



# Irish Railway Standard IRS-305-B

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Requirements for Class A ETCS CCT Systems and for IM  
Operating Rules in the Republic of Ireland (trackside)

Issue	Published by	Issue Date
A	CRR on behalf of the Irish Railway industry stakeholders	24/08/2022
B	CRR on behalf of the Irish Railway industry stakeholders	26/07/2023

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## **1 FOREWORD**

### **1.1 This Irish Railway Standard:**

- i. cannot replace any Technical Specification for Interoperability (TSI) or other legal requirements which may be applicable to a given project;
- ii. are recommended to be chosen in accordance with RFU-STR-088 as an Alternative Solution in conjunction with a TSI Parameter to demonstrate conformity with the Essential Requirements;
- iii. may be called up as a code of practice in conjunction with CSM 402/2013;
- iv. may be called up as good industry practice in conjunction with Railway Safety Act 2005;
- v. may be called up as a code of practice in conjunction with the safe integration of projects within the Railway System in the Republic of Ireland as defined under 2016/797/EU Art 18 as transposed by S.I. 477 of 2020;
- vi. may in parts or in full be called up as a National Rule (NR) for the Republic of Ireland in conjunction with 2016/797/EU as transposed by S.I. 477 of 2020, and 2016/798/EU as transposed by S.I. 476 of 2020.

### **1.2 Where Irish Railway Standards are called up as a NR, in line with 2016/797/EU Art 13(2) as transposed by S.I. 477 of 2020 the reason for its application shall be identified, based on one or more of the following justifications:**

- i. where the TSIs do not cover, or do not fully cover, certain aspects corresponding to the Essential Requirements, including open points as referred to in 2016/797 Article 4(6) as transposed by S.I. 477 of 2020;
- ii. where non-application of one or more TSIs or parts of them has been notified under 2016/797 Article 7 as transposed by S.I. 477 of 2020;
- iii. where a specific case requires the application of technical rules not included in the relevant TSI;
- iv. National Rules used to specify existing systems, limited to the aim of assessing technical compatibility of the vehicle with the network;
- v. networks and vehicles not covered by TSIs;
- vi. as an urgent temporary preventive measure, in particular following an accident.

## 2 SCOPE AND APPLICATION

### 2.1 Scope

#### 2.1.1 General scope

This document is complementary to the European Union Agency for Railways (ERA) specifications for ETCS Baseline 3 Release 2, which are set out in the Control, Command and Signalling Technical Specification for Interoperability (CCS TSI).

The focus of this IRS is the standardisation of the requirements for the principal functional performance and principal interfaces of the ETCS systems to be implemented in Ireland. This document describes the trackside configuration choices for CCT.

*Note: This focus shall ensure that predictable system behaviour and performance, as well as standardised interfaces, support the safe and standardised operation of any Class A system application.*

#### 2.1.2 Scope of this version

This Release A forms the basis for the first application of ETCS Level 1 in the Republic of Ireland. The requirements of this IRS may be updated as a result of the application of the CRR Guideline [CRR-031].

### 2.2 General compliance date

This Irish Railway Standard comes into force on the date of its publication.

### 2.3 NR Provisions

- Table 1 identifies all sections of this IRS which are proposed as Irish NRs. The rationale is identified in line with section 1.2.
- In each case where DeBo assessment is required for conformity assessment of a NR it shall be performed by an IRL recognised DeBo employing the Modules stated. The assessment Modules are defined in 2010/713/EC (In this regard, the term NoBo (as used in 2010/713/EC) shall be understood to mean DeBo and references to TSIs shall be understood to mean references to Irish NRs). Note, all NRs to be employed as part of an authorisation require DeBo assessment. As exceptions NRs originating from the TSI OPS do not require DeBo assessment.
- Compliance with NRs to TSI OPS is demonstrated during SMS assessment and afterwards monitored by supervision.

Table 1 NR Provisions

Section	Rationale (as defined in section 1.2)		Module
None proposed	Absence of TSI requirements	i	Not applicable
None proposed	Non-application of TSIs	ii	Not applicable
None proposed	Technical Compatibility between on-board and trackside equipment	iv	
	Networks/ vehicles not covered by TSIs	v	

*Note: Some requirements of this document may necessitate Infrastructure Managers to define certain technical interfaces or operational rules for all Railway Undertakings operating or intending to operate on their networks. Based on current European and national legislation it is expected that this is enforced through the IMs Network Statements.*

## 2.4 Editing rules

- The document is divided into sections and sub-sections in which requirements are defined.
- Each requirement is identified with a unique identification number, and with an attribute, that makes the requirement Mandatory or Optional in order to specify the configuration for application of the requirements of [TSI-CCS], where these requirements contain options or contain a range of configuration parameters to select from.
  - Mandatory Requirements shall be implemented in all CCT installations.
  - Optional Requirements may be implemented or not.
- Each requirement is labelled with a 'Trackside' or 'Application Condition' "Allocation"
- Each requirement is labelled with an "Owner". The "Owner" label is an informative element which is intended to support the allocation of requirements between the industry stakeholders;
  - IM: the requirement is allocated to the IM which operates, or intends to operate, the network on which the CCT is installed)
  - ETCS CCT Supplier: the requirement is allocated to the IM which operates, or intends to operate, the network on which the CCT is installed. Its implementation may typically be carried out by a supplier which has been contracted by the IM to supply an element of the CCT)
  - All (both the 'IM' and the 'ETCS CCT Supplier')

The above allocation is independent of which entity is defined as the "Applicant" according to 2016/797 (EU).

- The unique identifiers are intended to support the development, verification & validation activities for the Class A equipment. The requirement identifiers are not intended to change in the next version of the document. For new requirements new identifiers would be generated in sequence and introduced between the existing ones.
- Notes, Justifications and Examples are only informative and shall be regarded as supporting information for the understanding of the requirements. They are shown in blue italics as follows:  
*Notes in the text.*
- The use of terms her, his, signalman, driver, etc. in this standard is not intended to be gender specific.

## 2.5 Conformity Assessment

Any IM, through application of their Safety Management System and of the requirements of [IOD] in combination with applicable TSIs and applicable NRs, shall ensure compliance with the requirements of this IRS.

When a requirement of this IRS refers to the [IRS-EMC], the conformity assessment of this requirement shall be made in accordance with the assessment requirements specified in that [IRS-EMC] document.

The assessment against the Application Conditions (SRACS) of this document shall be performed by the IM responsible for their definition and implementation (self-assessment), under the control of an Assessment Body (AsBo).

## 3 NORMATIVE REFERENCES

In the development, verification & validation, operation and management of the CCT systems the application of the following standards and legislations shall be required in conjunction with this IRS. Subsequent revisions may be used instead of the quoted revisions where these are compatible with the revision quoted. In case of legal documents, all amendments shall apply. In the case of legal documents, the use of subsequent revisions is often mandatory.

[50126] EN50126-1/-2:2017 Railway applications - The specification and demonstration of reliability, availability, maintainability and safety (RAMS) Part 1 and Part 2

[50128]	EN50128:2020 Railway applications - Communication, signalling and processing systems Software for railway control and protection systems
[50129]	EN50129:2018 Railway applications - Communication, signalling and processing systems Safety related electronic systems for signalling
[50159]	EN50159:2010 Railway applications - Communication, signalling and processing systems Safety- related communication in transmission systems
[CSM402]	CSM-RA 402/2009 Commission Implementing Regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment.
[IOD]	Interoperability Directive, (EU) 2016/797 (as transposed in IRL)
[SUB-026]	UNISIG ERTMS/ETCS SUBSET-026: System Requirements Specification, Issue 3.6.0
[SUB-036]	UNISIG ERTMS/ETCS SUBSET-036: FFFIS for Eurobalise, Issue 3.1.0
[SUB-040]	UNISIG ERTMS/ETCS SUBSET-040: Dimensioning and Engineering rules, Issue 3.4.0
[SUB-041]	UNISIG ERTMS/ETCS SUBSET-041: Performance Requirements for Interoperability, Issue 3.2.0
[SUB-113]	UNISIG ERTMS/ETCS SUBSET-113: ETCS Hazard Log, Issue 1.5.0
[ERA-OPINION]	‘Opinion for the European Union Agency for Railways for The European Commission Regarding Error Correction to the CCS TSI’, dated 05/05/2020, and referenced ERA-OPI-2020-2
[02S126]	ERTMS/ETCS RAMS Requirements Specification - Chapter 2 – RAM, issue 6
[IRS-EMC]	IRS-203 Irish Railway Standard EMC Coordination, version as valid on the date of application
[IRS-CCO]	IRS-304 Requirements for Class A CCO Systems in the Republic of Ireland (onboard)
[TSI-CCS]	Technical Specification for Interoperability relating to the ‘control-command and signalling’ subsystems of the rail system in the European Union COMMISSION REGULATION (EU) 2016/919 including any related amendments
[TSI-OPE]	Commission Implementing Regulation (EU) 2019/773 on the Technical Specification for Interoperability relating to the operation and traffic management subsystem of the rail system within the European Union including any related amendments.
[CRR-031]	Guidance for the Drafting, Reviewing, Publishing and Updating of Irish Railway Standards, CRR- G-031

## 4 TERMS AND DEFINITIONS

Where a Term contained in this section is used in this IRS, it shall have the associated Definition contained in this section.

*Note: Standard terms from [TSI-CCS] are not recalled in this section*

Encoder (or LEU)	An Electronic device which stores and selects telegrams to be sent via variable Balise Group message to the CCO, on the basis of information received from the Non-Class A or Non-Class B CCT (e.g. signal circuits or interlocking controls).
Fixed Installations	Installations and equipment of the railway network in IRL, which comprises the infrastructure (INF), electric traction energy supply systems (ENE) and trackside control command and signalling systems (CCT).
Mid-section Level Crossing	Level crossing in the middle of a section, which is protected by non-interlocked stop signals. Such signals only supervise the status of the level crossing, and do not supervise other signalling conditions. In the context of this standard, user worked level crossings are not considered to be mid-section level crossings.
Operating Rule	<p>Any Operating Rule required by this standard shall be established in accordance with [TSI OPE].</p> <p><i>Note: Operating Rules which become required through the application of this IRS will constitute e.g. SMS operational procedures or IM/RU Company rules relating to the operation of a class A CCT or CCO system according to [TSI OPE].</i></p> <p>In accordance with [TSI-OPE] and the IM's SMS established under the requirements of the Railway Safety Directive, the Operating Rules shall be contained in the Route Book elements provided from an IM to the RUs for integration into their Rule Books for drivers.</p> <p>In accordance with [TSI-OPE] and the RU's SMS established under the requirements of the Railway Safety Directive, the Operating Rules shall be contained in the driver's Rule Book provided from the RUs to the drivers.</p> <p>In accordance with [TSI-OPE] and the IM's SMS established under the requirements of the Railway Safety Directive the Operating Rules for IM shall be contained in the Documentation for Infrastructure Managers' staff.</p>
Running Line	Any section of track that is not a siding or a depot/facility.
<b>Signal</b>	See definitions below.
<b>Main Signal</b>	<p>Any Stop Signal or Distant signal located on the Running Line or authorising access to the Running Line.</p> <p><i>Note: Main Signals may also be referred to as Running Signals.</i></p>
<b>Stop Signal</b>	A Main Signal that can display a stop or danger aspect and may display other aspects.
<b>Distant Signal</b>	A Main Signal that cannot display a stop or danger aspect.
<b>Shunt Signal</b>	A Signal that authorises shunting movements.
<b>Speed</b>	See definitions below.
<b>Civil Line Speed</b>	The maximum speed authorised by an IM for a section of track, derived from its design (e.g. track alignment, transition curves, maximum permitted cant deficiency, axle load), and a tolerance for maintenance and operation. Different Civil Line Speeds can be defined for different train categories.
<b>Turnout Speed</b>	The maximum speed authorised by an IM for a turnout, derived from its design, and a tolerance for maintenance and operation.



Train	An operational formation consisting of one or more Units. Operational means, in this context, that the Train is equipped with a traction system, with at least one cab from which the Train can be operated, and with all other equipment as required for its operation on the rail network.
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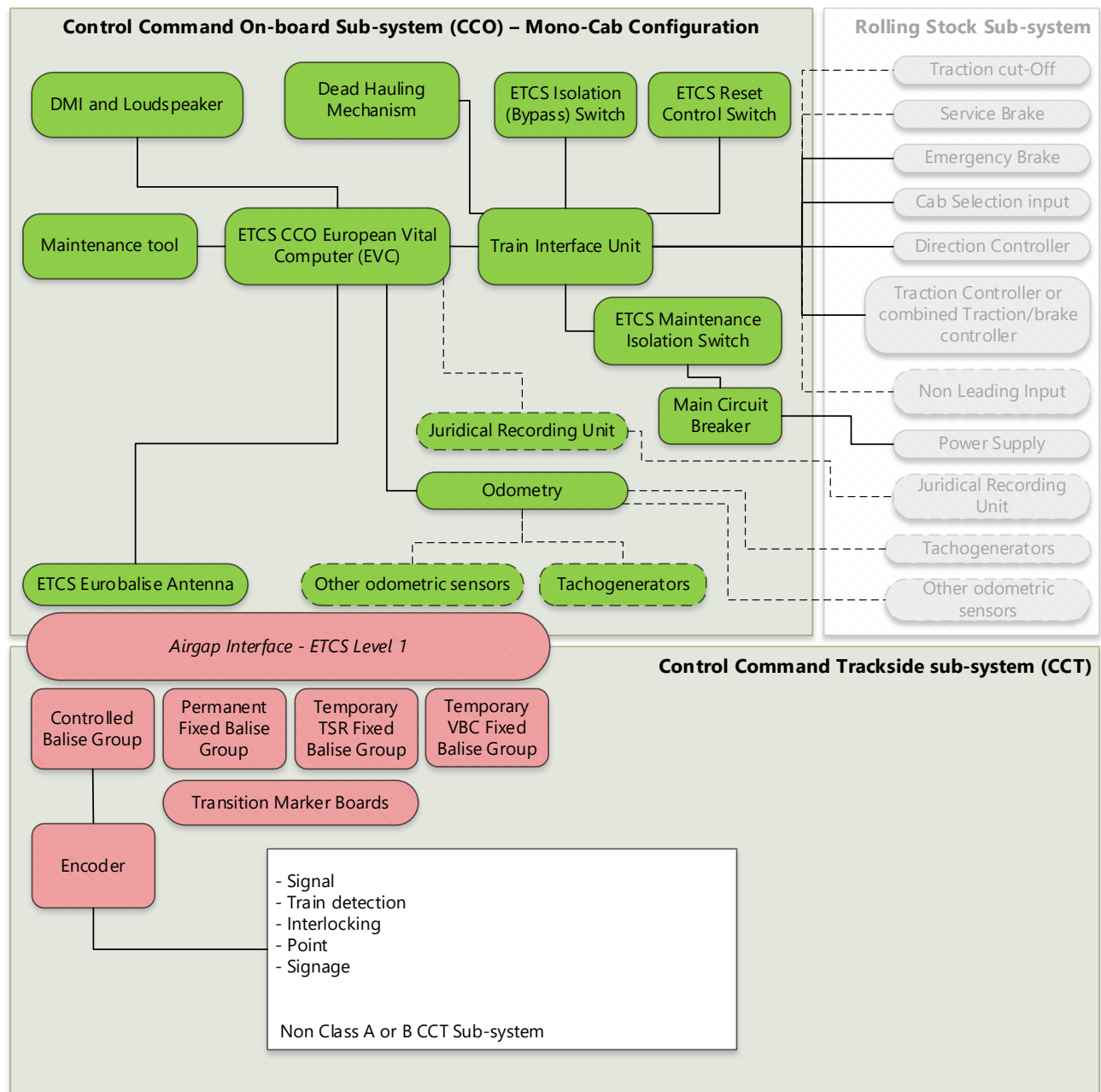
## 5 SYMBOLS AND ABBREVIATED TERMS

BG	Balise Group
CCO	Class A Command Control & signalling On-board sub-system, unless specified otherwise
CCT	Class A Command Control & signalling Trackside sub-system, unless specified otherwise
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EOA	End of Authority
ETCS	European Train Control System
IM	Infrastructure Manager
IRL	Republic of Ireland
IRS	Irish Railway Standard
MA	Movement Authority
NR	National Rule
SIL	Safety Integrity Level
SRAC	Safety Related Application Condition(s)
SSP	Static Speed Profile
TSI	Technical Specification for Interoperability
VBC	Virtual Balise Cover

Where a Term contained in this section is used in this IRS, it shall have the associated Definition contained in this section.

## 6 CCO AND CCT ARCHITECTURE OVERVIEW

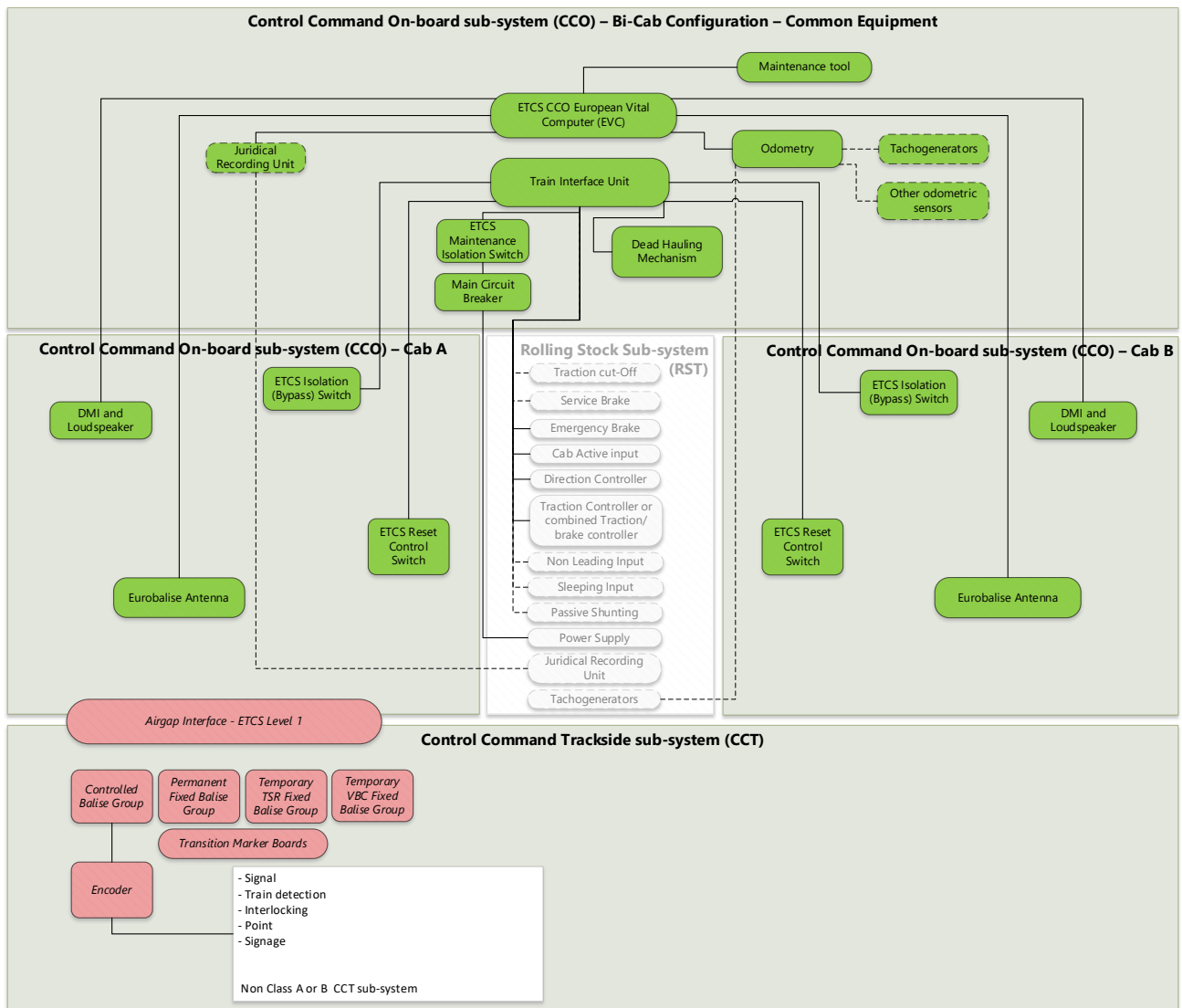
The figures below provide a description of the overall CCT and CCO architecture, reflecting a single cab and dual cab configurations.



**Figure 1: CCT and CCO architecture block diagram – Single Cab Configuration**

*Note: Refer to [IRS-CCO] for an up to date architecture diagram of the CCO components*

*Note: Dashed lines and elements refer to optional or alternative CCO configurations*



**Figure 2: CCT and CCO architecture block diagram - Dual Cab Configuration**

*Note: Refer to [IRS-CCO] for an up to date architecture diagram of the CCO components*

*Note: Dashed lines and elements refer to optional or alternative CCO configurations*

## 7 CONTROL COMMAND AND SIGNALLING TRACKSIDE (CCT) REQUIREMENTS (INCLUDING REQUIREMENT FOR IM OPERATING RULES)

### 7.1 General Requirements for CCT

**[REQ:IRS\_CLASSA\_CCT\_00001];[Allocation:Trackside];[Type:Mandatory];[Owner:All]**

The CCT requirements indicated in this section shall be read in conjunction with the CCO requirements from [IRS-CCO].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00176];[Allocation:Trackside];[Type:Mandatory];[Owner:All]**

Unless otherwise stated, 'CCT' shall be read in this document as meaning 'Class A ETCS CCT'.

On some occasions, where Class B CCT is intended to be referenced, the term 'Class B CCT' is specifically employed.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00177];[Allocation:Trackside];[Type:Mandatory];[Owner:All]**

In this document the term 'Non-Class A or Non-Class B CCT' refers to any elements related to the CCT subsystem which are different from Class A or Class B CCT elements. This includes e.g. Train Detection, Route Interlocking, Lineside Signals, and Traffic Control Systems.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00178];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The CLASS A ETCS CCT shall fully conform to

- The mandatory set of specifications for ETCS Baseline 3 Release 2, listed in (EU) 2016/919 CCS TSI Annex Table A 2.3 (including any related amendments), and
- The trackside mitigation specified in [SUB-113] to mitigate the hazards H0081, H0087, H0088 and H0110 as referred to in [ERA-OPINION].

**[END\_REQ]**

*Note: The full backward compatibility is expected to be ensured by future release of the TSI. If necessary, in this context, this IRS will be updated and will define mandatory or optional modification to existing CCT to ensure on-going compatibility.*

**[REQ:IRS\_CLASSA\_CCT\_00002];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The CCT shall not interfere adversely with any Class B CCO or CCT systems, which are operated in IRL at the time of placing CCT in service. This shall be demonstrated based on the relevant requirement of [TSI-OPE], [TSI-CCS], [IRS-EMC], and consider the actual application of these systems.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00003];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

SRAC: Every SRAC indicated in this document requiring information or training of staff shall, in accordance with [CSM402], be transferred to the relevant actors, through suitable means.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00004];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

SRAC: An Operating Rule shall be established to ensure that IMs inform all RUs operating on their network at least six months before a change to the technical or operation requirements related to CCO becomes effective.

**[END\_REQ]**

*Note: This could relate to a change of CCO pre-configured parameters or the introduction of a change of CCT area fitment, or the introduction of a new / modified CCO functionality. Such change could be driven by a preceding modification of this IRS.*

**[REQ:IRS\_CLASSA\_CCT\_00005];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** Maintenance Procedures shall be produced to define the rules applicable to IMs for maintaining the CCT equipment to ensure ongoing fulfilment of all requirements of this IRS for CCT.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00006];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The electromagnetic characteristics for the CCT (EMC and EMI requirements) shall be according to [IRS-EMC].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00007];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An Operating Rule shall be established to ensure that the process of data preparation, configuration, programming, installation, and verification and validation of Class A CCT equipment (encoders, permanent Balises and temporary Balises), including the necessary interfacing with Non-Class A or Non-Class B CCT, is commensurate with a SIL4 application. This shall follow the relevant requirements of [EN50126], [EN50128], [EN50129] and [CSM\_402].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00008];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An Operating Rule shall be established to ensure that no modification of Fixed Installations interferes with the compliance of CCO and CCT with all requirements defined in this standard. This shall at least consider but not be limited to the following:

- Modification of Civil Line speed,
- Modification of Signalling and Civil installations,
- Introduction of Big Metal Masses as per [SUB-036] definition
- Changes in the EMC environment.

**[END\_REQ]**

## 7.2 CCT Architecture

**[REQ:IRS\_CLASSA\_CCT\_00009];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The CCT architecture shall be compliant with the [TSI-CCS] requirement for ETCS Level 1.

**[END\_REQ]**

### 7.2.1 Signalling System

*Note: The specification of the requirements for the Non-Class A or Non-Class B CCT, including Train Detection, Route Interlocking, and Lineside Signals is out of the scope of this IRS.*

### 7.2.2 Code Generators and Track Coding Sections

*Note: The specification of the requirements for the historical Class B CCT, including Code Generators and Track Coding Sections is out of the scope of this IRS.*

### 7.2.3 Balise Group

**[REQ:IRS\_CLASSA\_CCT\_00179];[Allocation:Trackside];[Type:Mandatory];[Owner:All]**

Unless stated otherwise in this document, Balise Group shall be read as meaning a Balise Group permanently installed (i.e. permanent Balise Group).

**[END\_REQ]**

*Note: Balise Group principles:*

- *Balise Groups can consist of between one and eight Balises.*
- *Balise Groups consisting of one Balise are called single Balise Groups.*
- *Typically Balise Groups of one or two Balises will be used. If required for functional or redundancy purposes, additional Balises can be used.*
- *A Balise Group can transmit information which is valid for normal, reverse or both directions of travel.*
- *The direction of travel for which the Balise Group information is intended can be determined by CCO by two means:*

- *If the CCO has received linking information to that Balise Group from a previous Balise Group: the Balise Group information intended for the direction of travel can be determined by the CCO and the reading of only one Balise is sufficient.*
- *If the CCO has not received linking information to that Balise Group from a previous Balise Group: The reading of two Balises of the Balise Group becomes necessary, unless only information valid for both directions is transmitted. Each Balise of the Balise Group is marked with an individual position identifier so that the CCO can determine for which direction of travel the Balise Group information is intended.*
- *Each Balise of a Balise Group transmits a telegram. Each telegram is composed of headers and functional packets and an end packet (refer to [SUB-026])*
- *All the necessary CCT information relevant to CCO functions is contained in the telegrams of the Balise Group. The telegrams are then concatenated by CCO to make one Balise Group Message.*
- *A Balise Group can be either a Fixed Balise Group or a Controlled Balise Group*
- *Fixed Balise Groups are composed of Balise(s) that always transmit(s) the same pre-configured telegram(s), independently from the Non-Class A or Non-Class B CCT Subsystem conditions. Fixed Balise Groups are not interfaced with the Non-Class A or Non-Class B CCT Subsystem.*
- *Controlled Balise Groups are composed of Balise(s) of which at least one transmits a Balise telegram which depends on the condition of the Non-Class A or Non-Class B CCT Subsystem with which the Balise is interfaced (e.g., signal lamp circuits or interlocking controls).*
- *Controlled Balises of Controlled Balise Groups are interfaced with the Non-Class A or Non-Class B CCT Subsystem via Encoders.*
- *Encoders store a set of pre-configured telegrams for each Controlled Balise, and transmit to the Controlled Balises the telegrams associated with predefined conditions of the interfaced Non-Class A or Non-Class B CCT Subsystem.*
- *If the interface between the Encoder and a Controlled Balise has failed, that Balise transmits a Balise default telegram that is stored in its memory.*
- *If the interface between the Non-Class A or Non-Class B CCT Subsystem and the Encoder has failed, the Encoder transmits an individual Encoder default telegram to each of the Controlled Balises of the Balise Group.*

**[REQ:IRS\_CLASSA\_CCT\_00010];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Balise Groups shall be composed of Balises compliant with [SUB-036]. A Balise Group may be either a:

- Fixed Balise Group, or a
- Controlled Balise Group

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00011];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Fixed Balise Groups shall be composed of Balise(s) transmitting a fixed message, i.e. one fixed telegram per Balise, independent from the condition of the Non-Class A or Non-Class B CCT Subsystem.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00012];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Controlled Balise Groups shall be composed of Balises of which at least one is transmitting an individual variable telegram which is received from an Encoder and which depends on the condition of the Non-Class A or Non-Class B CCT Subsystem to which the Encoder is interfaced.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00013];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

In addition to the ability to send variable telegrams, each Controlled Balise of a Controlled Balise Group shall also be programmed with a Balise default telegram stored in the Balise memory, which shall be sent to the CCO if the interface between the Encoder and the Balise is detected as lost or as functioning incorrectly.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00014];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Any Controlled Balise shall permanently relay unaltered the telegrams received from the Encoder while the Balise is energised by the Balise Antenna, in accordance with [SUB-036].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00015];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The method of fixing the Balises to the track shall comply with the requirements of [SUB-036].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00016];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Means shall be provided by CCT such that specific Balise Group messages are ignored by the CCO when this is required by CCT. This shall be developed, shall be implemented and shall be demonstrated in accordance with the requirements of the relevant TSIs (including [TSI-CCS]), and the risk management requirements of , [50126], [50128], and [50129].

**[END\_REQ]**

*Note: the reading of a Balise Telegram that has not been fully commissioned can lead to a hazardous situation.*

**[REQ:IRS\_CLASSA\_CCT\_00017];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Balises shall not be installed in the presence of Big Metal Masses as defined by [SUB-036].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00018];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Balises shall not be installed in sections of track defined by the 'Track Condition Big Metal Mass' information (packet 67) transmitted to the CCO by a preceding Balise Group.

**[END\_REQ]**

*Note: this requirement is established for availability purposes.*

#### 7.2.4 Encoder

**[REQ:IRS\_CLASSA\_CCT\_00019];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Encoders shall be connected to the Non-Class A or Non-Class B CCT subsystem (e.g. Interlocking control relays or signal lamp circuits) to sense signalling information and transmit the corresponding variable telegrams to the Balises of the Controlled Balise Group to which the Encoder is also connected.

**[END\_REQ]**

*Note: The Non-Class A or Non-Class B CCT subsystem information sensed by Encoders typically consists of signal aspects or route indicators. Depending on the needs and local configuration, the position of the points may also be sensed.*

**[REQ:IRS\_CLASSA\_CCT\_00020];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Each Encoder shall be programmed with a preconfigured set of telegrams for each Controlled Balise of the Controlled Balise Group to which it is connected. Each telegram shall be associated with one predefined Non-Class A or Non-Class B CCT subsystem condition that shall be sensed by the Encoder.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00021];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

In addition to the ability to send a telegram corresponding to the Non-Class A or Non-Class B CCT subsystem condition, the Encoder shall also be programmed with Encoder default telegrams, which shall be sent to the connected Balises if the interface between the Encoder and the Non-Class A or Non-Class B CCT subsystem is detected as lost or as functioning incorrectly.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00022];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**



The Encoder shall record the date and time of each occurrence in order of occurrence, with a recorded time resolution of at least one second, of every instance of the following events and the resulting status/value:

- Change of input status from Non-Class A or Non-Class B CCT sub-system
- Identifiers of the telegrams which are sent to controlled balises
- Internal errors
- Interface errors

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00023];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The encoder shall have sufficient memory so that recorded data is available for at least 7 days before becoming overwritten by fresh data.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00024];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An Operating Rule shall be established to ensure that recorded data in the encoders can be readily made available in a readable format to Infrastructure Manager, National Safety Authorities, and National Investigation Bodies.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00025];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]**

**Optional:** The Encoder may provide the Blocking of Telegram Switching function as defined in [SUB-036] with a maximum blocking time correlated with the time required for reading a Balise at all foreseeable train speeds. This maximum blocking time shall be defined in accordance with the requirement of relevant TSIs (including [TSI-CCS]), and the risk management requirements of , [50126], [50128], and [50129] and shall in no case be greater than 1s.

**[END\_REQ]**

*Note: The blocking of telegram switching prevents a telegram from changing during the blocking time while a Balise Antenna is activating the Balise.*

**[REQ:IRS\_CLASSA\_CCT\_00026];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The duration between a change of Non-Class A or Non-Class B CCT subsystem condition (e.g. lineside signal aspect) and the presence of a correspondingly changed telegram in the Controlled Balise connected to the encoder, shall not be longer than 1s.

**[END\_REQ]**

*Note: this Class A CCT requirement can be related to the safety risk associated with a signalling aspect downgrade (e.g., signal put back to danger by signaller, or automatic fail-safe response of the Non-Class A or Non-Class B CCT sub-system). This safety risk is deemed to be protected by procedure and communication with the signalman and the proposed response time has minor impact on the overall sequence of events, and is deemed to be adapted to the situation.*

#### 7.2.5 Interface between Balise and Encoder

**[REQ:IRS\_CLASSA\_CCT\_00027];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The interface between the Balises and the Encoder shall be developed, shall be implemented and shall be demonstrated in accordance with the requirements of the relevant TSIs (including [TSI-CCS]), and the risk management requirements of , [50126], [50128], and [50129].

**[END\_REQ]**

#### 7.2.6 Interface between Non-Class A or Non-Class B CCT Sub-System and Encoder

**[REQ:IRS\_CLASSA\_CCT\_00028];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The interface between the Non-Class A or Non-Class B CCT Sub-System and the Encoder shall be developed, shall be implemented and shall be demonstrated in accordance with the requirements of the relevant TSIs (including [TSI-CCS]), and the risk management requirements of , [50126], [50128], and [50129].

**[END\_REQ]**

### 7.2.7 Interface between CCT Balise and CCO Balise Antenna

[REQ:IRS\_CLASSA\_CCT\_00029];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

The CCT system shall be compliant and compatible with the requirements and interfaces described in [SUB-036].  
[END\_REQ]

## 7.3 CCT fitment and transitions between CCT areas

[REQ:IRS\_CLASSA\_CCT\_00030];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

All areas on the network in IRL shall be fitted with:

- the Class A CCT equipment types as defined in this IRS (i.e. ETCS Level 1), and/or
- historical Class B CCT (i.e. 83.3Hz CODE or 50Hz CODE), or
- be Unfitted.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00211];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]

Optional: Areas on the network in IRL fitted with historical Class B CCT (i.e. 83.3Hz CODE or 50Hz CODE) may also be fitted with CLASS A CCT (i.e. ETCS Level 1). These areas are referred to as ETCS Level 1//50Hz CODE, or ETCS Level 1//83.3Hz CODE CCT areas.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00031];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

CCT fitment areas shall always be large, systematic and integrated sections of the network.

[END\_REQ]

*Note: these intents to minimise the number of level transitions and support drivers in maintaining their knowledge of the CCT area fitment, which is part of the route knowledge.*

[REQ:IRS\_CLASSA\_CCT\_00032];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

CCT fitment on single isolated signals, buffer stops or small areas of track shall not be permitted.

[END\_REQ]

*Note: Fitting isolated signals does not provide efficient protection unless at least the previous signal is also fitted.*

[REQ:IRS\_CLASSA\_CCT\_00033];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

All transition locations between CCT areas (and where relevant between CCT areas and neighbouring IM networks) must be fitted with the necessary CCT transition equipment as defined in this IRS.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00034];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

Sidings and depots that are connected to a CCT area shall form part of that CCT area.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00035];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

The fitment of sidings and depots belonging to a CCT area fitted with ETCS Level 1 shall follow the fitment rules of section 7.4.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00036];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]

SRAC: An Operating Rule shall be established to ensure that all CCT areas and transition locations between these CCT areas (and where relevant between these CCT areas and neighbouring IM networks) are published in the IM network statements and made available for the preparation of the Route Book according to [TSI-OPE].

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00037];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]

**SRAC:** An Operating Rule shall be established to ensure that any change to the fitment of an area or the location of the CCT area transitions shall be published in the IM Network Statement at least 6 months before the change becomes effective.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00038];[Allocation:Trackside];[Type:Mandatory];[Owner:IM]**

From the date of publication of this IRS, it is not permitted to create the following types of CCT areas:

- Only 50Hz CODE area, or
- Only 83.3Hz CODE area, or
- Unfitted

**[END\_REQ]**

*Note : This means that it is acceptable to implement new or altered CCT areas of ETCS Level 1, ETCS Level 1//50Hz CODE, or ETCS Level 1//83.3Hz CODE CCT areas, and it is acceptable to maintain existing 50Hz CODE or 83.3Hz CODE.*

**[REQ:IRS\_CLASSA\_CCT\_00039];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Lineside CCT area change marker boards shall be fitted at all transition locations. The position of the marker boards shall be such that the CCO reaction to the transition and the sighting of the marker board by the driver occur at approximately the same time, to the extent that this is practical.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00180];[Allocation:Application condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An Operating Rule shall be established to ensure that drivers stop their trains and contact the signaller in case of inconsistency between the CCT area and the ETCS Level indicated on the DMI in following circumstances:

- Crossing CCT area boundaries based on lineside marker boards, or
- Within CCT areas based on driver route knowledge

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00040];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The lineside marker board located at the transition location shall follow the definitions illustrated in the drawing of Figure 3 (all dimensions in mm):

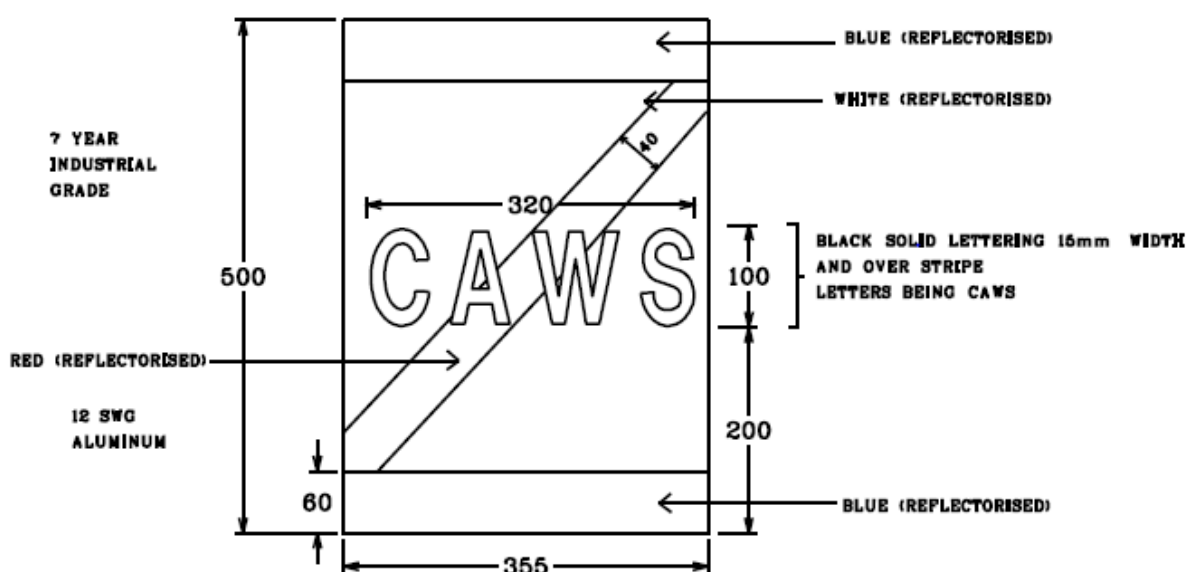




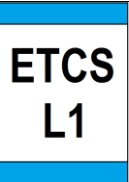
Figure 3: Lineside Marker Board

**[END\_REQ]**



**[REQ:IRS\_CLASSA\_CCT\_00041];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Lineside CCT area change marker boards shall indicate the commencement and termination of each type of CCT area fitment present between the boards, in accordance with the following rules:

- I. Where multiple boards are required to reflect a combination of CCT area fitments, they shall be co-located on the same pole.
- II. Commencement boards: The following boards indicate the type of CCT area fitment commencing at the board:

		
CAWS C1	CAWS C2	ETCS L1

- III. Termination boards: The following boards indicate the type of CCT area fitment terminating at the board:

	
END CAWS	END ETCS L1

- IV. A CAWS C1 board shall be used for indicating the commencement of an area fitted with 50Hz code.
- V. An END CAWS board shall be used for indicating the termination of an area fitted with 50Hz code not transitioning into an area fitted with 83.3Hz code.
- VI. A CAWS C2 board shall be used for indicating the commencement of an area fitted with 83.3Hz code.
- VII. A CAWS C1 board shall be used for indicating the termination of an area fitted with 83.3Hz code, transitioning into an area fitted with 50Hz code.
- VIII. An END CAWS board shall be used for indicating the termination of an area fitted with 83.3Hz code not transitioning into an area fitted with 50Hz code.
- IX. An ETCS L1 board shall be used for indicating the commencement of a CCT area fitted with ETCS Level 1.
- X. An END ETCS L1 board shall be used for indicating the termination of a CCT area fitted with ETCS Level 1.
- XI. Commencement boards for CCT areas fitted with ETCS Level 1 shall be positioned at least 10m and no further than 60m after the Stop Signal or Shunt Signal co-located with the transition Balise Group.
- XII. Commencement boards for CCT areas fitted with ETCS Level 1 for trains travelling in an un-signalled direction shall be co-located with the “Stop and Obtain Instruction Board” and associated transition Balise Group.
- XIII. Termination boards from CCT areas fitted with ETCS Level 1 shall be positioned in line with the Balise Group transmitting Level Transition Execution information.
- XIV. Commencement and termination boards shall be located such that the driver’s attention is not distracted from the main driving tasks (e.g. not installed on approach to a signal).

**[END\_REQ]**

*Note: Typically, the position for the commencement board of a CCT area fitted with ETCS Level 1 should be located at a distance equal to 1 second travel at Civil Line Speed from the signal or “Stop and Obtain Instructions” board co-located with the transition Balise Group.*

**[REQ:IRS\_CLASSA\_CCT\_00042];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The retroreflective colours (other than white) of the CCT lineside marker boards shall be Diamond Grade reflectivity. Retroreflective white should be High Intensity Grade reflectivity.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00043];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The following colour specifications shall be used for the CCT lineside marker boards:

- Red = RGB 237, 28, 36.
- Blue = RGB 0, 163, 232.
- White = RGB 255, 255, 255

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00044];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

Transition Balise Groups shall only be fitted at transitions to and from a CCT area fitted with ETCS Level 1 (ETCS Level 1, ETCS Level 1/50Hz CODE, or ETCS Level 1/83.3Hz CODE)

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00045];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

At transitions from CCT ETCS Level 1 areas to CCT ETCS Level 1/83.3Hz or ETCS Level 1/50Hz areas, Transition Balise Groups shall not be installed.

[END\_REQ]

*Note: This ensures that trains operating under the supervision of CCO remain in ETCS Level 1.*

[REQ:IRS\_CLASSA\_CCT\_00046];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

For managing transitions to a CCT area fitted with ETCS Level 1 for trains travelling under the authority of a Main Signal (in the normal running direction on double track lines or for bi-directionally signalled lines), the following rules shall apply:

- A Controlled Balise Group of at least two Balises shall be located at the first Stop Signal within the ETCS Level 1 CCT area and shall transmit the Level Transition Execution information.
- A Fixed Balise Group of at least two Balises shall be located between 6 and 8 seconds travel at Civil Line Speed before the first Stop Signal within the ETCS Level 1 CCT area and shall transmit Level Transition Announcement information.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00181];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]

Optional: At ETCS Level 1 CCT area boundaries where trains arrive from other jurisdictions (e.g. Northern Ireland) specific arrangements may be implemented to enable an earlier transition to ETCS Level 1.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00047];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

For managing a transition from ETCS Level 0 to ETCS Level 1 for trains travelling in an unsignalled direction of a double track line, the following rules shall apply:

- A fixed or controlled Balise Group of at least two Balises shall be located at the boundary of the ETCS Level 1 CCT area and shall transmit the Level Transition Execution information. This boundary shall be located at a 'Stop and Obtain Instructions' board or a Shunt Signal. This boundary shall be located as close as practicable to the transition implemented for the signalled direction on the opposite track, but no further than 200m.
- A fixed Balise Group of at least two Balises shall be located before the boundary at a distance of between 6 and 8 seconds travel at the speed authorised for the unsignalled movements and shall transmit Level Transition Announcement information.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00048];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

For managing transitions from ETCS Level 1 to ETCS Level 0, for trains travelling under the authority of a Main Signal (normal running direction on double track lines or for bi-directionally signalled lines), the following rules shall apply:

- A controlled Balise Group of at least two Balises shall be located at the last Stop Signal within the ETCS Level 1 CCT area and shall transmit the Level Transition Announcement information.
- A fixed Balise Group of at least two Balises shall be located at the ETCS Level 1 termination board, after the last Stop Signal of the ETCS Level 1 CCT area, and shall transmit the Level Transition Execution

information. This termination board shall be located at least at a distance of between 6 and 8 seconds travel at Civil Line Speed after that signal, and not beyond the next Stop Signal.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00049];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For managing transitions from ETCS Level 1 to ETCS Level 0, for trains travelling in an unsignalled direction of a double track line, the following rules shall apply:

- A fixed Balise Group of at least two Balises shall be located at the ETCS Level 1 termination board, and shall transmit the Level Transition Execution information. This termination board shall be located as close as practicable to the transition implemented for the signalled direction on the opposite track, but no further than 200m.
- A fixed Balise Group of at least two Balises shall be located before the termination board at a distance of between 6 and 8 seconds travel at the speed authorised for the unsignalled movements, and shall transmit Level Transition Announcement information.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00050];[Allocation:CCT];[Type:Mandatory];[Owner:ETCSSupplier]**

For managing transitions from ETCS Level 1 to ETCS Level 0, for trains travelling under the authority of a Shunt Signal, the following rules shall apply:

- A fixed Balise Group of at least two Balises shall be located at the ETCS Level 1 termination board, and shall transmit the Level Transition Execution information. This termination board shall be located at the end of the movement authority which was transmitted at the Shunt Signal.
- A fixed Balise Group of at least two Balises shall be located before the termination board at a distance of between 6 and 8 seconds travel at the speed authorised for the shunt movement, and shall transmit Level Transition Announcement information.

Or

- A controlled Balise Group of at least two Balises shall be located at the last fitted Shunt Signal within the ETCS Level 1 CCT area and shall transmit the Level Transition Announcement information.
- A fixed Balise Group of at least two Balises shall be located at the ETCS Level 1 termination board, after the last fitted Shunt Signal of the ETCS Level 1 CCT area, and shall transmit the Level Transition Execution information. This termination board shall be located at least at a distance of between 6 and 8 seconds travel at Civil Line Speed after that signal, and not beyond the next signal or Stop and Obtain Instructions board.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00182];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If a Level Transition from ETCS Level 1 to ETCS Level 0 is provided under the authority of a Main or Shunt Signal, and this signal can display aspects for at least one route which does not leave the ETCS Level 1 CCT area:

- the Level Transition Announcement shall be repeated by a Balise Group fitted at a location where the route taken by the train is unambiguous, or
- the Level Transition Execution shall be repeated by a second Balise Group within a distance of 8 seconds travel at Civil Line Speed after the termination of the CCT area fitted with ETCS Level 1 (where the first Level Transition Execution information is transmitted).

**[END\_REQ]**

*Note: The repeated Level Transition Execution may be provided by the Level Transition Announcement Balise Group corresponding to the opposite direction. The above requirement is provided because the train may be authorized to pass the last signal at danger, and in this case no Level Transition Announcement is provided / obtained, because the route taken by the train is not unambiguous for the ETCS CCT, and it cannot be determined whether the train would remain in the ETCS Level 1 CCT Area or leave it. It shall be ensured that the Level Transition packet is received by CCO from two separate Balise Groups in all operational conditions.*

**[REQ:IRS\_CLASSA\_CCT\_00051];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**



In the normal running direction, transitions from ETCS Level 0 CCT area to ETCS Level 1 shall be located at the Stop Signal preceding the first signal requiring the protection of the ETCS Full Supervision mode, except in situations where the option contained in requirement IRS\_CLASSA\_CCT\_00181 is implemented.

**[END\_REQ]**

*Note: The signal co-located with the transition Balise Group is not protected by the functionality of Full Supervision Mode. The train stop order transmitted from the Balise Group of the first fitted signal within the ETCS Level 1 CCT area, if the signal presents a danger aspect, cannot systematically prevent the train from exceeding the signalling overlap associated with that signal (as the approach speed of the train may not be fully controlled by the CCO). The first signal protected by the Full Supervision mode can only be the next Stop Signal after the first signal where an area fitted with ETCS Level 1 commenced.*

*Note, that in case of transitions from other jurisdictions, special arrangements may be implemented.*

**[REQ:IRS\_CLASSA\_CCT\_00052];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The location of transitions to and from CCT areas fitted with ETCS Level 1 shall be chosen such that no information, other than the information essential for the transition, is displayed to the driver until the transition is completed.

**[END\_REQ]**

*Note: The intent of this requirement is to ensure that the drivers' workload is not increased by the requirement to carry out tasks other than the management of the transition.*

## **7.4 Balise Group fitments**

*Note: This section describes the high-level requirements applicable to the installation of Balise Groups in ETCS Level 1 CCT areas and ETCS Level 1/50Hz areas, and ETCS Level 1/83.3Hz CCT areas.*

*In this section each Balise Group Type is defined by a name, which is derived from its location or its main purpose. The following section 7.5 describes the detail of the messages that shall be transmitted from each of these Balise Groups.*

**[REQ:IRS\_CLASSA\_CCT\_00053];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

In a CCT area fitted with ETCS Level 1, the Generic Application and Specific Application designs for the fitment of Balise Groups shall be defined in accordance with the rules specified in this IRS and in accordance with the requirements of the relevant TSIs (including [TSI-CCS]), and the risk management requirements of [CSM402], [50126], [50128], and [50129].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00054];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

In a CCT area fitted with ETCS Level 1, the Balises shall be installed in accordance with [SUB-036] and [SUB-040].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00055];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]**

Optional: It may be possible for a Balise Group to serve the purpose of several Balise Group types described in section 7.4.1 to 7.4.9, if it can be demonstrated that the installation, safety and functional requirements of all these Balise Group types described in section 7.4 are fulfilled by the one Balise Group.

If one Balise Group is used to serve the purpose of several Balise Group types, this Balise Group shall be named based on its main purpose.

If the functional requirement of at least one of the Balise Group types mandates a Controlled Balise Group, then the Balise Group used to serve the purpose of other Balise Group types shall be a Controlled Balise group.

If the functional requirement of at least one of the Balise Group types mandates at least two balises, then the Balise Group used to serve the purpose of other Balise Group types shall be composed of at least two Balises.

**[END\_REQ]**

### **7.4.1 Level Transition Balise Groups**

*Note: The Level Transition Balise Groups are the fixed Balise Groups referred to in section 7.3.*

#### 7.4.2 Main Signal Balise Groups

*Note: This Balise Group Type will be fitted at every Stop Signal (except for Stop Signals protecting a Mid-section Level Crossing, see section 7.4.8) in a CCT area fitted with ETCS Level 1 to transmit Movement Authority information.*

**[REQ:IRS\_CLASSA\_CCT\_00056];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

A Balise Group shall be fitted at every Stop Signal, except Stop Signals protecting mid-section level crossings. Such Balise Groups shall be called Main Signal Balise Groups.

**[END\_REQ]**

*Note: Co-located Stop Signal and Shunt Signal shall be fitted with a Main Signal Balise Group. In this case it is not required to install two separate Balise Groups.*

*Note: Repeater and Banner Repeater signals are not Stop Signals, and therefore shall not be fitted with Main Signal Balise Groups.*

*Note: Buffer stops' red lamps shall not be fitted with Main Signal Balise Groups, because they are protected by other means.*

*Note: Distant signals are not Stop Signals, and therefore shall not be fitted with Main Signal Balise Groups.*

**[REQ:IRS\_CLASSA\_CCT\_00057];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

A Main Signal Balise Group shall be a Fixed Balise Group of at least two Balises if the associated signal permanently presents a unique aspect. Otherwise it shall be a Controlled Balise Group of at least two Balises.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00058];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Main Signal Balise Groups shall be installed in accordance with [SUB-040] and as close as practicable to the signal.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00210];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

SRAC: A set of operating rules shall be established which defines procedures for passing Main Signals at danger and for reacting to ETCS Trip applications which are coherent across the whole network in IRL. This shall include as a minimum the following scenarios:

- The Driver requests authority from the Signaller to pass a signal at danger and to initiate the override EOA procedure.
- The signal has been passed at danger and a trip order has been transmitted by the CCT and applied by the CCO.
- The signal has been passed at danger and a trip has been executed without reception of information from the Signal Balise Group (i.e. trip due to min safe front end passing the EOA or linking reaction).
- The signal has not been passed at danger, but a trip order has been received by the Balise Group located before the signal.
- The signal has been passed at danger and a no trip has been executed yet (i.e. no trip due to min safe front end not passing the EOA yet and no linking reaction executed).

**[END\_REQ]**

#### 7.4.3 Shunt Signal Balise Groups

**[REQ:IRS\_CLASSA\_CCT\_00059];[Allocation:Trackside];[Type:Optional];[Owner:IM]**

Optional: Balise Groups may be installed at Shunt Signals or Limit of Shunt boards. If fitted, such Balise Groups shall be called Shunt Signal Balise Groups.

A safety risk assessment for fitting or not fitting Shunt Signals and Limit of Shunt boards with Balise Groups shall be made at specific application level in accordance with the requirements of [CSM402], [50126], [50128], and [50129] and shall consider whether or not they shall transmit trip orders.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00183];[Allocation:Trackside];[Type:Mandatory];[Owner:IM]**



A means shall be provided to drivers to visually differentiate Shunt Signals or Limit of Shunt Boards that are fitted or protected with Balise Groups from those that are not fitted or protected with Balise Groups.

[END\_REQ]

*Note: The detail of this means shall be defined in a future version of this IRS.*

[REQ:IRS\_CLASSA\_CCT\_00060];[Allocation:CCT];[Type:Mandatory];[Owner:ETCSSupplier]

A Shunt Signal Balise Group shall be a Fixed Balise Group of at least two Balises:

- When installed at a Limit of Shunt board or
- If the associated Shunt Signal permanently presents a unique aspect.

Otherwise it shall be a Controlled Balise Group of at least two Balises.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00061];[Allocation:CCT];[Type:Mandatory];[Owner:ETCSSupplier]

Shunt Signal Balise Groups shall be installed in accordance with [SUB-040] and as close as practicable to the signal.

[END\_REQ]

#### 7.4.4 Stop Balise Groups

[REQ:IRS\_CLASSA\_CCT\_00062];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]

Optional: Balise Groups may be installed at Stop and Obtain Instruction boards. If fitted, such Balise Groups shall be called Stop Balise Groups. The assessment for fitting these boards with Balise Groups shall be made at specific application level in accordance with the requirements of [CSM402], [50126], [50128], and [50129].

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00063];[Allocation:CCT];[Type:Mandatory];[Owner:ETCSSupplier]

A Stop Balise Group shall be a Fixed Balise Group of at least two Balises.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00064];[Allocation:CCT];[Type:Mandatory];[Owner:ETCSSupplier]

A Stop Balise Group shall be located adjacent to the Stop and Obtain Instructions board, with a tolerance of 2 metres on each side.

[END\_REQ]

#### 7.4.5 Infill Balise Groups

[REQ:IRS\_CLASSA\_CCT\_00065];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]

Optional: Balise Groups may be installed if required for performance reasons, on the approach to Stop Signals to anticipate the information sent from the Main Signal Balise Group. These Balise Groups shall be called Infill Balise Groups.

[END\_REQ]

*Note: these Balise Groups are generally required in areas where trains are likely to be approaching a signal at red and need to be communicated an upgrade to a proceed aspect of this signal before reaching the signal, to avoid undue delays.*

*Note: Several Infill Balise Groups may be installed on approach to the same signal.*

[REQ:IRS\_CLASSA\_CCT\_00066];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

Infill Balise Groups shall be fitted at every Distant signal, unless the Distant signal always displays a caution aspect.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00067];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

Infill Balise Groups shall be Controlled Balise Groups of at least one Balise.

[END\_REQ]

**[REQ:IRS\_CLASSA\_CCT\_00068];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The location of the infill Balise Groups shall be defined at generic application and specific application levels, considering operational performance requirements and applicable operating rules.

**[END\_REQ]**

#### 7.4.6 Relocation Balise Groups

*Note: In case of a mid-section level crossing, the CCO manages the mid-section level crossing protecting signal as a temporary End of Authority. In this case, this temporary End of Authority shall be considered as an End of Authority for relocation purposes.*

**[REQ:IRS\_CLASSA\_CCT\_00069];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

When no other permanent Balise Group is available for resetting the CCO odometry confidence interval, a specific Balise Group shall be installed. Such Balise Groups shall be called Relocation Balise Groups.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00070];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Relocation Balise Groups shall be Fixed Balise Groups of at least one Balise.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00071];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The maximum permitted distance between two linked Balise Groups shall be 2.5 km. If this distance cannot be met by other permanent Balise Groups, Relocation Balise Group(s) shall be installed.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00072];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The maximum permitted distance  $D_{\max}$  is defined as the distance from the latest Balise Group recalibrating the CCO odometry regarding the remaining distance to the End of Authority of a Full Supervision Movement Authority.

$D_{\max}$  shall be determined to ensure that the CCO odometry confidence interval is commensurate with the distance between that End of Authority and its associated signalling overlap. The maximum allowed Confidence Interval shall be derived from:

- The distance between the End of Authority and the end of its associated signalling overlap, or in case of mid-section level crossing the commencement of the mid-section level crossing, and
- The gradients applicable between the rear-end of the train and the End of Authority, and between the End of Authority and the end of its associated signalling overlap, considering the longest authorised train with its front end at the End of Authority and
- A worst case ETCS Braking Model considering the following braking performances for the speed band 0 to 15km/h:
  - 10 seconds of Emergency Brake delay time
  - 0.35 m/s<sup>2</sup> established Emergency Brake deceleration, and
- The Release Speed associated with the End of Authority or in case of a mid-section level crossing, the  $V_{LX}$  speed.

The maximum Confidence Interval and the resulting distance  $D_{\max}$  shall be calculated using one single method for the whole network in the Republic of Ireland, in accordance with the requirements of relevant TSIs (including [TSI-CCS]), and the risk management requirements of , [50126], [50128], and [50129].

**[END\_REQ]**

*Note: typically, it is expected that most overlaps present in IRL can be protected with a Confidence Interval of +/- 40m, i.e. a maximum distance  $D_{\max}$  of 700m. Certain locations of the network may require further reduction in Confidence Interval.*

**[REQ:IRS\_CLASSA\_CCT\_00184];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

SRAC: The braking performance of all trains permitted to operate on ETCS CCT area shall be demonstrated to be equal to or better than the performances used in the calculation of  $D_{max}$  (see *IRS\_CLASSA\_CCT\_00072*). This shall be demonstrated to a SIL 4 level, or equivalent, in accordance with the requirements of relevant TSIs (including [TSI-CCS]), and the risk management requirements of , [50126], [50128], and [50129].

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00073];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

If the distance from a Balise Group to the Full Supervision End of Authority transmitted by that Balise Group is greater than the maximum distance  $D_{max}$ , and no other Balise Group is available within the  $D_{max}$  distance to reset the odometry confidence interval, an additional Relocation Balise Group shall be installed between  $D_{max}$  and 50 m before that End of Authority.

[END\_REQ]

*Note: Relocation Balise Groups are not required to be installed within  $D_{max}$  of Shunt Signals, even if they are fitted, because no Full Supervision End of Authority is associated with a Shunt Signal.*

[REQ:IRS\_CLASSA\_CCT\_00185];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

A Relocation Balise Group shall be installed  $500 \pm 50$  metres from the End of Authority, if there are no other Balise Groups between 250 and 700 metres before the End of Authority.

[END\_REQ]

*Note: This provides an odometry correction at an optimal location and ensures that an optimal braking curve is calculated.*

[REQ:IRS\_CLASSA\_CCT\_00186]; [Allocation: Application Condition]; [Type:Mandatory];[Owner:IM]

SRAC: An operating rule shall be established to ensure that the requirements for Vehicle Network Access for ETCS fitted Vehicles enforce an ETCS configuration and a Braking Performance that is compatible at network level with the method of calculating  $D_{max}$ .

[END\_REQ]

#### 7.4.7 Repositioning Balise Groups

[REQ:IRS\_CLASSA\_CCT\_00074];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]

Optional: if an Encoder is not capable of unambiguously determining the route set by the Signal to which it is interfaced, additional Balise Groups may be fitted after the divergence to adjust the length of the actual section of the Movement Authority, if no other permanent Balise Group of at least two balises is present for other purposes. Such balise groups shall be called 'Repositioning Balise Groups'.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00075];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

Repositioning Balise Groups shall be Fixed Balise Groups of at least two Balises.

[END\_REQ]

#### 7.4.8 Mid-Section Level Crossing Balise Group

[REQ:IRS\_CLASSA\_CCT\_00076];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

A Balise Group shall be fitted at every Stop Signal protecting a Mid-Section Level Crossing to transmit information about the protected status of the mid-section level crossing. Such Balise Groups shall be referred to as Mid-Section Level Crossing Balise Groups, and shall be Controlled Balise Groups of at least two Balises.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00077];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

Mid-section Level Crossing Balise Groups shall be fitted at every mid-section level crossing Distant Signal to repeat / update the information about the protected status of the mid-section level crossing. Such Balise Groups shall also be referred to as Mid-Section Level Crossing Balise Groups and shall be Controlled Balise Groups of at least one Balise.

[END\_REQ]

**[REQ:IRS\_CLASSA\_CCT\_00078];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]**

**Optional:** If required for performance reasons, Balise Groups may also be fitted before the Stop Signal protecting a Mid-Section Level Crossing, to repeat / update the information about the protected status of the mid-section level crossing. Such Balise Groups shall also be referred as Mid-Section Level Crossing Balise Groups and shall be Controlled Balise Groups of at least one Balise.

**[END\_REQ]**

*Note: These additional Balise Groups that transmit Level Crossing information on approach to the Mid-Section Level Crossing, only transmit packets which are processed by CCO when the operating mode is Full Supervision or On-Sight. In these modes, the availability of linking information permits the use of only one Balise per Balise Group.*

*Note: the ETCS CCT does not provide protection for user-operated level crossings, and it shall not be interfaced with level crossing decision support systems.*

**[REQ:IRS\_CLASSA\_CCT\_00187];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An operating rule shall be established which defines procedures for passing Stop Signals protecting Mid-Section Level Crossing at danger.

**[END\_REQ]**

*Note: this application condition is specific to Mid-Section Level Crossing signals because the driver has to interface with the operator/signaller in charge of a Level Crossing. .*

#### 7.4.9 Big Metal Mass Balise Groups

*Note: Balise Groups transmitting Big Metal Mass Information are used to inform the CCO of the presence of a Big Metal Mass so that the CCO can ignore Eurobalise Antenna errors raised when the antenna is above the announced Big Metal Mass. Big Metal Masses are the metal masses outside of the tolerances specified in 6.2.1.7 of [SUB-036]*

**[REQ:IRS\_CLASSA\_CCT\_00079];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If no other permanent Balise Group is present for announcing the location and length of a Big Metal Mass, a specific Balise Group shall be installed at a distance corresponding to a minimum of 5 seconds travel at Civil Line Speed before the commencement of the Big Metal Mass. Such Balise Groups shall be called Big Metal Mass Balise Groups.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00080];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Big Metal Mass Balise Groups shall consist of Fixed Balise Groups of at least two Balises.

**[END\_REQ]**

#### 7.4.10 Temporary Speed Restriction Balise Groups

*Note: The functionality supported by these Balise Groups is currently not implemented, but may be defined in a future version of this standard*

#### 7.4.11 Virtual Balise Cover Balise Groups

**[REQ:IRS\_CLASSA\_CCT\_00081];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

In areas where Virtual Balise Cover shall be activated by CCO over an area, temporary Balise Groups shall be installed specifically to indicate commencement and termination of these areas. These Balise Groups shall be called Virtual Balise Cover Balise Groups.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00082];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Virtual Balise Cover Balise Groups shall consist of two temporary Fixed Balise Groups sending the same information. Each Balise group shall consist of at least two Balises.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00188];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An Operating Rule shall be established to ensure that Virtual Balise Cover Balise Groups do not remain installed for long periods without recurrent maintenance checks. This rule and associated maintenance check frequency shall be defined in accordance with the relevant TSIs (including [TSI-CCS]), and the risk management requirements of [50126], [50128], and [50129].

**[END\_REQ]**

*Note: This is to mitigate against the inherent risks associated with using unlinked Balise Groups. The common cause of failure related to mechanical damage or removal of two consecutive unlinked Balise Groups should be considered.*

#### 7.4.12 Temporary Speed Restriction Warning Balise Groups

*Note: The functionality supported by these Balise Groups is intended to be a driver support function with Basic Integrity only. It can be used as an add-on to other already existing safety measures but not as a replacement for these measures.*

**[REQ:IRS\_CLASSA\_CCT\_00213];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

When Temporary Speed Restrictions commence within ETCS Level 1 areas, ETCS Temporary Speed Restriction warning messages shall be used to inform drivers that they are approaching these Temporary Speed Restrictions. These ETCS warning messages shall be transmitted via Balise Groups that shall be called Temporary Speed Restriction Warning Balise Groups.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00214];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Temporary Speed Restriction Warning Balise Groups shall consist of temporary Fixed Balise Groups of at least two Balises.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00221];[Allocation:Trackside];[Type:Mandatory];[Owner:IM]**

The implementation of the Temporary Speed Restriction Warning Balise Groups shall be such that any other existing controls in place for mitigating the risks associated with Temporary Speed Restrictions are unchanged and not degraded.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00215];[Allocation:Trackside];[Type:Mandatory];[Owner:IM]**

A Temporary Speed Restriction Warning Balise Group shall be co-located with the corresponding Temporary Speed Restriction lineside Warning (A) Board, i.e. located as close as possible to, and no further than 100m after, that Temporary Speed Restriction lineside Warning (A) Board.

**[END\_REQ]**

*Note: if this positioning of the Temporary Speed Restriction Warning Balise Group cannot be achieved (e.g. due to the presence of Big Metal Masses), the locations of the Warning (A) Board and subsequent Commencement (C) Board have to be changed.*

**[REQ:IRS\_CLASSA\_CCT\_00222];[Allocation:Trackside];[Type:Mandatory];[Owner:IM]**

Where successive Warning (A) Boards are present to announce successive Temporary Speed Restrictions, only one Temporary Speed Restriction Warning Balise Group shall be installed. It shall be co-located with the last of these Temporary Speed Restriction lineside Warning (A) Boards.

**[END\_REQ]**

*Note: This is to mitigate against the risk of a driver missing subsequent lineside Warning (A) Boards while managing DMI messages. According to the existing IM rules, successive Warning (A) Boards must be placed 50m apart.*

**[REQ:IRS\_CLASSA\_CCT\_00224];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An Operating Rule shall be established to ensure that the process of configuration, programming, installation, and verification and validation of Temporary Speed Restriction Warning Balise Group, including the necessary interfacing with infrastructure (e.g. presence of Big Metal Masses), is performed by competent persons. This shall follow the relevant requirements of [EN50126], [EN50128], [EN50129] and [CSM\_402] for Basic Integrity.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00216];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An Operating Rule shall be established to ensure that Temporary Speed Restriction Warning Balise Groups do not remain installed for long periods without recurrent maintenance checks. This rule and associated maintenance check frequency shall be defined in accordance with the relevant TSIs (including [TSI-CCS]), and the risk management requirements of [50126], [50128], and [50129].

**[END\_REQ]**

*Note: This is to mitigate against the inherent risks associated with using unlinked Balise Groups. The common cause of failure related to mechanical damage or removal of unlinked Balise Groups should be considered.*

**[REQ:IRS\_CLASSA\_CCT\_00217];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An Operating Rule shall be established to ensure that existing Temporary Speed Restriction controls remain as mitigation against Temporary Speed Restriction related hazards, and that ETCS Temporary Speed Restriction warning messages shall only be considered as an additional measure.

**[END\_REQ]**

## 7.5 ETCS Message Rules

*Note: This section describes the high-level requirements applicable to the data configuration of Balise Groups in ETCS Level 1 CCT areas. These requirements also apply to ETCS Level 1 //50Hz and ETCS Level 1 //83.3Hz CCT areas.*

### 7.5.1 General principles

**[REQ:IRS\_CLASSA\_CCT\_00083];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The CCT ETCS Level 1 messages shall comply with the requirements of [SUB-026], [SUB-036], [SUB-040], [SUB-041], and [SUB-091].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00084]**

Intentionally blank.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00085];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The CCT ETCS Level 1 messages shall be configured to deliver the functionality of ETCS Level 1 overlaid on and compatible with the existing Non-Class A or Non-Class B CCT and to provide:

- Full Supervision Movement Authority derived from Stop Signal aspects (except Stop Signals protecting Mid-Section Level Crossing, and except call-on aspects), and from block lengths and Civil Line Speed profile.
- Infill information, which is authorised to be sent via Balise Groups but shall not be sent via Radio or Euroloop.



- On-Sight Movement Authority derived from Shunt Signal aspects and from block lengths, where Shunt Signals are required to be fitted with ETCS Level 1.
- On-Sight Movement Authority derived from call-on aspects of Main Signals, and from block lengths.
- Train trip from any fitted Stop Signal displaying a danger aspect.
- Train trip from certain Limit of Shunt boards or any Stop and Obtain Instruction boards which are required to be fitted with ETCS Level 1.
- Level Crossing information derived from aspects of Stop Signals protecting Mid-Section Level Crossing.
- Temporary Speed Restriction Warning text messages through the use of temporary fixed Balise Groups.
- Virtual Balise Cover Orders through the use of temporary fixed Balise Groups.

**[END\_REQ]**

*Note: in particular, this means that the use of Limited Supervision mode is not authorised.*

## 7.5.2 ETCS Level 1 packets used

*Note: This section describes the packets that are permitted to be used in the ETCS Level 1 Irish application.*

**[REQ:IRS\_CLASSA\_CCT\_00086];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Depending on the Balise Group Type in a CCT area fitted with ETCS level 1, the messages sent by Balise Groups shall be composed of the packets as defined in Table 2 below, in accordance with the following meanings:

- G – Generic: It is mandatory to always transmit the packet.
- A – Aspect dependent: Transmit the packet as part of a controlled Balise telegram in case the detected signal aspect requires it.
- S – Site dependent: Transmit the packet if the specific site configuration requires it, otherwise do not transmit it.
- F – Forbidden: Must not be transmitted.
- Empty cells in the table indicate that the packet may be sent but its transmission is not mandatory.
- TBD – May be defined in a future version of this IRS. Forbidden until defined.

Table 2 Balise Telegram Packets

		Balise Group Types											Notes
Packets		Level Transition BG	Main Signal BG	Infill BG	Shunt Signal BG	Mid-section Level Crossing BG	Stop BG	Relocation BG	Repositioning BG	Big Metal Mass BG	Virtual Balise cover BG (temp.)	Temporary Speed Restriction Warning BG (temp.)	
0	Virtual Balise Cover marker	G											F
2	System Version order	G	S		S			S			S	F	S: A System Version order shall be sent together with National Values packets.
3	National Values	G	S		S			S			S	F	S: National Values shall be transmitted in BG with transition to Level 1, in signal BG that provide access to the main line from depots and in Relocation BG after major stations and freight yards.
5	Linking	S	A	S	A	S	S	S	S	S	F	F	A: In case of Proceed aspect S: Linking information may need to be transmitted from an intermediate Balise Group if the Main or Shunt Signal Balise

		Balise Group Types											
Packets		Level Transition BG	Main Signal BG	Infill BG	Shunt Signal BG	Mid-section Level Crossing BG	Stop BG	Relocation BG	Repositioning BG	Big Metal Mass BG	Virtual Balise cover BG (temp.)	Temporary Speed Restriction Warning BG (temp.)	Notes
													Group cannot transmit linking information to the end of the movement authority. Repositioning Balise Groups shall always transmit Linking Information unless there are no further balise groups on the line.
6	Virtual Balise Cover order	F									G	F	
12	Level 1 Movement Authority		A	A	A	S	G				F	F	A: Movement Authority shall be sent with any valid aspect of the Signal. Default telegrams may transmit a packet 254 instead of a Movement Authority. S: The Danger aspect of mid-section level crossing protecting signals shall send a Trip Order, and may transmit infill Movement Authorities.
16	Repositioning Information		S	S	S				G		F	F	S: Main or shunt Signal Balise Groups can be used to transmit Repositioning Information in the reverse Direction so long as they are composed of at least two Balises. Infill Balise Groups may transmit repositioning information.
21	Gradient Profile	S	A	S	A	S	S	S	G	S	F	F	A: In case of proceed aspect. Default telegrams may transmit a packet 254 instead of a Gradient Profile. S: Gradient information may need to be transmitted from an intermediate Balise Group if the Main signal Balise Group cannot transmit accurate gradient information to the end of the movement authority.
27	International Static Speed Profile	S	A	S	A	S	S	S	G	S	F	F	A: In case of proceed aspect. Default telegrams may transmit a packet 254 instead of a Static Speed Profile. S: SSP information may need to be transmitted from an intermediate Balise Group if the Main signal Balise Group cannot transmit accurate SSP information to the end of the movement authority.
39	Track Condition Change of traction system	F											
40	Track Condition Change of allowed current consumption	F											
41	Level Transition Order	G	G		G		G				S	F	S: To manage the commissioning of areas



		Balise Group Types											
Packets		Level Transition BG	Main Signal BG	Infill BG	Shunt Signal BG	Mid-section Level Crossing BG	Stop BG	Relocation BG	Repositioning BG	Big Metal Mass BG	Virtual Balise cover BG (temp.)	Temporary Speed Restriction Warning BG (temp.)	Notes
													newly fitted with ETCS Level 1, the VBC BGs may transmit Level Transition Orders to avoid the transition to an un-commissioned Level 1 trackside.
42	Session Management	F											
44	Data used by applications outside the ERTMS/ETCS system.	F											
45	Radio Network registration	F											
46	Conditional Level Transition Order	F											
49	List of balises for SH Area	F											
51	Axle load Speed Profile	F											
52	Permitted Braking Distance Information	F											
65	Temporary Speed Restriction	TBD											
66	Temporary Speed Restriction Revocation	TBD											
67	Track Condition Big Metal Masses	S								G	F	F	S: Any type of permanent Balise Group can be used to provide Big Metal Mass information so long as it is composed of at least two Balises.
68	Track Condition	F											
69	Track Condition Station Platforms	F											
70	Route Suitability Data	F											
71	Adhesion Factor	F											
72	Packet for sending plain text messages	S									G		S: Text messages may be used for application specific purposes.
76	Packet for sending fixed text messages	F											
79	Geographical Position Information	F											
80	Mode profile		A	A	A						F	F	A: Only sent in case of a proceed shunting aspect from Shunt signals co-located with Main signals or standalone shunt Signals, and in case of call-on aspect from Main Signals.
88	Level crossing information		S	S		G					F	F	S: Level Crossing Information shall be sent if Mid-Section Level Crossings are present within the movement authority sent from

		Balise Group Types											Notes
Packets		Level Transition BG	Main Signal BG	Infill BG	Shunt Signal BG	Mid-section Level Crossing BG	Stop BG	Relocation BG	Repositioning BG	Big Metal Mass BG	Virtual Balise cover BG (temp.)	Temporary Speed Restriction Warning BG (temp.)	
													the Main Signal BG.
90	Track Ahead Free up to level 2/3 transition location	F											
131	RBC transition order	F											
132	Danger for Shunting information		A		A	A	G				F	F	A: Danger for shunting shall be sent from specific Signals displaying a danger aspect.
133	Radio infill area information	F											
134	EOLM Packet	F											
135	Stop Shunting on desk opening	S									F	F	S: This packet may be used if required for a specific application (e.g. locations where turnbacks are expected to occur with rear cab operating in Passive Shunting mode instead of Sleeping mode)
136	Infill location reference			G		S					F	F	S: Mid-section level crossing protecting signals providing distant signalling information for Stop Signals shall transmit the information as infill.
137	Stop if in Staff Responsible						S				F	F	S: Balise Groups of Stop and Obtain Instruction boards may transmit the packet if required by the specific application requirements.
138	Reversing area information	F											
139	Reversing supervision information	F											
141	Default Gradient for Temporary Speed Restriction	TBD									F	F	
145	Inhibition of Balise Group message consistency reaction	F											
180	LSSMA display toggle order	F											
181	Generic LS function marker	F											
254	Default Balise, loop or RIU information	A	A	A	A	A					F	F	A: To be sent together with the default telegrams.
255	End of Information	G											

*Note: Temporary Speed Restriction Balise Groups message content may be addressed in a future version of this IRS*

[END\_REQ]

### 7.5.3 Balise telegram headers

**[REQ:IRS\_CLASSA\_CCT\_00087];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Only uplink Balise telegrams shall be used.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00088];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Balise telegrams shall indicate "Version 2.1" in their header.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00089];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

All possible telegrams related to any one Controlled Balise shall be differentiated with unique M\_MCOUNT values in their headers.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00090];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If there is more than one Controlled Balise within the same Balise Group, the M\_MCOUNT value corresponding to each Non-Class A or Non-Class B CCT condition shall be identical in all controlled Balise telegram headers, to enable detection of a change of Balise Group message during the passage of a train over the Balise Group.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00208];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The Balise default telegrams of controlled balises of Mid-Section Level Crossing Balise Groups located at the Stop Signal protecting the Mid-Section Level Crossing shall transmit a M\_MCOUNT variable set to 254.

**[END\_REQ]**

*Note: This is to ensure, jointly with the associated linking reaction, that trackside failures of Balise Groups installed at Stop Signals protecting Mid-Section Level Crossings lead to an emergency brake when the signal is at stop.*

**[REQ:IRS\_CLASSA\_CCT\_00091];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

SRAC: the values of the variables NID\_BG and NID\_C shall be managed and controlled by the IM such that each linked Balise Group of the IM network is associated with a unique identifier.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00092];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

All permanent Balise Groups shall be marked as linked (Q\_LINK = 1). Temporary Balise Groups shall be marked as unlinked (Q\_LINK = 0).

**[END\_REQ]**

### 7.5.4 Packet 0: Virtual Balise Cover marker

**[REQ:IRS\_CLASSA\_CCT\_00093];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

All Balise Group telegrams shall include at least one packet 0.

**[END\_REQ]**

*Note: Virtual Balise Covers can be used to inhibit the Balise Groups for facilitating temporary trackside situations or temporary degraded operations.*

**[REQ:IRS\_CLASSA\_CCT\_00094];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

SRAC: The values of the variable NID\_VBCMCK shall be allocated, managed and controlled by the IM such that the use of the Virtual Balise Cover function does not lead to a Balise Group being incorrectly ignored by the CCO.

**[END\_REQ]**

### 7.5.5 Packet 2: System Version order

**[REQ:IRS\_CLASSA\_CCT\_00095];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

A System Version Order packet shall be transmitted together with each National Values packet and shall be valid for the same direction of travel.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00096];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Balise Group messages shall order the use of “Version 2.1” in their Packet 2.

**[END\_REQ]**

#### 7.5.6 Packet 3: National Values

**[REQ:IRS\_CLASSA\_CCT\_00097];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

National Values shall be transmitted by the CCT to ensure that the trains entering ETCS Level 1 CCT areas and exiting depots within ETCS Level 1 CCT areas are operating with the correct national value set applicable for the CCT area.

**[END\_REQ]**

*Note: This is to cover the main use cases to transfer National Values to CCO. Other less frequent use cases are dealt with in requirement IRS\_CLASSA\_CCT\_00189.*

**[REQ:IRS\_CLASSA\_CCT\_00189];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

National Values shall be transmitted by the CCT in the first suitable Balise Group, as close as practicable to the exit of major stations and major freight yards within ETCS Level 1 CCT areas. At the latest, National Values shall be transmitted by the first Relocation Balise Group encountered in the nominal running direction after the exits of major stations and major freight yards within ETCS Level 1 CCT areas.

**[END\_REQ]**

*Note: This is to consider scenarios where hard reset would occur outside of depots or vehicles would be powered-up after cold hauling movement into an ETCS Level 1 area.*

*Note: It is not deemed necessary for safety reasons to transmit National Values when departing from Unfitted areas, as the 100km/h default value for Unfitted mode would be lower than the maximum Civil Line Speed currently in use in IRL160km/h national speed limit for unfitted areas.*

**[REQ:IRS\_CLASSA\_CCT\_00098];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The packet 3 shall be configured such that the National Values included in that packet 3 shall be applicable to country identifiers NID\_C 1022.

**[END\_REQ]**

*Note: the application of the reserved value 1023 for NID\_C will be defined in a future version of this IRS. .*

**[REQ:IRS\_CLASSA\_CCT\_00099];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The packet 3 shall transmit the National Values listed in Table 3:

Table 3 National Values

Variable	Value	Notes
V_NVSHUNT	15 km/h	<i>See note below table</i>
V_NVSTFF	30 km/h	<i>See note below table</i>
V_NVONSIGHT	15 km/h	<i>See note below table</i>
V_NVLIMSUPERV	0 km/h	<i>Limited Supervision mode is not authorised.</i>

Variable	Value	Notes
V_NVUNFIT	160 km/h	<i>This is aligned to the maximum authorised Civil Line Speed in Ireland. See note below table</i>
V_NVREL	15 km/h	<i>Release speed applicable when the section timer has elapsed. This value is aligned to the lowest Release Speed that is authorised to be used at signals.</i>
D_NVROLL	10 m	<i>This value provides sufficient tolerance for long loco hauled freight trains to roll back when starting on an uphill gradient</i>
Q_NVSBTSMPerm	1 (Yes)	<i>The first line of intervention shall be the Service Brake.</i>
Q_NVEMRRLS	1 (Revoke emergency brake command when permitted speed supervision limit is no longer exceeded)	<i>Rolling stock not fitted with a Service Brake Interface may be affected adversely if the Emergency Brake would be applied until standstill.</i>
Q_NVGUIPERM	0 (No)	<i>Use of Guidance curves would excessively increase the indication distance, which is undesirable for ETCS L1 applications.</i>
Q_NVSBFBPerm	0 (No)	<i>Using the service brake feedback could cause unexpected brake interventions.</i>
Q_NVINHSMICPerm	0 (No)	<i>It is not permitted to ignore the speed measurement inaccuracy in the calculation of the braking curves.</i>
V_NVALLOWOVTRP	0 km/h	<i>Override shall be selected only when the train is at standstill.</i>
V_NVSUPOVTRP	30 km/h	<i>Override speed limit shall be equal to the default Staff Responsible speed limit.</i>
D_NV OVTRP	100 m	<i>100m is considered a suitable distance limit for the validity of train trip override, which accommodates situations where the Balise Group may be located further than usual from the signal.</i>
T_NV OVTRP	60 s	<i>60s is considered a suitable time window for train trip override, which accommodates situations where the Balise Group may be located further than usual from the signal.</i>
D_NVPOTRP	0 m	<i>It is not permitted to undertake reverse movements in Post Trip mode.</i>
M_NVCONTACT	10 (No reaction)	<i>As this variable is not used for the Irish ETCS application, the TSI default value is retained.</i>
T_NVCONTACT	255 (Infinite)	<i>As this variable is not used for the Irish ETCS application, the TSI default value is retained.</i>

Variable		Value	Notes
M_NVDERUN		0 (No)	Due to existing alternative arrangement it is not required to use Driver ID in ETCS Level 1 application in Ireland.
D_NVSTFF		32767 ( $\infty$ )	To facilitate operation in ETCS CCT areas, where Shunt Signals may not be fitted, or in case of degraded situations, there is no distance limit for running in Staff Responsible mode.
Q_NVDRIVERADHES		0 (Not allowed)	The reduced adhesion function is not planned to be used; therefore, the Driver shall not be permitted to select it. See note below
A_NVMAXREADADH1		63 (No maximum deceleration, no additional display)	As the reduced adhesion function is not used in the Irish ETCS application, this value is retained.
A_NVMAXREADADH2		63 (No maximum deceleration, no additional display)	As the reduced adhesion function is not used in the Irish ETCS application, this value is retained.
A_NVMAXREADADH3		63 (No maximum deceleration, no additional display)	As the reduced adhesion function is not used in the Irish ETCS application, this value is retained.
Q_NVLOCACC		12 m	Default value. Within ETCS L1 CCT areas the transmitted location accuracy prevails.
M_NVAVADH		0	As the reduced adhesion function is not used in the Irish ETCS application, the TSI default value is retained.
M_NVEBCL		9 (99.9999999%)	The CCO shall use the highest confidence level for emergency brakes.
Q_NVKINT		1 (Integrated correction factors follow)	Only Gamma trains are allowed to operate. A preventive correction factor is applied to restrict any Lambda train from operating normally on the Irish railway network.
	Q_NVKVINTSET	01 (Conventional passenger trains)	Set of values below applicable to passenger trains
	A_NVP12	0.5 m/s <sup>2</sup>	1st Pivot value for 'Lower deceleration limit to determine the set of Kv'. (Kv = Correction factor)
	A_NVP23	0.55 m/s <sup>2</sup>	2nd Pivot value for 'Upper deceleration limit to determine the set of Kv'. As close as possible to the 1st pivot is used to ensure that the correction factor applies to all deceleration range
	V_NVKVINT	0 km/h	Fixed value which starts the Kv speed dependant profile

Variable			Value	Notes
		M_NVKVINT	0	Integrated correction factor Kv applicable for any speed above V_NVKVINT (0 km/h) if the maximum train deceleration is below A_NVP12 (0.5m/s <sup>2</sup> ). Most permissive value '0' selected to ensure Lambda trains cannot operate with ETCS on the Irish Network.
		M_NVKVINT	0	Integrated correction factor Kv applicable for any speed above V_NVKVINT (0 km/h) if the maximum train deceleration above A_NVP23 (0.55m/s <sup>2</sup> ). Most permissive value '0' selected to ensure Lambda trains cannot operate with ETCS on the Irish Network. Note: if the maximum train deceleration is between A_NVP12 (0.5m/s <sup>2</sup> ) and A_NVP23 (0.55m/s <sup>2</sup> ), then a linear interpolation of the correction factor applies as described in [SUB-026]
		N_ITER	0	No further speed step iterations for the Kv correction factor provided.
		N_ITER	1	A second set of Kv values is provided.
		Q_NVKVINTSET	00 (Freight trains)	Set of values below applicable to freight trains
		V_NVKVINT	0 km/h	Fixed value which starts the Kv speed dependant profile
		M_NVKVINT	0	Integrated correction factor Kv applicable for any speed above V_NVKVINT (0 km/h). Most permissive value '0' selected to ensure Lambda trains (which are not authorised to operate with ETCS on the Irish Network) will be enforced to calculate extremely conservative braking curves, leading to operation below release speed.
		N_ITER	0	No further speed step iterations for the Kv correction factor provided.
		L_NVKRINT	0 m	Fixed value which starts the Kr train length dependant profile
		M_NVRINT	0	Integrated correction factor Kr applicable for any train length above L_NVKRINT (0 m). Most permissive value '0' selected to ensure Lambda trains (which are not authorised to operate with ETCS on the Irish Network) will be enforced to calculate extremely conservative braking curves, leading to operation below release speed.



Variable	Value	Notes
N_ITER	0	No further train length step iterations for the Kr correction factor provided.
M_NVKTINT	1	The Kt correction factor brake build-up time for Lambda trains is unchanged, as the chosen Kv and Kr correction factors are capable of enforcing the operation of Lambda trains under very conservative braking curve.

**[END\_REQ]**

*Note: The V\_NVSHUNT and V\_NVONSIGHT speed limit of 15km/h, as a nominal speed, with an exceptional ETCS overspeed tolerance, is considered as a typical and acceptably safe industry value for line-of-sight or guided forward or reverse shunting operation, based on national and international good practice and based on consultation with operational representatives of Irish Railway Undertakings.*

*Note: The V\_NVSTFF speed limit of 30km/h is considered as a typical and acceptably safe industry value for operation in line-of-sight driving as it is expected to permit Trains to be stopped by drivers within the line-of-sight distance. This speed limit can be increased by the driver to 80km/h when operating in accordance with existing rules in defined scenarios where authority to increase the Staff Responsible Speed has been granted (refer to IRS\_CLASSA\_CCT\_00191, e.g. for temporary block working).*

*Note: The V\_NVUNFIT speed limit of 160km/h is aligned to the value previously authorised by the then relevant authority before 1990. The Unfitted Mode should be employed only while the migration to a fully fitted network is ongoing. Unfitted areas within the IM network should not be extended beyond their coverage at date of first publication of this IRS.*

*Note: The proposed value for Q\_NVDRIVERADHES indicates that the management of the reduced adhesion function by ETCS cannot be implemented. This is due to the lack of established criteria in Ireland for triggering its use. It is also deemed that the use of this function could provide a false sense of safety to the drivers when in practice it is impossible to precisely align the reduced adhesion factors preconfigured in the ETCS CCO and CCT with the actual condition of the track. Based on national and international good practice and based on consultation with operational representatives of Irish Railway Undertakings, it has been decided that the management of reduced adhesion shall not be performed by ETCS CCO and CCT. Instead the previously established operating rules shall remain applicable.*

**[REQ:IRS\_CLASSA\_CCT\_00190];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An operating rule shall be established to ensure that drivers are clearly and unambiguously aware that:

- the degradation of braking performance due to low wheel-rail adhesion is not reflected in the braking indication displayed on the DMI, and
- They are fully responsible to adjust their driving and braking to be compatible with their own assessment of the expected wheel-rail adhesion condition.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00191];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An operating rule shall be established to ensure that drivers are clearly and unambiguously aware that the increase of Staff Responsible speed by the driver from 30 km/h to 80 km/h:

- is only authorised in specific and controlled circumstances (e.g. in alignment with existing operating rules for temporary block working, passing a signal at danger with the signaller's authority) and,
- is strictly forbidden in other circumstances (e.g. starting-up in nominal scenarios).

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00192];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**



**SRAC:** An operating rule shall be established to ensure that only trains employing the Gamma braking model are authorised to operate on ETCS Level 1 CCT areas.

**[END\_REQ]**

#### 7.5.7 Packet 5: Linking

**[REQ:IRS\_CLASSA\_CCT\_00100];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

All Balise Groups transmitting relevant information for the CCO throughout the length of a Movement Authority for the direction of the movement shall be marked as linked and shall be announced with their unique identifiers to CCO by means of linking information from previous Balise Groups. This applies only if their unique identifiers can be unambiguously determined by the Balise Group transmitting the linking information.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00101];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

It is permitted that the linking information sent by a Main Signal Balise Group does not transmit the unique identifiers of all Balise Groups up to the end of the Movement Authority, and a shortened linking chain may be transmitted instead. In this case the linking chain shall be completed by subsequent linking information from two Balise Groups included in the initial linking chain, and the last Balise Group of the linking chain shall be linked with “Train trip” reaction. This requirement only applies where the unique identifiers can be unambiguously determined.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00102];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the linking information cannot unambiguously determine the unique identifiers of an upcoming Balise Group in the linking chain, the balise group after the last unambiguously known balise group shall be identified as “unknown” and shall be linked with “Train trip” reaction, and the repositioning and linking shall be managed according to the rules of [SUB-026].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00103];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The linking reaction associated with the last Balise Group located between  $D_{max}$  (as defined in section 7.4.6) and 50 m distance before the EOA shall depend on the distance between the Balise Group transmitting the linking information and the EoA:

- If the remaining distance to the EOA from the Balise Group transmitting the linking information is longer than  $D_{max}$ , then the linking reaction associated with the aforementioned last Balise Group shall be “Train Trip”.
- If the remaining distance to the EOA from a Balise Group transmitting linking information is shorter than  $D_{max}$ , then the linking reaction associated with the aforementioned last Balise Group shall be either “Train trip”, or if required for availability purposes “No Reaction”.

**[END\_REQ]**

*Note: If a Main Signal Balise Group located at an End of Authority would be incorrectly read or not read by the CCO, the immediate Trip Order transmitted by the Balise Group cannot be received by the CCO, and the Trip order is delayed to the location at which the CCO has determined that the End of Authority (EOA) has been passed.*

*To ensure that this deferred Trip Order happens sufficiently early so that the train does not exceed the safe overlap distance, the CCO odometry confidence interval shall be sufficiently low when reaching the EOA.*

*An odometry reset at maximum  $D_{max}$  distance from the EOA supports that the confidence interval is commensurate with the overlap length.*

**[REQ:IRS\_CLASSA\_CCT\_00104]**

Intentionally blank.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00105];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the length of the signalling overlap is shorter than the braking distance calculated for the shortest permitted  $D_{\max}$  distance as defined in section 7.4.6 (i.e. 50 m), a site-specific risk assessment shall be undertaken, in accordance with the requirement of [CSM402], [50126], [50128], and [50129], to define whether the Main Signal Balise Group at the associated EOA shall be associated with a “Train trip” linking reaction.

**[END\_REQ]**

*Note: If the overlap is very short, and the site-specific assessment requires further protection to be provided, the Main Signal Balise Group at the EOA shall be associated to “Train trip” linking reaction. The site-specific assessment shall consider conflicting movements and whether there is a route which can be infringed by the train exceeding the overlap.*

**[REQ:IRS\_CLASSA\_CCT\_00193];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The Mid-Section Level Crossing Balise Group located at the Stop signal protecting a Mid-Section Level Crossing shall be associated with a “Train Trip” linking reaction if the status of the level crossing (Q\_LXSTATUS) is set to 1.

The Mid-Section Level Crossing Balise Group located at the Stop signal protecting a Mid-Section Level Crossing shall be associated with a “Train Trip” or, if required for availability purposes, “No reaction” linking reaction if the status of the level crossing (Q\_LXSTATUS) is set to 0.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00194];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the Level Transition Announcement to ETCS Level 0 is not transmitted together with the linking information to the Balise Group which is transmitting the associated Level Transition Execution, then that Balise Group shall be associated with a “Train trip” linking reaction.

If the Level Transition Announcement to ETCS Level 0 is transmitted together with the linking information to the Balise Group which is transmitting the associated Level Transition Execution, then that Balise Group shall be associated with a “train trip” or, if required for availability purposes, “No Reaction” linking reaction.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00106];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

All other Balise Groups not specifically required by this IRS to be linked with “Train trip” linking reaction may be linked with “No reaction” linking reaction.

**[END\_REQ]**

*Note: Using the “No reaction” linking reaction provides a higher availability of the system by avoiding unnecessary emergency brake application while trains are running at normal operating speeds. The safety hazard related to the missing of a Balise Group transmitting restrictive information is deemed to be sufficiently mitigated by associated existing operating procedures, additional operating procedures required by this IRS, and other ETCS functionalities specified in this IRS (e.g. EOA to protect signals at danger, operating procedures (including communication with the signaller), in combination with interlocking approach locking functionality and ETCS section timers to mitigate the risk of a signal being inadvertently replaced by the signaller and a conflicting route being set at the same time).*

#### 7.5.8 Packet 6: Virtual Balise Cover order

**[REQ:IRS\_CLASSA\_CCT\_00107];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Virtual Balise Cover orders shall be sent by at least two consecutive Balise Groups, for both setting and removing a Virtual Balise Cover.

**[END\_REQ]**

*Note: The operational rule required to mitigate the risk of missing two consecutive Virtual Balise Cover Balise Groups is defined in section 7.3. This arrangement of Balise Groups is providing the same level of reliability, availability and safety as defined by the [TSI-CCS] for transition from ETCS Level 0 to Level 1 and for ETCS Temporary Speed Restriction management.*

#### 7.5.9 Packet 12: Level 1 Movement Authority

**[REQ:IRS\_CLASSA\_CCT\_00108];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For danger aspects of all Stop Signals, including Stop Signals protecting Mid-section Level Crossings, a Level 1 Movement Authority packet shall be sent by the Main Signal Balise Group or the Mid-section Level Crossing Balise Group to transmit an immediate trip order to the CCO.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00109];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

At Stop and Obtain Instructions boards that are fitted with a Stop Balise Group, a Level 1 Movement Authority packet shall be sent by that Stop Balise Group to transmit an immediate trip order to the CCO.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00110];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Infill Balise Group messages associated with danger aspects of Stop Signals, excluding Stop Signals protecting Mid-section Level Crossings, shall transmit a Level 1 Movement Authority packet after the Infill Location Reference packet to transmit a trip order and refresh the distance to the EOA.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00111];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For danger aspects of Shunt Signals that are fitted with a Balise Group and cannot be overset by a main or call-on route, a Level 1 Movement Authority packet shall be sent by the Shunt Signal Balise Group to transmit an immediate trip order.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00195];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For danger aspects of Shunt Signals that are fitted with a Balise Group and can be overset by a main or call-on route, a Level 1 Movement Authority packet sent by the Shunt Signal Balise Group shall not transmit a trip order.

**[END\_REQ]**

*Note: Trains operating under the authority of main or call-on routes are protected by main route signalling principles. Shunt signals within a main or call-on route are not applicable to trains operating under the authority of that route. Therefore an associated Shunt Signal Balise Group at danger that can be overset by a main or call-on route shall not send a trip order.*

**[REQ:IRS\_CLASSA\_CCT\_00196];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For Limit of Shunt Boards that are fitted with a Balise Group and cannot be overset by a main or call-on route, a Level 1 Movement Authority packet shall be sent by the Shunt Signal Balise Group to transmit an immediate trip order.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00197];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For Limit of Shunt Boards that are fitted with a Balise Group and can be overset by a main or call-on route, a Level 1 Movement Authority packet sent by the Shunt Signal Balise Group shall not transmit a trip order.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00112];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For proceed aspects of Stop and Shunt Signals, excluding Stop Signals protecting Mid-section Level Crossings, if an unambiguous End of Authority can be derived from the signal aspect, a Level 1 Movement Authority shall be sent from the Main or Shunt Signal Balise Group to authorise the whole length of the movement within the ETCS Level 1 CCT area.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00113];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the Movement Authority terminates within the boundaries of the ETCS Level 1 CCT area, an End of Authority shall be transmitted (i.e. the V\_EMA variable shall be set to "0").

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00114];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the lineside movement authority, given by a Stop Signal within the ETCS Level 1 CCT area, terminates outside the ETCS Level 1 CCT area, then the associated Main Signal Balise Group shall transmit the shorter of:

- a Movement Authority packet with an End of Authority that corresponds to the location of the Stop Signal at the end of the lineside movement authority outside the ETCS Level 1 CCT area, or
- a Movement Authority packet with a Limit of Authority set to the maximum Civil Line Speed and located at twice the minimum applicable signal spacing distance (calculated at the boundary) beyond the ETCS Level 1 CCT area boundary.

**[END\_REQ]**

*Note: In accordance with the requirement of section 7.5.12, the Static Speed Profile will be provided for the entire length of the Movement Authority including the section outside of the ETCS Level 1 CCT area.*

**[REQ:IRS\_CLASSA\_CCT\_00198];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the lineside movement authority, given by a Shunt Signal within the ETCS Level 1 CCT area, terminates outside the ETCS Level 1 CCT area, then the associated Balise Group shall transmit a Movement Authority with On Sight mode profile and Limit of Authority set to 15 km/h at a distance beyond the ETCS Level 1 CCT area boundary, which ensures that the Level Transition is executed before the train would exceed the Limit of Authority even in degraded conditions (e.g. maximum odometry inaccuracy, or missed Transition Balise Group)

**[END\_REQ]**

*Note: In case of transitions towards unsignalled areas (e.g. sidings) outside the ETCS Level 1 CCT area, there may be no Stop Signals but "Stop and Obtain Instructions" boards or Shunt Signals, and these will be approached with an OS mode profile.*

**[REQ:IRS\_CLASSA\_CCT\_00115];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The length of the Movement Authority given at a Stop Signal shall be determined according to the condition of the Non-Class A or Non-Class B CCT Subsystem. The transmitted Movement Authority shall not be longer than the distance which can be derived by the Encoder from the Non-Class A or Non-Class B CCT Subsystem as being the distance to the first Stop Signal which displays or could be displaying a Danger aspect, including buffer stop lights.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00199];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Where, because of infrastructure constraints, [SUB-040] requirements regarding the position of Balises near stopping points or End of Authorities cannot be directly complied with, the location of the End of Authority may be moved up to 10m beyond the associated signal.

**[END\_REQ]**

*Note: In this circumstance it is possible that a train may stop beyond the signal but before the End of Authority. The driver may then not be able to directly observe the signal aspect and the rules regarding passing signals at danger will have to be applied.*

**[REQ:IRS\_CLASSA\_CCT\_00223];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For call-on aspects of Stop Signals a Movement Authority shall be sent with an On-Sight mode profile and with an End of Authority located at the next Stop Signal, including buffer stop lights.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00116];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For proceed aspects of Shunt Signals that are fitted with a Balise Group, a Movement Authority shall be sent with an On-Sight mode profile and with an End of Authority located at the next fitted Shunt Signal or Stop Signal.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00117];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If, within the ETCS Level 1 CCT area, there are no further fitted Shunt Signals or Stop Signal on a given shunt route, the length of the On-Sight movement authority transmitted from the Main Signal Balise Group or Shunt Signal Balise Group shall correspond to the distance to the furthest end of the line.

**[END\_REQ]**

*Note: Drivers driving in OS mode are required to anticipate any obstruction on the track, including but not limited to other vehicles, buffer stops, turntables and unfitted Shunt Signals at danger, therefore providing the longest possible distance related to the furthest end of line is not safety critical.*

**[REQ:IRS\_CLASSA\_CCT\_00200];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If there is an intermediate unfitted Shunt Signal on the shunt route, and one of the routes from that unfitted Shunt Signal can possibly lead to a further fitted Stop Signal or Shunt Signal on the shunt route, repositioning information shall be provided by CCT as necessary to announce the Balise Group of the upcoming fitted Stop Signal or Shunt Signal.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00118];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The Full Supervision Movement Authority shall be transmitted in sections.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00201];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The On-Sight Movement Authority may be transmitted in one section.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00119];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The Movement Authority sections shall correspond to authorities that can be withdrawn by a signaller through a normal signal replacement procedure (i.e. not through an emergency replacement), and shall be timed such that they are not considered indefinitely valid by the CCO. This shall be achieved through the use of ETCS Section Timers.

**[END\_REQ]**

*Note: Section timers shall typically be used where routes can be cancelled in such a way that after the route locking becomes free:*

- *other conflicting or opposing routes can be set, or*
- *points can be moved within the length of the route including the overlap.*

**[REQ:IRS\_CLASSA\_CCT\_00202];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Where Comprehensive Approach Locking is used by the Non-Class A or Non-Class B CCT Subsystem, a Movement Authority transmitted by CCT before the start of a Comprehensive Approach Locking lookback zone shall terminate before or at the Stop Signal to which that Comprehensive Approach Locking lookback zone applies.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00120];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

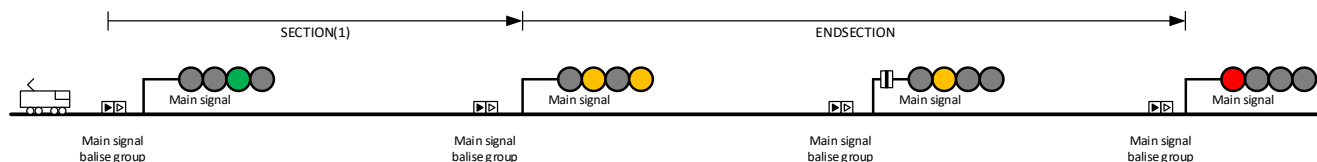
Where ETCS Section Timers are used, their duration for a given route shall be derived from the design of the Non-Class A or Non-Class B CCT Subsystem, and shall correspond to the approach locking timer of the corresponding route.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00121];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Each signalling block which requires to be protected by an ETCS Section Timer shall be transmitted as a separate Movement Authority section.

Signalling blocks which do not require to be protected by ETCS Section Timers can be merged into one Movement Authority section.



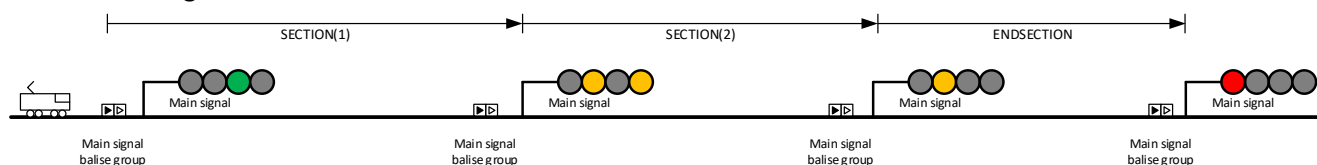
**Figure 4: Signalling Blocks and merged Movement Authority Sections**

**[END\_REQ]**

*Note: Automatic signals (as per Figure 4 above) and signals without approach locking functionality will not require section timers. In the example above, the second signal requires a section timer, while the third signal, being an automatic signal, does not, therefore the second and the third blocks can be merged into one Movement Authority section (indicated as ENDSECTION in the figure).*

**[REQ:IRS\_CLASSA\_CCT\_00122];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The length of the Movement Authority sections shall be determined according to the signalling block lengths, as illustrated in Figure 5.



**Figure 5: Movement Authority Section lengths**

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00123];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the exact route to be taken by the train cannot be derived by the Encoder from the condition of the Non-Class A or Non-Class B CCT Subsystem, the most restrictive Movement Authority parameters (including but not limited to Section length and Section Timer duration) shall be transmitted to the CCO. Repositioning information shall subsequently be provided by CCT to update the length of the corresponding MA section. Sections which can be included in repositioning shall not be merged with other upcoming sections.

In such cases the Movement Authority sectioning shall also consider the presence of repositioning, and the merging of sections shall be done in such a way that the Repositioning information provides correct information for the CCO and never unexpectedly shortens the Movement Authority.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00124];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Danger Point information shall always be transmitted within the Movement Authority if End of Authority is used. The Danger Point shall correspond to the location of the End of Authority when the End of Authority is not a buffer stop or a location defining the end of a line.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00127];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

ETCS Overlap information shall not be transmitted within the Movement Authority.

**[END\_REQ]**

*Note: Existing signalling overlaps are reserved for accommodating a level of degraded braking conditions related to degraded braking conditions, low wheel-rail adhesion condition, misjudgement of drivers or fault within the train braking system.*

*As a result, the Emergency Brake Deceleration curve of the CCO cannot target the end of the signalling overlap.*

**[REQ:IRS\_CLASSA\_CCT\_00125];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**



In case of buffer stops and locations defining the ends of lines, the 'virtual' Danger Point shall be transmitted in such a way that audible or visual alerts related to the entry into Indication or Warning Status are minimised for the Driver approaching the buffer stop or locations defining the end of the line.

The distance from the EOA to the Danger Point shall be defined in accordance with the requirement of [CSM402], [50126], [50128], and [50129].

[END\_REQ]

*Note: Drivers approaching a buffer stop shall not be disturbed by unnecessary warnings which would be present if the Danger Point was co-located with a buffer stop or location defining the end of a line, as the position of the Danger Point together with the odometry confidence interval determines the start of the audible or visual warning.*

[REQ:IRS\_CLASSA\_CCT\_00126]

Intentionally blank.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00128]

Intentionally blank.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00129]

Intentionally blank.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00130];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

Release Speed information shall be always transmitted together with the Danger Point information.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00131];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

The Release Speed shall never be less than 10 km/h.

[END\_REQ]

*Note: Release speeds less than 10 km/h are considered undrivable, and therefore shall not be used.*

[REQ:IRS\_CLASSA\_CCT\_00132];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

When approaching buffer stops, if no On-Sight Mode Profile information is transmitted, the release speed shall be 10 km/h. In all other cases the release speed shall be 15km/h.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00133];[Allocation:Trackside];[Type:Optional];[Owner:ETCS CCT Supplier]

In the case of End Section Timer information needing to be transmitted within the Movement Authority, the requirements shall be defined at generic and specific application levels, based on safety risk assessment, made in accordance with the requirements of [CSM402], [50126], [50128], and [50129].

[END\_REQ]

#### 7.5.10 Packet 16: Repositioning Information

[REQ:IRS\_CLASSA\_CCT\_00134];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

The Repositioning Information packet shall be transmitted at a location where the Movement Authority Section length needs to be extended because the exact route taken by the train could not be deduced from the detected condition of the Non-Class A or Non-Class B CCT Subsystem by the Encoder sending the Movement Authority.

[END\_REQ]

*Note: Repositioning information may be provided together with infill information.*

#### 7.5.11 Packet 21: Gradient profile

[REQ:IRS\_CLASSA\_CCT\_00135];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]



SRAC: The gradient profile to be transmitted shall be managed and controlled by the IM in a way which ensures that the CCO does not receive information which could lead to hazardous miscalculation of braking curves. This shall follow the relevant requirements of [EN50126], [EN50128], [EN50129] and [CSM\_402].

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00136];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

If the exact route taken by the train cannot be deduced by the Encoder from the detected condition of the Non-Class A or Non-Class B CCT Subsystem, or if the gradient profile is transmitted by a fixed Balise Group, a Gradient profile corresponding to the most restrictive combination of profiles from all possible routes shall be transmitted.

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00137];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

It is permitted that the transmitted Gradient Profile does not include the detailed profile for the complete Movement Authority, but in that case the Balise Group transmitting the profile shall transmit the detailed profile up to a specific profile discontinuity point, and shall transmit the most restrictive value for the part of the Movement Authority from that discontinuity point up to the Danger Point (which very often coincides with the End of Authority).

*[END\_REQ]*

#### 7.5.12 Packet 27: International Static Speed Profile

*[REQ:IRS\_CLASSA\_CCT\_00138];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

The International Static Speed Profile packets shall be implemented such that they enforce the applicable Civil Line Speeds and Turnout Speeds to the whole length of the trains.

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00212];[Allocation:Application condition];[Type:Mandatory];[Owner:IM]*

SRAC: The relevant IM shall ensure that the applicable Civil Line Speeds and Turnout Speeds for different train categories are established in accordance with the requirement of [CSM402], [50126], [50128], and [50129].

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00139];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

If the exact route to be taken by the train cannot be deduced from the detected condition of the Non-Class A or Non-Class B CCT Subsystem by the Encoder, or if the International Static Speed Profile is transmitted by a fixed Balise Group, an International Static Speed Profile corresponding to the most restrictive combination of profiles from all possible routes shall be transmitted.

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00140];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

It is permitted that the transmitted International Static Speed Profile does not include the detailed profile for the complete Movement Authority, but in that case the Balise Group transmitting the profile shall transmit the detailed profile up to a specific profile discontinuity point, and shall transmit the most restrictive value for the part of the Movement Authority from that discontinuity point up to the Danger Point (which very often coincides with the End of Authority)..

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00203];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

The V\_STATIC (basic SSP) variable shall be used to transmit the most restrictive Civil Line Speed applicable to any train category.

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00141];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

The NC\_DIFF variable shall be used to transmit train category specific differential speed restrictions which are higher than V\_STATIC (Basic SSP).

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00142]**

Intentionally blank

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00204];[Allocation:Application Condition];[Type:Optional];[Owner:IM]**

SRAC: To enable higher speeds than the Basic Static Speed Profile the IM shall define the “Other international” categories that are permitted for operation and the rules for assigning those categories to trains. An operating rule shall be established to ensure that the Infrastructure Manager Network Access Requirements oblige all Railway Undertakings that want to benefit from the increased performance to assign, according to these rules, one of the “Other international” train categories to every affected train running on the network.

**[END\_REQ]**

*Note: This is required to ensure that all RUs that want to operate at higher speed on an IM network apply rules for assigning train categories, which are consistent with the IM network characteristics.*

**[REQ:IRS\_CLASSA\_CCT\_00143];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The NC\_CDDIFF variable shall be used to transmit “Cant deficiency” category specific differential speed restrictions which are higher than V\_STATIC (Basic SSP).

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00205];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

SRAC: An operating rule shall be established to ensure that the Infrastructure Manager Network Access Requirements oblige all Railway Undertakings to assign one of the “Cant Deficiency Category” train categories to every train running on the network.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00144]**

Intentionally blank.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00145];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The value of the Q\_DIFF variable shall be determined at specific application level in accordance based on information obtained from the IM as indicated in IRS\_CLASSA\_CCT\_00145.

**[END\_REQ]**

#### 7.5.13 Packet 41: Level Transition Order

**[REQ:IRS\_CLASSA\_CCT\_00146];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Level Transition Orders within the ETCS Level 1 CCT area shall only contain “Level 1” as an available level.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00147];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Level Transition Orders managing the transition towards ETCS Level 1 CCT areas shall only contain “Level 1” as an available level.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00148];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Level Transition Orders managing the transition from an ETCS Level 1 CCT area shall only contain “Level 0” as an available level.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00149];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Level Transition Orders announcing a transition shall transmit a D\_LEVELTR value sufficiently long to ensure that any level transition resulting directly from the processing of a Level Transition Announcement information is enforced only in the case of the failure of the Balise Group transmitting the associated Level Transition Execution information.

**[END\_REQ]**

*Note: The value of the D\_LEVELTR variable shall be sufficiently high that the announced level transition is not executed before the train reaches the Balise Group which transmits the Level Transition Execution information, so that the announcement is only effective (i.e. causes the CCO to implement the level transition) if the Balise Group which orders an immediate level transition has failed. The possible odometry confidence interval shall be considered.*

*By this arrangement it is ensured that the train can read the Main Signal Balise Group of the first fitted signal of the ETCS Level 1 CCT area and receive its first Movement Authority before the announced Level Transition takes place, so that no unexpected train trip occurs due to a premature level transition.*

*This also ensures that the Level Transition Balise Group, which is the last Balise Group upon leaving the ETCS Level 1 CCT area, can be read while the train is in Level 1 and the desired linking reaction is enforced.*

**[REQ:IRS\_CLASSA\_CCT\_00150];[Allocation:CCT];[Type:Mandatory];[Owner:ETCSSupplier]**

The Level Transition Orders shall be transmitted in such a way that any acknowledgement required by the driver shall be displayed to the driver at a distance before the location at which the transition would be executed, which corresponds to 5 to 7 seconds travel at the maximum applicable Civil Line Speed.

**[END\_REQ]**

#### 7.5.14 Packet 65: Temporary Speed Restriction

*Note: This section will be defined in a future version of this standard*

#### 7.5.15 Packet 66: Temporary Speed Restriction Revocation

*Note: This section will be defined in a future version of this standard*

#### 7.5.16 Packet 67: Track Condition Big Metal Masses

**[REQ:IRS\_CLASSA\_CCT\_00151];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The Track Condition Big Metal Masses packet shall announce the location and length of a Big Metal Mass area at a distance before the commencement of the Big Metal Mass area which corresponds to a minimum of 5 seconds travel at Civil Line Speed.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00152];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If there is any Main Signal Balise Group or Shunt Signal Balise Group between the announcement and the commencement of the Big Metal Mass area, that Balise Group shall repeat the Track Condition Big Metal Masses packet.

**[END\_REQ]**

*Note: The CCO may receive a new Movement Authority after restarting, therefore the announcement shall be repeated by the Balise Group providing Movement Authority.*

#### 7.5.17 Packet 72: Packet for sending plain text messages

**[REQ:IRS\_CLASSA\_CCT\_00153];[Allocation:Trackside];[Type:Mandatory];[Owner:IM]**

The requirements for sending Packet 72 for purposes other than ETCS Temporary Speed Restriction warning messages shall be defined at generic and specific application levels, based on safety risk assessment, made in accordance with the requirements of [CSM402], [50126], [50128], and [50129].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00218];[Allocation:Trackside];[Type:Mandatory];[Owner: ETCS CCT Supplier]**

ETCS Temporary Speed Restriction warning messages shall be transmitted via Packet 72.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00219];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The plain text messages sent to transmit ETCS Temporary Speed Restriction warning messages shall be set with the following properties:

- The message shall be classified as 'Important Information' (Q\_TEXTCLASS = 01)
- The message shall be displayed as soon as it is received from the Temporary Speed Restriction Warning Balise Group (D\_TEXTDISPLAY = 0)
- The message shall be displayed in all possible modes and levels (M\_MODETEXTDISPLAY = 15 and M\_LEVELTEXTDISPLAY = 5)
- The end of the message display shall not be conditional on the distance travelled since it has been displayed (L\_TEXTDISPLAY = 32767)
- The message display duration shall be set to 7 seconds (T\_TEXTDISPLAY = 7)
- The message shall require acknowledgement by the driver, with Service Brake Application if it is not acknowledged within the 7 seconds expiration window (Q\_TEXTCONFIRM = 10)
- Even if the driver acknowledges the message before the 7 seconds window expires, the message shall remain displayed on the DMI until the 7 seconds window has expired (Q\_CONFTEXTDISPLAY = 1)
- The message text shall be "WARNING – TSR AHEAD"
- Q\_TEXTDISPLAY shall be set to 0 in accordance with [SUB-113] rules

**[END\_REQ]**

*Note: Existing Temporary Speed Restriction controls remain as mitigation against Temporary Speed Restriction related hazards. ETCS Temporary Speed Restriction warning messages shall only be considered as an additional measure. In this context, it is permissible that this particular driver support function does not systematically reduce the speed to an appropriate level before the commencement of the Temporary Speed Restriction area.*

#### 7.5.18 Packet 80: Mode Profile

**[REQ:IRS\_CLASSA\_CCT\_00154];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

A Mode Profile packet with M\_MAMODE = "On Sight" shall be sent together with the Movement Authority in case of proceed shunt aspects and call-on aspects, as required in section 7.5.9.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00155];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The length of the Mode Profile shall be equal to or greater than the length of the Movement Authority, plus, in case of buffer stops or locations defining end of line, any applicable distance from the EOA to the 'virtual' Danger Point.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00156];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For On Sight mode, the transmitted mode related speed shall correspond to the National Value.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00157];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Mode Profile packets with M\_MAMODE = "Limited Supervision" or M\_MAMODE = "Shunting" shall not be used.

**[END\_REQ]**

*Note: When entering Shunting mode, the train data is invalidated on-board. Therefore, the use of On Sight mode is preferred for operating under the authority of a fitted shunt signal.*

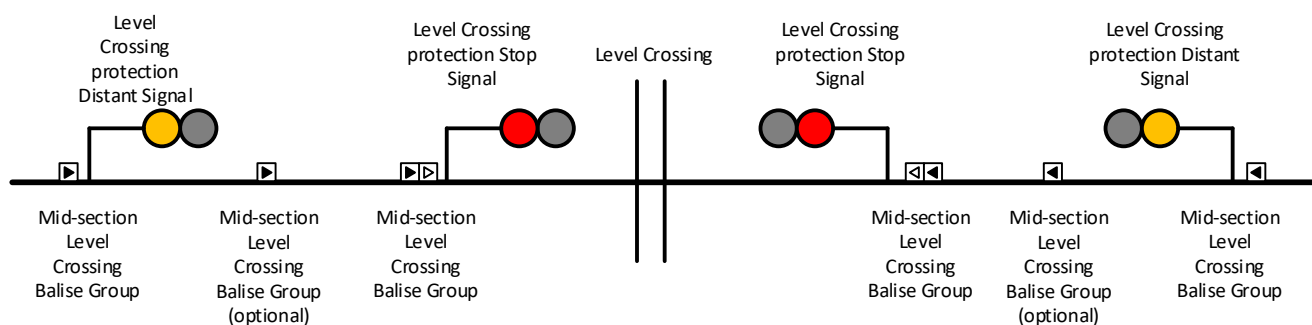
#### 7.5.19 Packet 88: Level Crossing Information

**[REQ:IRS\_CLASSA\_CCT\_00158];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Each Balise Group message transmitting a Movement Authority length which includes one or more Mid-Section Level crossings shall also contain Level Crossing Information packet(s) which shall transmit the protected status of each Mid-section Level Crossing which is present in the length of the Movement Authority. The 'protected status' of a Mid-Section Level crossing shall correspond to a proceed aspect of the Signal protecting the Level Crossing.

[END\_REQ]

*Note: Additional Controlled Balise(s) may be required in Signal Balise Groups to increase the message length and include all Mid-section Level Crossing information present within the Movement Authority distance.*



**Figure 6: Typical arrangement of a Mid-section Level Crossing**

[REQ:IRS\_CLASSA\_CCT\_00159];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

The Level Crossing Information packet shall be transmitted with updated information by any further Mid-section Level Crossing Balise Groups, Main Signal Balise Groups and Infill Balise Groups which are interfaced to encoders that receive updated information about the protected status of the corresponding Mid-section Level Crossing(s).

[END\_REQ]

*Note: It is not required that all intermediate Controlled Balise Groups transmit a Level Crossing Information packet for all Mid-section Level Crossings for the length of the Movement Authority, but only those which update information about those crossings whose status is known by detecting the condition of the Non-Class A or Non-Class B CCT Subsystem.*

*It is possible that a Stop Signal protecting a Mid-section Level Crossing displays a distant aspect for a further Stop Signal protecting another Mid-section Level Crossing. In this case, Level Crossing Information related to both Mid-Section Level Crossings shall be transmitted at that first signal.*

*It is possible that a Stop Signal (which is not a Stop Signal protecting a Mid-section Level Crossing) displays a distant aspect for a further Stop Signal protecting a Mid-section Level Crossing. In this case Level Crossing Information shall be transmitted together with the Movement Authority from that Stop Signal.*

*It is also possible that a Stop Signal protecting a Mid-section Level Crossing displays a distant aspect for a further Stop Signal (which is not a Stop Signal protecting a Mid-section Level Crossing). In this case the Mid-section Level Crossing Balise Group may transmit infill information related to the upcoming Stop Signal, and it shall be considered as a Balise Group with combined functionality.*

[REQ:IRS\_CLASSA\_CCT\_00206];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

If a Mid-Section Level Crossing Balise Group, a Main Signal Balise Group or an Infill Balise Group transmits a default telegram, it shall not transmit level crossing information which it would have transmitted when working correctly.

[END\_REQ]

[REQ:IRS\_CLASSA\_CCT\_00160];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]

The value of D\_LX shall be determined such that the "Level Crossing start location" is at the Stop Signal protecting the Mid-section Level Crossing.

[END\_REQ]

**[REQ:IRS\_CLASSA\_CCT\_00161];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The length of the Level Crossing area (L\_LX) shall be set to 0.

**[END\_REQ]**

*Note: Passing a Stop Signal at danger protecting a Mid-section Level Crossing leads to a train trip. For design simplicity this value is therefore set to 0.*

**[REQ:IRS\_CLASSA\_CCT\_00162];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]**

**SRAC:** An operating rule shall be established to ensure that the usage of NID\_LX variables is managed and controlled by the IM in accordance with the requirements of [CSM403], [50126], [50128], and [50129].

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00163];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If a Level Crossing Information packet is sent together with a Movement Authority:

- If the aspect of the Mid-section Level Crossing protecting Stop Signal cannot be determined by the detected condition of the Non-Class A or Non-Class B CCT Subsystem, the variable Q\_LXSTATUS = 1 shall be sent.
- If the aspect of the Mid-section Level Crossing protecting Stop Signal is "Danger", the variable Q\_LXSTATUS = 1 shall be sent.
- If the aspect of the Mid-section Level Crossing protecting Stop Signal is "Proceed" the variable Q\_LXSTATUS = 0 shall be sent.

**[END\_REQ]**

*Note: It is possible that the aspect of the Section Signal (the Stop Signal which provides Movement Authority for the section) provides distant information about the aspect of a mid-section level crossing protecting Stop Signal. If this is not the case, the Mid-section Level Crossing protecting Stop Signal shall be considered to be at Danger.*

**[REQ:IRS\_CLASSA\_CCT\_00164];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the Level Crossing information packet is transmitted by a Mid-section Level Crossing Balise Group:

- If the aspect of the Mid-section Level Crossing protecting signal is "Danger", the variable Q\_LXSTATUS = 1 shall be sent.
- If the aspect of the Mid-section Level Crossing protecting signal is "Proceed" the variable Q\_LXSTATUS = 0 shall be sent.

**[END\_REQ]**

**[REQ:IRS\_CLASSA\_CCT\_00165];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

If the variable Q\_LXSTATUS=1 is sent, the V\_LX variable shall have the value of "15 km/h" and the Q\_STOPLX variable shall have the value "0" (No stop required).

**[END\_REQ]**

*Note: By transmitting the V\_LX and Q\_STOPLX variables as above, the CCO behaviour when approaching a Stop Signal at danger protecting a Mid-section Level crossing will be similar to the behaviour at other Stop Signals.*

**[REQ:IRS\_CLASSA\_CCT\_00220];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The Level Crossing Information packet shall not be transmitted by CCT at locations where the CCO Minimum Safe Front End may have already passed the "Level Crossing start location".

**[END\_REQ]**

*Note: This provides a trackside mitigation to a performance issue related to non-application of CR1324 from [ERA-OPINION].*

## 7.5.20 Packet 132: Danger for Shunting information

**[REQ:IRS\_CLASSA\_CCT\_00166];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

For danger aspects of all Stop Signals (including Stop Signals protecting Mid-section Level Crossings), a Danger for Shunting information packet shall be sent by the Main Signal Balise Group with Q\_ASPECT = "0" (Stop if in

SH mode), except when the Stop Signal is used for propelling movements and no last wheel replacement is provided.

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00167];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

For danger aspects of Shunt Signals that are fitted with Balise Groups, a Danger for Shunting information packet shall be sent by the Shunt Signal Balise Group with Q\_ASPECT = "0" (Stop if in SH mode), except when the Shunt Signal is used for propelling movements and no last wheel replacement is provided.

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00207];[Allocation:Trackside];[Type:Mandatory];[Owner:IM]*

A safety risk assessment for authorising propelling movements where no last wheel replacement is provided shall be made at specific application level in accordance with the requirements of [CSM402], [50126], [50128], and [50129].

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00209];[Allocation:Application Condition];[Type:Mandatory];[Owner:IM]*

SRAC: An operating rule shall be established to ensure that appropriate controls are in place to secure propelling movements where authorised and not protected by Danger for Shunting information.

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00168];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

At Limit of Shunt boards that are fitted with Shunt Signal Balise Groups, a Danger for Shunting information packet shall be sent by the Shunt Signal Balise Group with Q\_ASPECT = "0" (Stop if in SH mode).

*[END\_REQ]*

*[REQ:IRS\_CLASSA\_CCT\_00169];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

At Stop and Obtain Instructions Boards that are fitted with Stop Balise Groups, a Danger for Shunting information packet shall be sent by the Stop Balise Group with Q\_ASPECT = "0" (Stop if in SH mode).

*[END\_REQ]*

#### 7.5.21 Packet 135: Stop Shunting on desk opening

*[REQ:IRS\_CLASSA\_CCT\_00170];[Allocation:Trackside];[Type:Mandatory];[Owner:IM]*

The locations for sending Packet 135 shall be defined at generic and specific application levels, based on safety risk assessment, made in accordance with the requirements of [CSM402], [50126], [50128], and [50129].

*[END\_REQ]*

#### 7.5.22 Packet 136: Infill location reference

*[REQ:IRS\_CLASSA\_CCT\_00171];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

An Infill location reference packet shall be provided by Infill Balise Groups to indicate the upcoming Main Signal Balise Group to which the infill information applies.

*[END\_REQ]*

#### 7.5.23 Packet 137: Stop if in Staff Responsible

*[REQ:IRS\_CLASSA\_CCT\_00172];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]*

At Stop and Obtain Instructions boards that are fitted with Balise Groups, a Stop if in Staff Responsible packet shall be sent by the Stop Balise Group with Q\_SRSTOP = "0" (Stop if in SR mode) if required by the specific application requirements.

*[END\_REQ]*



#### 7.5.24 Packet 141: Default Gradient for Temporary Speed Restriction

*Note: This section will be defined in a future version of this standard*

#### 7.5.25 Packet 254: Default Balise, loop or RIU information

**[REQ:IRS\_CLASSA\_CCT\_00173];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Packet 254 shall be transmitted in the Balise default telegrams of Controlled Balises, and in the Encoder default telegrams.

**[END\_REQ]**

#### 7.5.26 Packet 255: End of Information

**[REQ:IRS\_CLASSA\_CCT\_00174];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

Packet 255 shall be transmitted at the end of each Balise telegram.

**[END\_REQ]**

#### 7.5.27 Packets not to be transmitted

**[REQ:IRS\_CLASSA\_CCT\_00175];[Allocation:Trackside];[Type:Mandatory];[Owner:ETCS CCT Supplier]**

The following packets shall never be transmitted by the CCT:

- Packet 39: Track Condition Change of traction system
- Packet 40: Track Condition Change of allowed current consumption
- Packet 42: Session Management
- Packet 44: Data used by applications outside the ERTMS/ETCS system
- Packet 45: Radio Network registration
- Packet 46: Conditional Level Transition Order
- Packet 49: List of balises for SH area
- Packet 51: Axle load Speed Profile
- Packet 52: Permitted Braking Distance Information
- Packet 68: Track Condition
- Packet 69: Track Condition Station Platforms
- Packet 70: Route Suitability Data
- Packet 71: Adhesion Factor
- Packet 76: Packet for sending fixed text messages
- Packet 79: Geographical Position Information
- Packet 90: Track Ahead Free up to level 2/3 transition location
- Packet 131: RBC transition order
- Packet 133: Radio infill area information
- Packet 134: EOLM packet
- Packet 138: Reversing area information
- Packet 139: Reversing supervision information
- Packet 145: Inhibition of Balise Group message consistency reaction
- Packet 180: LSSMA display toggle order
- Packet 181: Generic LS function marker

**[END\_REQ]**

*Note: the use of individual packets mentioned in this requirement may become permitted in a future revision of this IRS. The revision process for upgrading of IRS documents can be obtained from the CRR website, within [CRR-031].*

## 8 FURTHER CLARIFICATION

Further clarification on these guidelines can be sought from the CRR by phone at +353 1 206 8110 or by email [info@crr.ie](mailto:info@crr.ie).

## 9 LIST OF PARTICIPANTS

The participants for each revision of this IRS are shown below in Table 4.

Table 4 List of Participants by Revision

Participant Name and Organisation		Involved in IRS-305-A	Involved in IRS-305-B	
Páraic Ó Lochlainn	IÉ-IM	✓	✓	
François Pignard	IÉ-IM	✓	✓	
István Darázsi	IÉ-IM	✓	✓	
Maik Wuttke	CRR	✓	✓	