicle of a type ; Applicable 7 years after the entry into force of the NTSN on modified vehicles designs requiring the vehicle type authorisation and/or vehicle authorisation for placing in service issued by the authorising entity after a change of an already authorised vehicle and/or vehicle type	Applicable 7 years after the entry into force of the NTSN	Not applicable	Not applicable

---

[26] Definition of phases provided in point 7.2.4.1.1

B.2   Changes of requirements and transition regimes for CCS Trackside Subsystem

Table B2

Transition regime for CCS Trackside Subsystem

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime
CCS Trackside Error Corrections				
1	Appendix A + Points 7.4.1.2 and 7.2.10.3	Set 1, 2 and 3 of specifications without error corrections	Table A2 includes the maintenance of the functions into 1 set of specifications.	CCS Trackside Subsystems, which are in advanced stage of development or in operation, shall implement the identified set of corrections for the unacceptable errors as described in point 7.2.10.1 within: - 2 years after the publication of the IM decision in the case no new authorisation is required; - 2 years and 6 months after the publication of the IM decision in the case a new authorisation is required; 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; + point 7.4.1.3	Not applicable	New ETCS functions from system version 2.2 to 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 (which are not in advanced stage of

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime
				development), even when a Class B system is also installed at the same time; or - Marker Boards are installed during renewal or upgrading (which are not in advanced stage of development) of the infrastructure subsystem in a line equipped with ERTMS; Detailed provisions for applicable requirements for fitting the harmonised 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 completed and published with an amendment of this CCS NTSN.
Partial fulfilment:				
6	Not applicable	Points 6.1.1.3 and 6.4.3 are deleted.	When implemented, all functions, performance and interfaces or performance shall comply with the Chapter 4 (including the specifications referred to in Appendix A).	7 years after the entry into force of the NTSN.
Former set of specifications set #1, #2 and #3				
7	Appendix A - Table A 2	Appendix A - Table A 2 1 – Set of specification #1, Table A 2 2 – Set of specification #2 Table A 2 3 – Set of specification #3	Table A 2 includes the maintenance of the functions into 1 set of specifications.	Requirements and deadlines defined in point 7.4.1.2.

B.3   Changes of Interoperability Constituent requirements and transition regimes for CCS Subsystem

Table B3

Transition regime for CCS Interoperability Constituents

According to point 7.2.4.3 Interoperability constituents transition periods defined for CCS Subsystems are applicable for the Interoperability Constituents unless specified in this table.

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime
1	Appendix A + point 4.2.20.1 + point 7.2.10.2	Technical opinions on Art. 10 errors are not legally binding	Implementation of error corrections into ERTMS on-board Interoperability Constituents for existing CCS subsystems for functionality ETCS up to system version 2.1 and GSM-R.	If one or more registered errors are identified for the area of use specified in the authorisation of the vehicle: a) For legal releases (with error correction specifications) published before 1 January 2026: ERTMS on-board Interoperability Constituents integrated into a vehicle shall implement the necessary error corrections within the area of use specified in the authorisation, the latest 18 months after the publication of the IM-decision; b) For legal releases (with error correction specifications) published after 1 January 2026 onwards: ERTMS on-board Interoperability Constituents integrated into a vehicle shall comply with the maintained set of specifications of this NTSN 18 months after the publication of the IM-decision; This transition regime can be handled flexibly in agreement with the applicant for the UK verification of the on-board subsystem and the railway undertaking as long as the overall transition regime (as per Table B1.1 plus as per Table B3) is met.

No	NTSN point(s)	NTSN point(s) in previous version	Explanation on NTSN change	Transition regime
				Note: If no errors are registered for the concerned area of use, these will be mandatory implemented according to the transition regime linked to the point of partial fulfilment.
2	Appendix A + point 4.2.20.1 + point 7.2.10.2	Technical opinions on Art. 10 errors are not legally binding	Implementation of error corrections into ERTMS Trackside Interoperability Constituents for new CCS trackside projects for functionality, ETCS up to system version 2.1 and GSM-R.	ERTMS Trackside Interoperability Constituents, 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 + point 4.2.20.1 + point 7.2.10.2	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, 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 18 months year after the publication of the IM-decision.
4	Appendix A, Table A.2 Index 90, 92 + 5.2.2.2	N/A	Implementation of Ethernet based communication for integration with ATO On-Board IC and FRMCS On-Board IC	New ETCS On-Board Interoperability Constituents placed on the market within 2 years after entry into force of the NTSN shall implement the Ethernet based connections required for ATO and FRMCS interfacing as specified in Index 90 (points 3.1.1.2 and 3.1.1.3) and as specified in Index 92 (point 7.2)

Appendix C

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]*[27]

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following subsystem[28]:

[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(s):

[Reference to: ESC Type Identifiers as published in the GB ESC/RSC Technical Document]

has been assessed by the following Approved Body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

---

[27] The information in square brackets [ ] is provided to support the user in correctly and exhaustively compiling the template.

[28] The description of the subsystem shall enable unique identification and allow for traceability.

The following conditions of use and other restrictions apply[29][30]:

[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]

---

[29] When a reference to a list of conditions of use and other restrictions is made, such list shall be accessible to the authorising entity.

[30] Template for restrictions and added functionality in the CCS NTSN Appendix D shall be used

C.2   ESC Interoperability Constituent Statement template

TEMPLATE FOR ESC STATEMENT FOR INTEROPERABILITY CONSTITUENT

ESC STATEMENT FOR INTEROPERABILITY CONSTITUENT

ETCS System Compatibility Statement document for the Interoperability Constituent *[Document number]*[31]

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following Interoperability Constituent[32]:

[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(s):

[Reference to: ESC Type Identifiers as published in the GB ESC/RSC Technical Document]

has been assessed by the following Approved Body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

---

[31] The information in square brackets [ ] is provided to support the user in correctly and exhaustively compiling the template.

[32] The description of the interoperability constituent shall enable unique identification and allow for traceability.

The following conditions of use and other restrictions apply[33][34]:

[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]

---

[33] When a reference to a list of conditions of use and other restrictions is made, such list shall be accessible to the authorising entity

[34] Template for restrictions and added functionality in the CCS NTSN Appendix D shall be used

C.3   RSC Statement template

TEMPLATE FOR RADIO SYSTEM COMPATIBILITY STATEMENT

RADIO SYSTEM COMPATIBILITY STATEMENT

Radio System Compatibility Statement document *[Document number]*[35]

We, Applicant:

[Business name]

 [Complete postal Address]

Declare under our sole responsibility that the following subsystem[36]:

[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(s):

[Reference to: RSC Type Identifiers as published in the GB ESC/RSC Technical Document]

has been assessed by the following Approved 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[37][38]:

---

[35] The information in square brackets [ ] is provided to support the user in correctly and exhaustively compiling the template.

[36] The description of the subsystem shall enable unique identification and allow for traceability.

[37] When a reference to a list of conditions of use and other restrictions is made, such list shall be accessible to the authorising entity.

[38] Template for restrictions and added functionality in the CCS NTSN Appendix D shall be provided

[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 Statement for Interoperability Constituent template

TEMPLATE FOR RSC STATEMENT FORINTEROPERABILITY CONSTITUENT

RSC STATEMENT FOR INTEROPERABILITY CONSTITUENT

Radio System Compatibility Statement document for the Interoperability Constituent *[Document number]*[39]

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following Interoperability Constituent[40]:

[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 Identifiers as published in the GB ESC/RSC Technical Document]

has been assessed by the following Approved Body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

---

[39] The information in square brackets [ ] is provided to support the user in correctly and exhaustively compiling the template.

[40] The description of the interoperability constituent shall enable unique identification and allow for traceability.

The following conditions of use and other restrictions apply[41][42]:

[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]

---

[41] When a reference to a list of conditions of use and other restrictions is made, such list shall be accessible to the authorising entity.

[42] Template for restrictions and added functionality in the CCS NTSN Appendix D shall be used

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]*[43]

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following subsystem[44]:

[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 GB ESC/RSC Technical Document]

has been assessed by the following Approved 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[45][46]:

---

[43] The information in square brackets [ ] is provided to support the user in correctly and exhaustively compiling the template.

[44] The description of the subsystem shall enable unique identification and allow for traceability.

[45] When a reference to a list of conditions of use and other restrictions is made, such list shall be accessible to the authorising entity.

[46] Template for restrictions and added functionality in the CCS NTSN Appendix D shall be used

[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 COMBINED ESC and RSC STATEMENT FOR INTEROPERABILITY CONSTITUENT

COMBINED ESC AND RSC STATEMENT FOR INTEROPERABILITY CONSTITUENT

ETCS and Radio System Compatibility Statement document for Interoperability Constituent *[Document number][47]*

We, Applicant:

[Business name]

[Complete postal Address]

Declare under our sole responsibility that the following Interoperability Constituent[48]:

[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 GB ESC/RSC Technical Document]

has been assessed by the following Approved Body:

Business name

Registration number

Full address

In accordance with the following report(s):

[Report(s) number(s), date(s) of issue]

---

[47] The information in square brackets [ ] is provided to support the user in correctly and exhaustively compiling the template.

[48] The description of the interoperability constituent shall enable unique identification and allow for traceability.

The following conditions of use and other restrictions apply[49][50]:

[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]

---

[49] When a reference to a list of conditions of use and other restrictions is made, such list shall be accessible to the authorising entity.

[50] Template for restrictions and added functionality in Appendix D shall be used

Appendix D

In this appendix the template for description of conditions, restrictions and added functions is provided.

The document describing the template and its use is published by the Competent Authority.

Appendix E The document describing the template and its use is published by the Competent Authority.

List of harmonised text indications and messages displayed on the ETCS Driver Machine Interface

Table E1

List of harmonised text indications and messages displayed on the ETCS Driver Machine Interface

Id. Number	Text message
1	Ack(nowledgement)
2	Adhesion
3	Airtight
4	ATO data
5	ATO data entry complete?
6	ATO data view
7	ATO needs data
8	ATO selector
9	Axle load category
10	Balise read error
11	BMM reaction inhibition
12	Brake percentage
13	Brightness
14	Communication error
15	Contact last RBC
16	Continue in SM
17	Data
18	Data view
19	Del(ete)
20	Driver ID
21	Emergency stop

22	End of data entry
23	Enter data
24	Enter RBC data
25	Entering FS
26	Entering OS
27	Entering SM
28	Exit Shunting
29	Exit SM
30	Initiate SM
31	Language
32	Length (m)
33	Level
34	Level crossing not protected
35	Loading gauge
36	Main
37	Maintain Shunting
38	Max(imum) speed
39	NL no longer permitted
40	No
41	No MA received at level transition
42	No track description
43	Non slippery rail
44	Non-Leading
45	Odometer impaired
46	On
47	Operated system version
48	Out of GC
49	Override
50	PT distance exceeded

51	Radio data
52	Radio network ID
53	Radio network registration failed
54	RBC data
55	RBC data entry complete?
56	RBC ID
57	RBC phone number
58	Revoke BMM reaction inhibition
59	Remove VBC
60	Remove VBC entry complete?
61	Route unsuitable – axle load category
62	Route unsuitable – loading gauge
63	Route unsuitable – traction system
64	Runaway movement
65	RV distance exceeded
66	Safe consist length no longer available
67	Select type
68	Set VBC
69	Set VBC entry complete?
70	Settings
71	SH refused
72	SH request failed
73	SH stop order
74	Shunting
75	Slippery rail
76	SM refused
77	SM request failed
78	Spec(ial)
79	Specific data entry selection

80	SR distance exceeded
81	SR speed / distance
82	SR speed / distance entry complete?
83	SR stop order
84	Stand-by
85	Start
86	System version
87	Trackside malfunction
88	Trackside not compatible
89	Train category
90	Train data
91	Train data changed
92	Train data entry complete?
93	Train integrity
94	Train is rejected
95	Train running number
96	Train type
97	Unauthorized passing of EOA / LOA
98	Use short number
99	Validate ATO data
100	Validate [name of NTC] data
101	Validate remove VBC
102	Validate set VBC
103	Validate train data
104	VBC[n] set code
105	VBC code
106	Volume
107	Yes
108	[name of NTC] brake demand

109	[name of NTC] data entry complete?
110	[name of NTC] failed
111	[name of NTC] is not available
112	[name of NTC] needs data

Appendix F [51]Open Points

Open Point	Notes
Reliability/availability requirements	Frequent occurrences of degraded situations caused by failures of control-command and signalling equipment will decrease the system safety. See point 4.2.1.2

---

[51] In former versions of the TSI and NTSN this was named Annex G. References to CCS TSI Annex G shall be read as CCS NTSN Appendix F.

Appendix G Partial Fulfilment

Notwithstanding the options allowed in this NTSN, e.g. under point 7.3.2 or in subset 34, it is possible to deviate from this NTSN provided that compliance with provisions of point 6.1.1.2 and the deviation fulfils one of the categories below and limited to the defined cases in the table underneath:

(1) Functions requiring upgrades of existing installations which would compromise the economic viability of a project regarding upgrades of already authorised hardware installed in the vehicles

(2) Functions included in system version 2.2 and 3.0 temporarily not implemented as long as the missing functions are not required for the intended area of use – provided such functions would be implemented at the earlier of the following conditions:

 (a) If implementation of the missing function does not require authorisation: at the next occasion when error correction is mandatory by virtue of table B1.1 row 1 and in any case not before 1.1.2026.

 (b) If implementation of the missing function requires authorisation: at the next reauthorisation resulting from another change to the vehicle train protection (ETCS) system

 (c) At the next upgrade to a higher system version of the ETCS train protection part.

 Until the implementation of full functionalities of system versions 2.2 and 3.0 these vehicles shall be declared as system version 2.1 and 2.2 respectively.

(3) Subset 34 options at interoperability constituent level: if functionally relevant to exclude certain signals or functions

Partial fulfilment of NTSN Requirement	Conditions and mitigation measures	Scope of application of partial fulfilment
SUBSET-091: safety requirements leading to DMI SIL 2 may not be implemented.	The associated hazards linked to the safety requirements leading to DMI SIL 2 shall be mitigated by appropriate measures.	Only allowed in case of upgrading an existing ETCS part (with DMI SIL 0).
Some new functionalities included in this NTSN	Note: Individual CR solutions which are excluded are published	The following on-board functionalities impacting the ETCS on-board system version

are excluded from the on-board envelopes up to 2.1 and 2.2. These reduced envelopes will be specified in SUBSET-153.	on the ERA website to temporarily develop the on-board envelopes up to 2.1 and up to 2.2. After the publication of the SUBSET-153, the vehicle shall update its products if not compliant to the consolidated specifications according to the transition clause on partial fulfilment listed in Table B.1.	are excluded in the reduced on-board envelope up to 2.1: CR968;CR988; CR1238;CR1244;CR1302; CR1344;CR1346;CR1350; CR1359;CR1363;CR1367; CR1374;CR1375;CR1379; CR1397. The following on-board functionalities impacting the ETCS on-board system version are excluded in the reduced on-board envelope up to 2.2: CR968;CR988; CR1244;CR1302;CR1344; CR1346;CR1350;CR1359; CR1363;CR1367;CR1374; CR1375;CR1379;CR1397.
Subset 34: options available at subsystem level are also available at interoperability constituent level.	The functionality will not be required for the fully interoperable operations of the vehicle.	Interoperability constituents are not required to include functionalities related to electrical traction if these interoperability constituents are designed for vehicles equipped with catenary independent engines

Appendix H

Intentionally blank