

Future Railway Mobile Communication System

Functional Requirements Specification

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1 Table of Contents

Document History 3
1 Table of Contents 4
2 List of abbreviations 9
3 List of definitions 10
4 Introduction 19
4.1 Background 19
4.2 Purpose of this document 19
4.3 Scope 20
4.4 Applicability 23
4.5 Readers guide 24
5 FRMCS Application & Communication Service concept 26
5.1 Goal 26
5.2 Principles 27
5.3 FRMCS Applications & Communication Services framework and management 33
5.4 FRMCS Application & Communication Service Management requirements 36
5.5 FRMCS Application & Communication Service Management guidelines 36
6 FRMCS functional addressing 39
6.1 Generic requirements 39
6.2 Functional Identity types 40
6.3 Group Identity 44
6.4 Short Dialling Codes 44
7 Introduction to Common Functions and FRMCS Applications & Communication Services 45
8 Common functions 47
8.1 Introduction 47
8.2 Common functions 47
9 Introduction to FRMCS Applications & Communication Services 93
9.1 Introduction 93
9.2 FRMCS Applications & Communication Services 94
9.3 Generic HMI aspects 98
10 Voice FRMCS Applications & Communication Services 100

10.1 Voice Communication functions for FRMCS Applications & Communication Services 100
10.2 Generic Voice - FRMCS Application 112
10.3 On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train - FRMCS Application 119
10.4 On-Train incoming Voice Communication from the Controller towards a Train Driver - FRMCS Application 123
10.5 Multi-Train Voice Communication for Drivers - FRMCS Application 128
10.6 Banking Voice Communication - FRMCS Application 138
10.7 Trackside Maintenance Voice Communication - FRMCS Application 143
10.8 Shunting Voice Communication - FRMCS Application 146
10.9 Public Emergency Call - FRMCS Application 150
10.10 Ground to ground Voice Communication - FRMCS Application 151
10.11 Railway Emergency Communication - FRMCS Application 154
10.12 Intentionally deleted. 169
10.13 Public Train emergency Voice Communication - FRMCS Application 169
10.14 Working alone - FRMCS Application 169
10.15 On-Train outgoing Voice Communication from Train Staff towards a Ground User - FRMCS Application 169
10.16 On-Train incoming Voice Communication from a Ground User towards Train Staff - FRMCS Application 170
10.17 Railway Staff emergency communication - FRMCS Application 174
10.18 Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train - FRMCS Application 174
10.19 Urgent Multi-Train Voice Communication for Drivers - FRMCS Application 175
10.20 Multi-Train Voice Communication for Drivers excluding Ground User(s) - FRMCS Application 176
10.21 On-Train Voice Communication - FRMCS Application 176
10.22 Lineside Telephony - FRMCS Application 176
10.23 On-Train Voice Communication towards passengers (Public Address) - FRMCS Application 177
10.24 Station Public Address - FRMCS Application 181
10.25 Communication at stations and Depots - FRMCS Application 182
11 Data FRMCS Applications & Communication Services 183
11.1 Data Communication functions for FRMCS Applications & Communication Services 183
11.2 Generic Data Communication - FRMCS Communication Service 189
11.3 Role management and presence - FRMCS Application 192

11.4 Automatic Train Protection - FRMCS Communication Service 196
11.5 Automatic Train Operation - FRMCS Communication Service 199
11.6 Data Communication for Possession Management - FRMCS Communication Service 203
11.7 Trackside Maintenance Warning System communication - FRMCS Communication Service 203
11.8 Remote control of engines - FRMCS Communication Service 203
11.9 Monitoring and control of critical infrastructure - FRMCS Communication Service 204
11.10 Access to recording of communications - FRMCS Communication Service 208
11.11 Intentionally deleted. 209
11.12 Shunting Data Communication - FRMCS Application 210
11.13 Train integrity monitoring Data - FRMCS Communication Service 212
11.14 Public Emergency Warning - FRMCS Communication Service 212
11.15 Critical Advisory Messaging services- safety related Data - FRMCS Communication Service 213
11.16 Virtual coupling Data - FRMCS Communication Service 215
11.17 Train Parking Protection - FRMCS Communication Service 215
11.18 Key Management System Data - FRMCS Communication Service 216
11.19 On-Train Telemetry - FRMCS Communication Services 219
11.20 Infrastructure Telemetry - FRMCS Communication Service 223
11.21 On-Train remote equipment control - FRMCS Communication Service 223
11.22 Monitoring and Control of Non-Critical Infrastructure - FRMCS Communication Service 223
11.23 Wireless on-Train Data Communication for Train Staff - FRMCS Communication Service 223
11.24 Wireless Data Communication for Railway Staff on platforms - FRMCS Communication Service 223
11.25 Train Driver advisory -Train performance Data - FRMCS Communication Service 223
11.26 Train Departure Data - FRMCS Communication Service 223
11.27 Messaging services - FRMCS Application 224
11.28 Transfer of data - FRMCS Communication Service 229
11.29 Record and broadcast of information - FRMCS Application 232
11.30 Transfer of CCTV archives - FRMCS Communication Service 232
11.31 Augmented reality Data - FRMCS Communication Service 232
11.32 Real time translation of speech Data - FRMCS Communication Service 232
11.33 Passenger Information System Data - FRMCS Communication Service 233

11.34 On-Train safety device to ground communication - FRMCS Application 237
12 Video FRMCS Applications & Communication Services.....241
12.1 Video Communication functions for FRMCS Applications & Communication Services 241
12.2 Generic Video Communication - FRMCS Communication Services..... 242
12.3 Critical real time video - FRMCS Communication Services 242
12.4 Non-critical real time video - FRMCS Communication Services 242
12.5 Non-critical real time Video Communication - FRMCS Communication Services 242
13 Handheld terminal requirement 243
13.1 Use case: Deported control of applications 243
14 System management and configuration aspects 245
14.1 Introduction..... 245
14.2 Network management and configuration..... 245
14.3 User Device management and configuration..... 247
14.4 Intentionally deleted. 248
15 Digital resilience 250
15.1 Generic requirements 250
15.2 For further study 250
16 FRMCS Domain change, Interconnection and Interworking 251
16.1 Introduction..... 251
16.2 Inter FRMCS Domain Change generic..... 251
16.3 Interconnection 252
16.4 Intentionally deleted. 252
16.5 Interworking 252
16.6 Intra FRMCS Domain Changes and Service Continuity 253
17 References.....254
17.1 Normative references..... 254
17.2 Informative references 254
Appendix A URS Pr’s and GN’s covered in FRS.....255
Appendix B Intentionally deleted.....261
Appendix C Regional requirements.....262
1 European Union 263
2 Asia.....288

3 US 288
Appendix D Mapping of functional addressing with GSM-R 289
Appendix E Examples of “first to accept” call handling 293
Appendix F Guidance to construct Functional Identities 297
Appendix G Common functions used per FRMCS Application 298
Appendix H Intentionally deleted. 304
Appendix I Arbitration rules for Drivers 305
Appendix J Priority ordering 312
Appendix K Group Identities 315
Appendix L Metadata per FRMCS Applications & Communication Service 316
Appendix M Short Dialling Codes 319

2 List of abbreviations

ATO	Automatic Train Operation
ATP	Automatic Train Protection
ADC	Assured Data Communication
AVC	Assured Voice Communication
CCTV	Closed Circuit Television
COTS	Commercial off The Shelf
EIN	European Identification Number
ERA	European Union Agency for Railways
ETCS	European Train Control System
FRMCS	Future Railway Mobile Communications System
GDPR	General Data Protection Regulation
GNSS	Global Navigation Satellite System
GSM-R	Global System for Mobile Communications – Railway
HMI	Human-Machine Interface (this term encompasses all Human-Machine Interfaces including the Driver-Machine Interface and the Controller-Machine Interface). Human actions can also be voice
IM	Infrastructure Manager
ISO	International Organisation for Standardisation
MOTS	Modified Off The Shelf
M2M	Machine to Machine
OC	Organisation Code
OPE TSI	Operations and Traffic Management Technical Specification for Interoperability
O&M	Operation & Maintenance
PIS	Passenger Information System
RFID	Radio Frequency Identification
RU	Railway Undertaking
RAC	Railway Access Code
REC	Railway Emergency Communication
TAF TSI	Telematics Applications for Freight Technical Specification for Interoperability
TAP TSI	Telematics Applications for Passenger services Technical Specification for Interoperability
TSI	Technical Specification for Interoperability
UIC	Union Internationale des Chemins de Fer
URS	User Requirements Specification

3 List of definitions

Activation of an FRMCS Application or FRMCS Communication Service

Activation/deactivation of an FRMCS Application or FRMCS Communication Service are actions performed by the human User or automatically in case of a non-human User in order to start/stop the FRMCS Application or FRMCS Communication Service. See also Enabling of an FRMCS Application & Communication Service.

Addressed User

A User which is considered by the FRMCS System to be a candidate participant of the communication.

Alphanumeric Characters

Alphanumeric characters refers to the 26-letter Latin alphabet, the numerical digits from 0-9, and sometimes special characters.

Application Management:

Tooling and procedures responsible for management of FRMCS Applications and FRMCS Communication Services, including repository, version management and configuration management functions.

Authentication

The process of verifying the claimed identity to ensure it is genuine.

Authorised Controller

A Controller that has been granted, by the authorisation of communication Common Function, the right to access and use specific FRMCS functions (e.g. authorisation to terminate a specific call).

Authorised Driver

A Driver that has been granted, by the authorisation of communication Common Function, the right to access and use specific FRMCS functions (e.g. authorisation to initiate a specific call like banking).

Authorised Ground User

A Ground User that has been granted, by the authorisation of communication Common Function, the right to access and use specific FRMCS functions (e.g. authorisation to participate to a specific call).

Authorised Shunting Team

A Shunting Team that has been granted, by the authorisation of communication Common Function, the right to access and use specific FRMCS functions (e.g. authorisation to invite additional User(s) to an existing Shunting Data Communication).

Authorised User

A User that has been granted, by the authorisation of communication Common Function, the right to access and use specific FRMCS functions.

Bi-directional

Two-way communication.

Common Function

A common module of FRMCS Application framework providing common functionality for the various FRMCS Applications. Common functions are building blocks that each provide a part of the functionality required by the FRMCS Applications such as authorisation, quality of service or Talker control functionalities.

Conductor

The person in charge of a train crew and its operations, responsible for ensuring the safety and comfort of passengers on passenger trains.

Controller

An individual responsible for the conduct of some aspect of Train operations. For the purposes of this specification, the following Functional Identities of Controllers are defined:

a) Signaler.
b) Railway Undertaking (RU) Controller (e.g. a Railway Staff Controller).
c) Infrastructure Manager (IM) Controller.
d) Power supply Controller.
e) Etc.

Depending on local circumstances, a number of Functional Identities can be assigned to a single Controller or a single Functional Identity can be carried out by a number of Controllers.

Cyber Security

All solutions and procedures needed to obtain a system that is resilient against malicious acts, theft of data and unintended / unwanted access to systems and data.

Data Communication

Exchange of information in the form of any digital information not being voice or video (e.g. voice and recorded video file communication).

Depot

The term covers all Depots, yards and sidings and other locations where Trains operate outside the main line.

Driver

A person capable and authorised to drive Trains, including locomotives, shunting locomotives, work Trains, maintenance railway vehicles or Trains for the carriage of passengers or goods by rail in an autonomous, responsible and safe manner.

Driver Safety Device

An on-Train system that monitors the alertness of the Driver and provides warnings and alarms to other systems as appropriate.

Drop of Communication

Complete loss of a communication with a need to fully re-establish this communication.

Equipment Identity

An identity which is assigned after the equipment is logged in to the FRMCS System on FRMCS Application level and registered to a Functional Identity related to the equipment.

Enabling of an FRMCS Application & Communication Service

The enabling of the FRMCS Application is a prerequisite for the activation of an FRMCS Application by the User. The rationale is e.g. to only allow activation of FRMCS Applications which are authorised for the Role of the User and/or authorised in the area where the User is located. Enabling/disabling of an FRMCS Application is performed by the FRMCS System. See also activation of an FRMCS Application.

European Union Agency for Railways

The agency for railway safety and interoperability established by Regulation (EC) No 881/2004 of the European Parliament and the Council of 29th April 2004 establishing a European Railway Agency, currently named the European Union Agency for Railways.

External System

A back office type of system connected to the FRMCS System, such as traffic management systems, tracking systems, planning systems, weather report system, etc.

Floor Control

A method that determines who has the authority to transmit (talk) at a point in time during a Voice Communication.

FRMCS Application

Is a set of functionalities provided to the User to cover a certain need for railway operations for which FRMCS communication is needed and is specified in this document. For example voice, messaging service.

Please note that in this FRS specification also the word “application” is used, with a lower case a. This is not to be confused with “FRMCS Application” where the communication need is comprehensively captured in this FRS. The definition of application, written without a capital A, is to be used in different contexts. Mostly it is used for a communication need not specified in this FRS but application is also used in the context of the URS.

FRMCS Application & Communication Service

FRMCS Application and FRMCS Communication Service.

FRMCS Communication Service

Communication services are methods and technologies that enable exchange of information between two or more authorised Users.

FRMCS Domain

An FRMCS Domain is the administrative area for FRMCS Applications and FRMCS Communication Services.

FRMCS Operator

The entity responsible for operating the FRMCS System (trackside and/or On-Board).

FRMCS System

The railway specific telecommunication system according to the set of FRMCS specifications.

FRMCS User Device

Combination of hardware and software, both on trackside and On-Board side, required to use the FRMCS System.

Function Label

Defines the type of Role of the User (human (e.g. Driver), Machine (e.g. sensor) or a type of communication (when used in a Group Identity for e.g. REC or Multi-train).

Functional Identity

An identity assigned to the User which represent the Role of this User.

Geographical Position

A Geographical Position is an absolute coordinates consisting of latitude, longitude with a certain accuracy (such as a GNSS coordinate, radio cell identity; the accuracy is represented by a circle or polygon).

Ground User

A User that is not On-Board a Train. The User can be stationary or moving, connected via wire or wireless.

Home FRMCS Domain

The FRMCS Domain which is considered as the home FRMCS System of the train.

Interconnection

The ability of two networks of the same technology to communicate with each other, enabling services to be delivered across the two networks.

Interruption of Communication

Temporarily interruption of the flow of information during a communication.

Interworking

The ability of two networks of different technologies to communicate with each other, enabling services to be delivered across the two networks.

For Interworking, it is assumed that the GSM-R system is configured to route communications to the FRMCS System, which further routes the communication to the appropriate User.

GSM-R system can only route a communication to a User if the User can be reached by an address or identity understood by the GSM-R system.

Inter Domain Change

A User changing from one FRMCS Domain to another FRMCS Domain.

Intra Domain Change

A User changing communication bearers within one FRMCS Domain. A change in this context is considered as a change of the set of access functions and corresponding core functions applicable for the FRMCS System (e.g. changing of radio access).

Lineside Telephony

A telecommunication service installed at a fixed location connected to a fixed or mobile network.

Location Label

Indicates a specific location or area (e.g. area ID).

Location Information

The information on the location of a User device. This can consist of one or more of the following elements:

a) Geographical Position;
b) Velocity (the combination of speed and direction);
c) Infrastructure Location (additional information specifying railway infrastructure elements; for example: signal 123, switch 456, track section 789A, radio access related information;
d) Accuracy information (horizontal and vertical accuracy, accuracy of Infrastructure Location, etc)
e) Train Route Setting.

Machine

A process working autonomously from a human User after being initiated.

Merging/Merge/Merged

After execution of the merging action on two distinct communications, these are combined into a single communication involving all the participants of both initial ones. Communications can be merged whatever is (are) the type(s) of content (voice, voice+video, voice+data…).

Non-FRMCS User

A user with an identity not part of the FRMCS System setting up / receiving communication with/from an FRMCS System (such as a public, a railway private user setting up communication to a Driver or a GSM-R user by its CT8 number).

Off-network

Off-network allows entities to communicate without a telecom infrastructure.

On-Board FRMCS

System enabling FRCMS communication for On-Board FRMCS Applications.

On-Board User

A User that is On-Board a Train.

On-network

On-network allows entities to communicate through a telecom infrastructure.

Organisation Code

Identifier according to the Technical Documents accompanying the Technical Specification for Interoperability relating to the subsystem telematics applications for passenger services / Technical Specification for Interoperability relating to the subsystem telematics applications for freight.

Public Address

Loudspeaker system On-Board used for passenger announcements.

Public Emergency Call

A user-to-user Voice Communication, which is used to notify non-railway authorities (such as Police, Ambulance, or fire services) of an emergency situation.

Public Emergency Warning

A warning which the Public Safety Authority is able to broadcast to a subset of the civil population based on their location.

Railway Staff

Personal employed by railways.

Role

A railway operational function assigned to a User at a given time (Leading Driver of train 9545, Conductor for train 9545, Controller of area 12456…). Within FRMCS the Role of a User is formalized by a Functional Identity.

Role Set

A set of Roles that the User is allowed to register to.

Service Continuity

Capability of the FRMCS System to maintain the FRMCS Application & Communication Service for the User at an acceptable level following an inter FRMCS Domain transition. Any interruption/delay causes no severe influence of the operational performance.

Short Dialling Code

A numeric code which is used by a User to allow a quick dialling functionality, by having a short (e.g. 4) digit code defined to reach some target(s). The Short Dialling Code numbers are harmonized for all railways in EU.

Shunting Team

A group of people maneuvring Trains in order to change their location or composition.

Single Sign On/Off

Single sign-on/off is an identification procedure that enables Users to log in to or log-off from one or multiple User devices hosting one or multiple FRMCS Applications by a single input action.

Subscriber Identity

An identity which is available to address a communication towards a User’s equipment after it is powered on and attached to the FRMCS System.

Train Route Setting

Location Information made available for the movement planned for Trains and other Users between different locations with associated (route) section. This information contains additional information like maximum speed of the Train by considered the restrictive conditions of each route section, in order to run between specific locations.

The Train Route Setting information is provided to the FRMCS System by External Systems (e.g. interlocking, ATP).

Train Staff

Railway Staff that are On-Board a Train but are not Drivers, for example Conductors, catering staff, security staff etc.

Train

A connected line of car(s)/vehicle(s), with or without a locomotive.

Uni-directional

One-way communication, like a broadcast.

Usability

International standard, ISO 9241-11, defines usability as: the extent to which a product can be used by specified Users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

User

A human user or a Machine making use of the FRMCS System (for Non FRMCS Users the type of user is clearly mentioned e.g. public user, GSM-R user).

User’s Default Device

In the case that the User is using multiple devices, the default device is the device that is actively used for communication, in the case that the communication needs to be automatically connected.

User Identity

An identity which is available after the User is logged in to the FRMCS System via the credentials.

Vehicle Identity

Identity of a vehicle according to EIN.

Video Communication

Exchange of information in the form of streaming video (not a recorded video file), regardless of the transmission method (video is not considered as data in this document).

Vehicle Equipment Function

A function of an equipment on a vehicle, e.g. a door, an airconditioning, lighting.

Voice Command

Defines an action that Users can initiate by speaking.

Voice Communication

Exchange of information in the form of voice (not a recorded voice file), regardless of the transmission method (voice is not considered as data in this document).

Wild card

Wild Cards are planned to be used for Functional Identity labels to allow adressing a group or single user without knowing exact target address. Wild card are special characters or symbols used in a label to represent one or more unknown characters. Wild cards allow flexible matching of labels. Examples are “Driver*” for all Drivers.

4 Introduction

4.1 Background

4.1.1 The predicted obsolescence of GSM-R, combined with the long term life expectancy of ETCS and the Railway business needs, have led to the European (EU) Railway community initiating work to identify a successor for GSM-R. This document is one of the first steps in the process where the railways' needs are identified and defined in a consistent and technology independent way, the foundation for next steps on defining the Future Railway Mobile Communications System (FRMCS). (I)

4.1.2 The FRMCS FRS is part of the FRMCS specifications as depicted in Figure 4-1. (I)

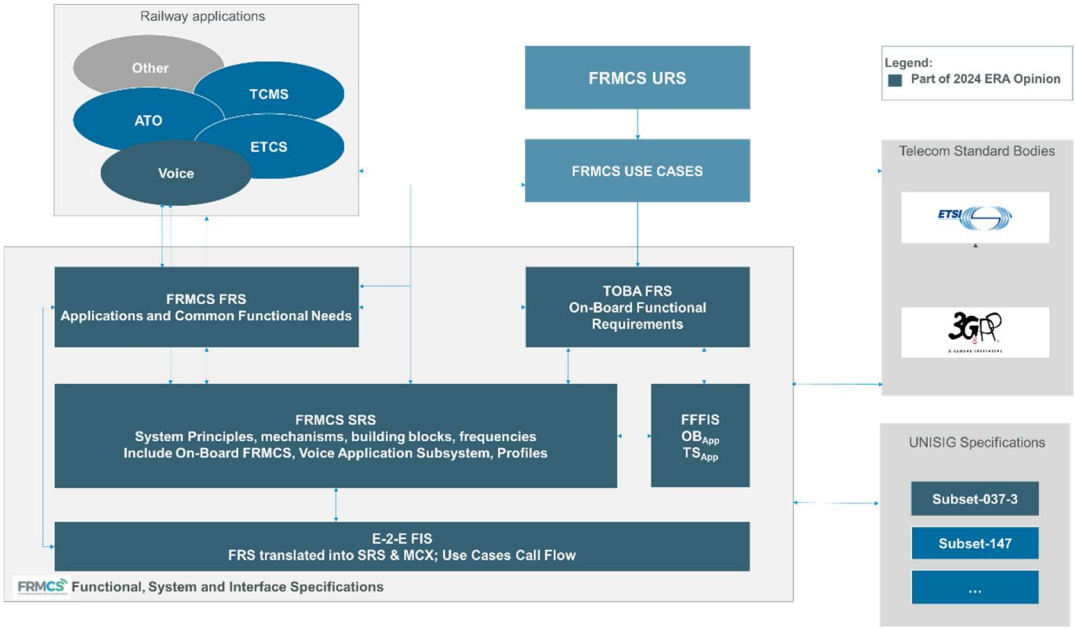


Figure 4-1: FRMCS specifications

4.2 Purpose of this document

4.2.1 The purpose of this document is to specify the functional requirements satisfying the communication needs of the railway sector for the next generation communication system, as a successor of GSM-R. The new communication system is called FRMCS, Future Railway Mobile Communication System. (I)

4.2.2 The functional requirements fulfil the needs of the rail sector as described in the URS and Use cases. Implementations are based on operational needs and regulation / legislations. (I)

4.2.3 The functional requirements aim to provide the railway sector with a system that meets the operational needs of today and tomorrow. This is achieved by not stating the operational rules in the specific requirements but instead allowing the Infrastructure managers (and other stakeholders) to implement the operational needs by configuration. (I)

4.2.4 This specification document aims to cover all needs from all members in the railway sector, and is considered a global specification. For usage on regional or specific country level individual requirements can be selected from this specification and classified accordingly. In Appendix C these requirements and classifications are listed. (I)

4.2.5 For specific national needs a railway could require to implement a variant of FRMCS Applications as specified in this document. The FRMCS System offers criteria allowing to distinguish between the specified FRMCS Applications and the national variant of those FRMCS Applications specified in this FRS (e.g. the requirements for the FRMCS Application Multi-Train Voice Communication for Drivers could be re-used to design national variants of this FRMCS Application). (I)

4.3 Scope

4.3.1 The scope of the FRMCS Functional Requirements Specification (FRS) is described in this section. (I)

4.3.2 Some of the main Users of the FRMCS System are illustrated in Figure 4-2. These Users can be humans or Machines. An entity is considered as a User when it interacts with a device included or partly included in the FRMCS System scope. The Users are classified into two main categories: (I)

a) On-Board Users: Users who access the FRMCS System while they are located on a rolling stock;
b) Ground Users: Users who access the FRMCS System while they are not located on a rolling stock.

4.3.3 Here are some examples of human Users: (I)

a) The Train Driver needs to communicate with Controllers. For this purpose, the Driver interacts with a HMI which is partly covered by the FRMCS System scope;
b) The railway employees involved in a shunting operation need to communicate to other shunters for the same operation.

4.3.4 Here are some examples of non-human Users: (I)

a) The On-Board ATP device, which regularly exchanges data with an ATP application server. The interaction between the Driver and the On-Board ATP is out of the FRMCS System scope;
b) The trackside warning system needs an interface to the FRMCS System in order to enable exchange of data with railway infrastructure control systems. The interaction between the trackside workers and the trackside warning system is out of the FRMCS System scope.

4.3.4i The specific HMI requirements are not part of the FRS. However, the functional need to have an HMI to allow human interaction is noted in each section, together with the indication of some points of attention, and some generic HMI aspects are described in section9.3Other detailed requirements may be included in other FRMCS documents. It is expected to have a dedicated guidance on the HMI icons, sounds, ergonomic considerations and “look and feel” in separate documents. These should be applicable to all sorts of terminals (On-Board, fixed terminals used by Controllers, mobile terminals). (I)

4.3.5 In order to enable communication between the end users of the public networks and Users, the required interfaces are included in the FRMCS System scope. In the same way, the interfaces required to enable communication between Users and the end users of railway legacy telecom systems (GSM-R, TETRA…) are included in the FRMCS System scope. (I)

4.3.6 The railway legacy systems are only expected to be adapted thanks to configuration changes. It is not envisaged to introduce modifications in the existing products. (I)

4.3.7 The communication media of the FRMCS System are classified into three main categories: (I)

a) Voice Communication (e.g. for vocal communication between the Train Driver and the Controller);
b) Data Communication:
    i. FRMCS control data (e.g. multi-talker control data);
    ii. FRMCS user traffic (e.g. FRMCS messaging service, bearer for ATP, bearer for trackside warning system);
c) Video Communication.

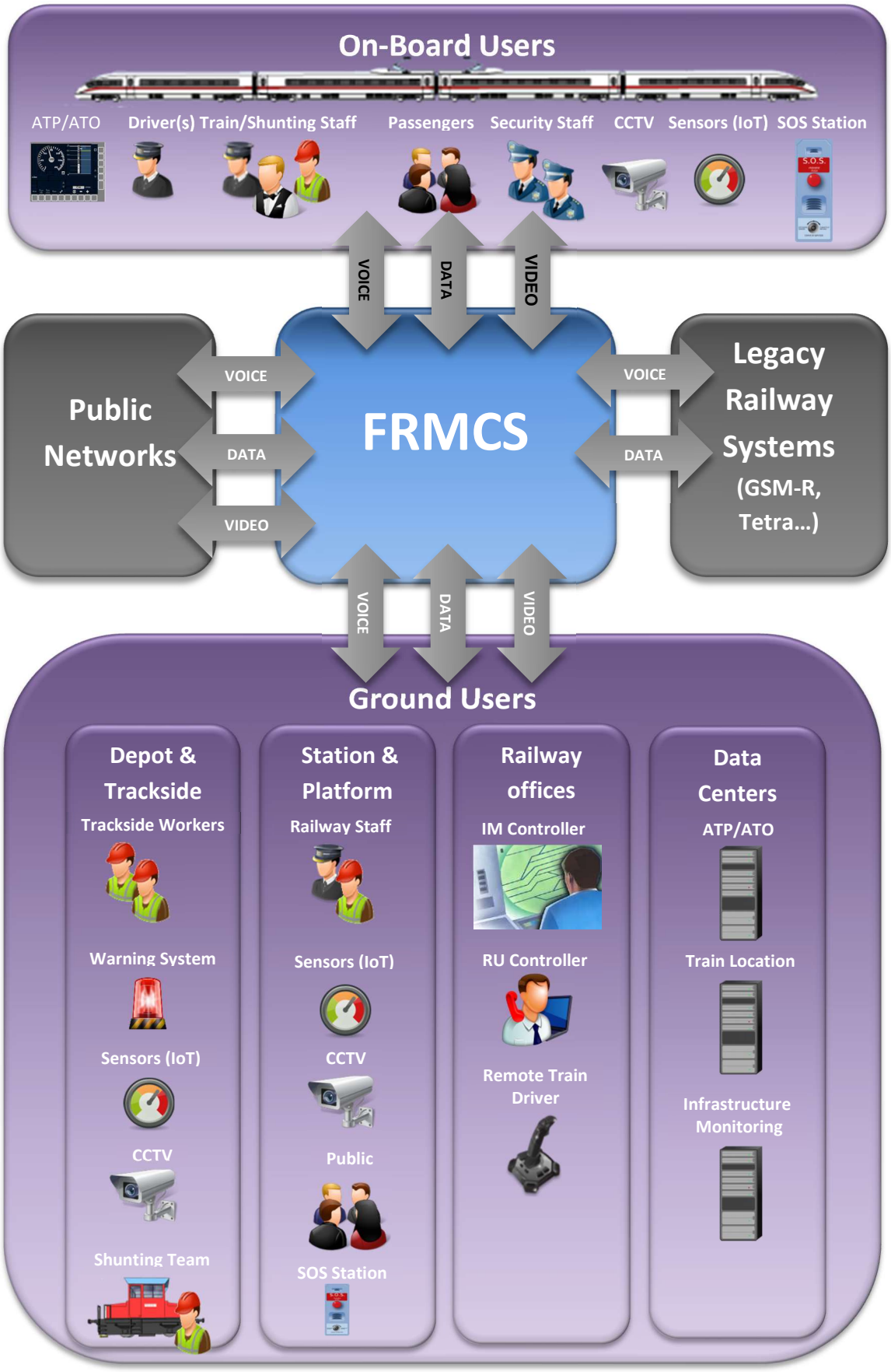


Figure 4-2: FRMCS System Scope

4.4 Applicability

4.4.1 The statements made in the FRS specification are assigned to the following categories: (I)

a) **Mandatory for the System** (indicated by '(M)' at the end of the clause). These requirements mean a condition set out in this specification that must be met without exception in order to deliver a system ensuring the fulfilment of essential functional and system needs, compliance to relevant standards and technical integration. The mandatory requirements are identified as sentences using the keyword "shall".

b) **Optional for the system** (indicated by '(O)' at the end of the clause). These requirements may be used based on the implementers' choice. When an optional requirement is selected, the related requirement(s) of this specification becomes mandatory for the system. The optional requirements are identified as sentences using the keyword "should".

c) **Information** (indicated by '(I)' at the end of the clause). These statements provide additional information to help the reader understanding a requirement.

Please note that NA is used to indicate that a particular item is not applicable and therefore not needed to be provided.

4.4.2 When a requirement clause contains a bulleted list, the categorisation precedes the bulleted list indicating that the FRMCS System shall/should support all items in the list. (I)

4.4.3 The following marking is applied to denote the applicability of clauses: (I)

a) Indications (M), (O) and (I) are used for clauses within the scope of the V2 specification, which is the minimum set of requirements for validation;
b) Indications (M-V3), (O-V3) and (I-V3) are used for clauses within the scope of the V3 specification. The V3 series of specification are the target version to be included in the TSI, to allow migration from the GSM-R system to the FRMCS System (FRMCS 1st edition). The V3 clauses are to be considered for information for V2;
c) Indications (M-Vx), (O-Vx) and (I-Vx) are used for clauses for a later version of the specification. These clauses are kept in the specification for readability and consistency purposes.
d) Indications (M-V3), (O-V3), (I-V3) and (M-Vx), (O-Vx), (I-Vx) may also be used for sub bullets within a clause to identify a different applicability. In this case each bullet will be indicated individually
e) Intentionally deleted.

4.5 Readers guide

4.5.1 For the readers comfort, the authors of this specification advise the readers to consider the following guidance notes. (I)

4.5.2 In this document the FRMCS System is considered as a black box. The sub components within the FRMCS System are not specified. (I)

4.5.3 The FRS specification defines the *what* and not the *how*. In other words, the FRS specifies the functional requirements to be fulfilled by the FRMCS black box. The technical details to fulfil the functional needs are specified in the further downstream specifications like TOBA FRS, SRS, FIS, FFFIS, etc. FRS specifies the interaction between the User and the FRMCS System, not only for communication functionality but also for the configuration aspects. (I)

4.5.4 The URS captures the communication needs of the railway sector. In the URS the needs are defined as communication applications and support applications. In this FRS some URS defined communication applications have an end-to-end character like for Railway Emergency Communication (in this FRS identified as FRMCS Applications) whilst for other URS defined communication applications the FRS specifies only the bearer (like for ATP; in this FRS identified as FRMCS Communication Service). The URS defined support applications are described as Common Functions (in chapter 8) in the FRS. (I)

4.5.5 Chapters 10.1, 11.1 and 12.1 describe the functionality that is the basis for all FRMCS Applications & Communication Services within these chapters, the functionality is applicable to the FRMCS Applications & Communication Services listed in chapters 10, 11 and 12 unless otherwise specified. (I)

4.5.6 The FRS specifies the global needs from the railway sector. The requirements that are applicable in a legal framework are described in Appendix C document per regional level. (I)

4.5.7 All requirements for Off-network functionality in this document are preliminary because a final decision of the needs by the railway sector has not been taken yet. In version x, a version after version 3, of this specification this will be clarified. (I-Vx)

4.5.8 The current version of the FRS does not cover any specific requirements for the dispatcher system. This will be added in the next version of the specification. (I-V3)

4.5.9 The approach in FRS is to try not to copy the same requirements in each individual section (of Common Functions and FRMCS Applications & Communication Services) in order to have a readable (and not too big) specification. For that, a set of common communication functions is described for Voice FRMCS Applications & Communication Services (section 0), for Data FRMCS Applications & Communication Services (section 11) and for Video FRMCS Applications & Communication Services (section 12). The principle of Common Functions is detailed in sections 5.2 and 6.3. (I)

4.5.10 A slight deviation of this approach is made in this version of the specification for the requirements on domain change, Interconnection and Interworking. In each section of Common Functions and FRMCS Applications & Communication Services the requirements are specified although overlap or duplication could be concluded here. The generic requirements that are not mentioned anywhere can be found in chapter 16. Maybe in a next version of the specification this could be optimized. (I)

4.5.11 In Appendix A an overview is given which Pr's (Principles) and GNs (Guidance) from the URS are covered where in the FRS, or elsewhere. (I)

5 FRMCS Application & Communication Service concept

5.1 Goal

5.1.1 The main achievements expected from the FRMCS Application & Communication Service concept are: (I)

a) The flexibility allowing to fit to the common and specific operational communication needs of each infrastructure manager and railway undertaking, as well as;
b) The cost effectiveness and speed of implementation when the common and specific operational communication needs evolve.

5.1.2 Using FRMCS Applications & Communication Services also allows introducing new ones, thereby ensuring correct operation of such FRMCS Applications & Communication Services on devices without affecting existing FRMCS Applications or FRMCS Communication Services and reducing the need to go through a (new or full) authorisation process. (I)

5.1.3 Other benefits expected from the FRMCS Application & Communication Service concept are reliability and efficiency of the operation and maintenance activities: (I)

a) The ability for an easy changing of FRMCS Application & Communication Service parameters, according to operational or maintenance needs;
b) Capturing of relevant data related to events and actions performed by an FRMCS Application or FRMCS Communication Service, for the purpose of keeping historic logs, and elaboration of statistics and calculating performance indicators;
c) Capturing of data related to the running of each FRMCS Application or FRMCS Communication Service for performance monitoring and fault detection for respectively predictive and corrective maintenance actions.

5.1.4 The major factors to achieve the goals are: (I)

a) High level of software modularity and reliability allowing:
    i. To minimize the impact on the implementation costs and delays, caused by the authorisation processes. The authorisation process is applied only if there is an impact on FRMCS Applications & Communication Services which are subject to authorisation;
    ii. Application & Communication Service development becoming more independent from equipment;
b) Lean specifications ensuring functionality without impact on flexibility;
c) Ability to run the FRMCS Applications & Communication Services on COTS/MOTS User devices;
d) Ability of a User device to run any of the FRMCS Applications & Communication Services required (e.g. a single cab User device supporting all the required FRMCS Applications & Communication Services);

e) Independence from the radio access technologies allowing the FRMCS Application & Communication Service to be future-proof against the evolution of these technologies.

5.2 Principles

5.2.1 Within this FRS, FRMCS Applications & Communication Services describe the functional behavior expected. This functionality is based on a set of Common Functions that act as ‘functional building blocks’ available to all FRMCS Applications & Communication Services. Each FRMCS Application or FRMCS Communication Service can use the functionality of the Common Functions and add -where needed- functionality to create the FRMCS Application or FRMCS Communication Service covering the railway need. In Figure 5-1 the FRMCS Application framework is shown. Please note that this split between Common Functions and FRMCS Applications & Communication Services does not correspond to any technical architecture / solution. The aim is to specify the functional needs in the most efficient way. (I)

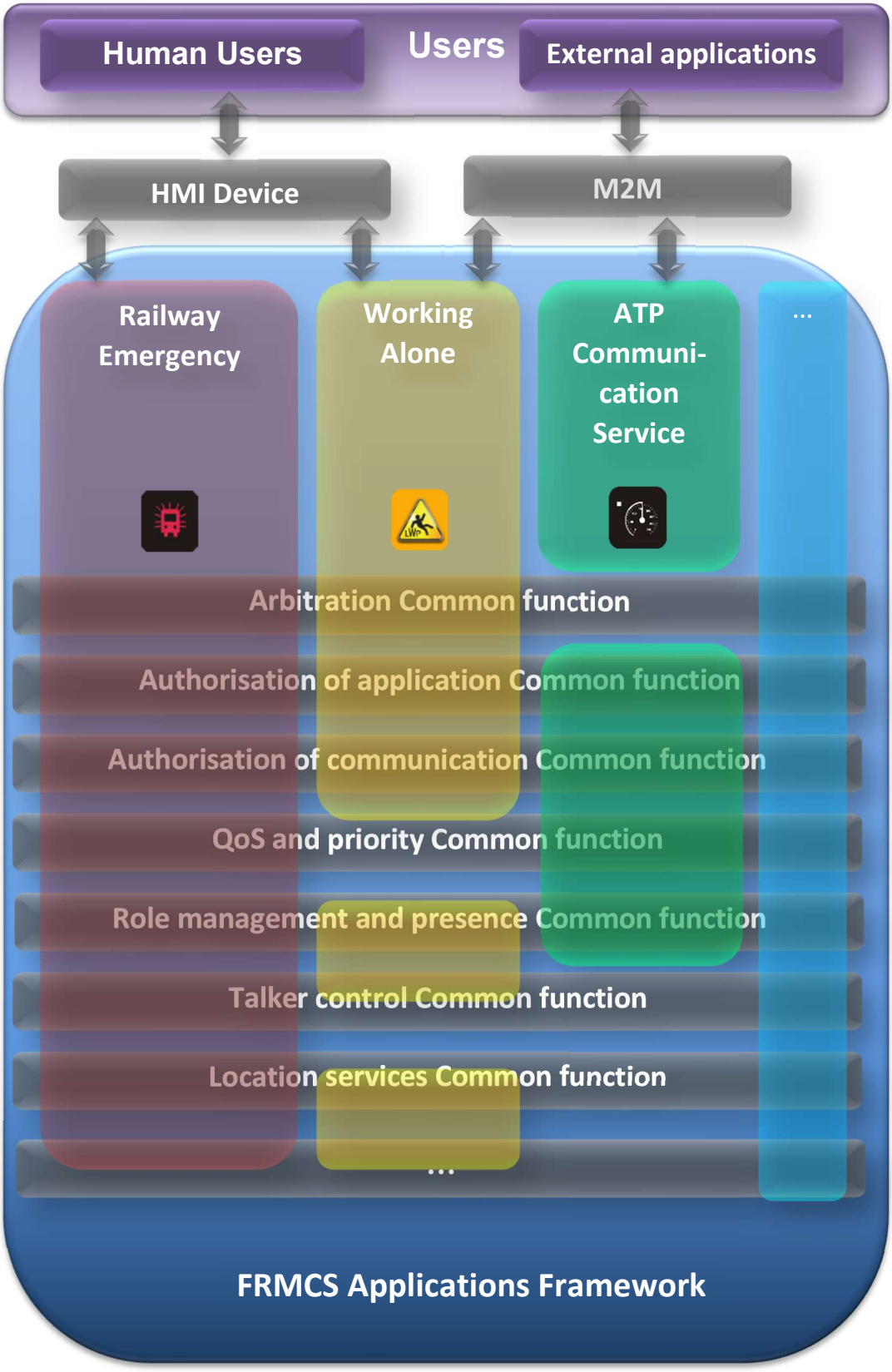


Figure 5-1: FRMCS Application framework

5.2.2 To allow a User to use an FRMCS Application or an FRMCS Communication Service on the device, the FRMCS Application or FRMCS Communication Service is installed and activated. The installation includes not only the initial installation but also the software updates required during the whole life cycle of the FRMCS Application & Communication Service to cope with the corrective maintenance and the change management. The User does not have the task to make sure FRMCS Applications & Communication Services are up-to-date. This is taken care by the FRMCS Application Management either automatically or based on manual control. (I)

5.2.3 Appointed organisations (such as, for the European Union, the European Union Agency for Railways) can determine, in order to make interoperable railway traffic possible, to notify a subset of the FRMCS Applications & Communication Services in the FRS to be mandatory. When notified such and described in appropriate regulation, these are referred to as FRMCS Applications or FRMCS Communication Services performing harmonised functionality, i.e. harmonised FRMCS Applications / Communication Services. (I)

5.2.4 Where an FRMCS Application or FRMCS Communication Service is introduced that does not perform a function as described by the FRS, it is not an FRMCS Application or FRMCS Communication Service. Such an FRMCS Application or FRMCS Communication Service does not hinder other FRMCS Applications or FRMCS Communication Services. (I)

5.2i FRS scope

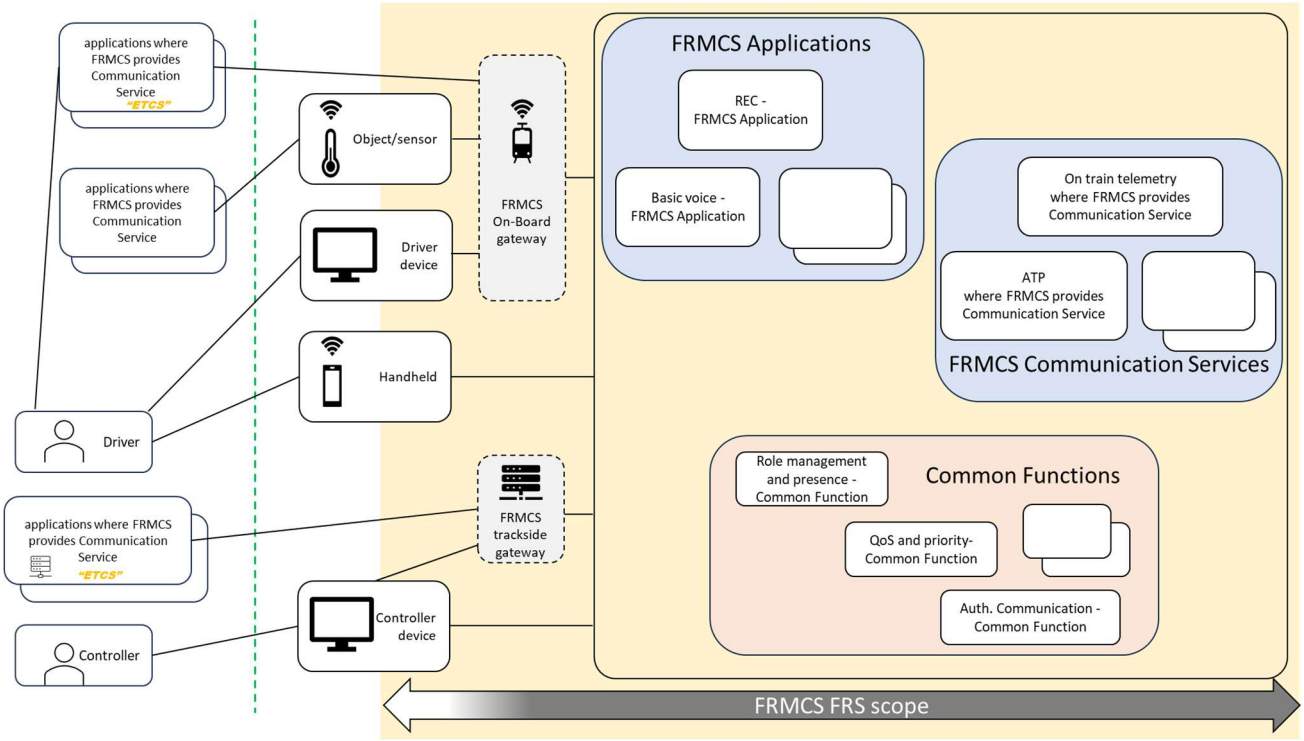


Figure 5-2: FRMCS FRS scope

5.2i.1 Figure 5-2 shows the scope of the FRMCS FRS. (I)

5.2i.2 Intentionally deleted.

5.2i.3 A functionality is realised by combining Common Functions and FRMCS Applications & Communication Services, and by using the gateway and user-facing equipment. (I)

5.2i.4 Figure 5-2 shows: (I)

a) The **Common Functions** described in the FRS;
b) The **FRMCS Applications** described in the FRS;
c) The **FRMCS Communication Services** described in the FRS, used by applications outside the scope of this FRS, e.g. ATP, like ETCS in Europe, interfaces with the FRMCS communication system but its requirements are not part of FRMCS – depicted by the ETCS box in the figure being completely outside the FRMCS FRS scope delimiter;
d) Devices used by machine and/or human Users to access FRMCS Application & Communication Services. The FRS does contain some functional requirements related to these devices – depicted by the lightening shading of the arrow at the bottom showing the FRS scope;
e) Intentionally deleted.
f) Intentionally deleted.

5.2i.4i Intentionally deleted.

5.2i.4ii Intentionally deleted.

5.2i.5 Although some architectural elements are indicated, figure 5-2 and figure 5-3 are explicitly not meant to provide an architecture view, but to show the difference between the FRMCS Application / Common Function concept on the one side and FRMCS Communication Service on the other side. The SRS elaborates further on the technical architecture. (I)

5.2i.6 In figure 5-3 is, as example, the implementation of the Railway Emergency Communication is shown (by the yellow marking in the figure). (I)

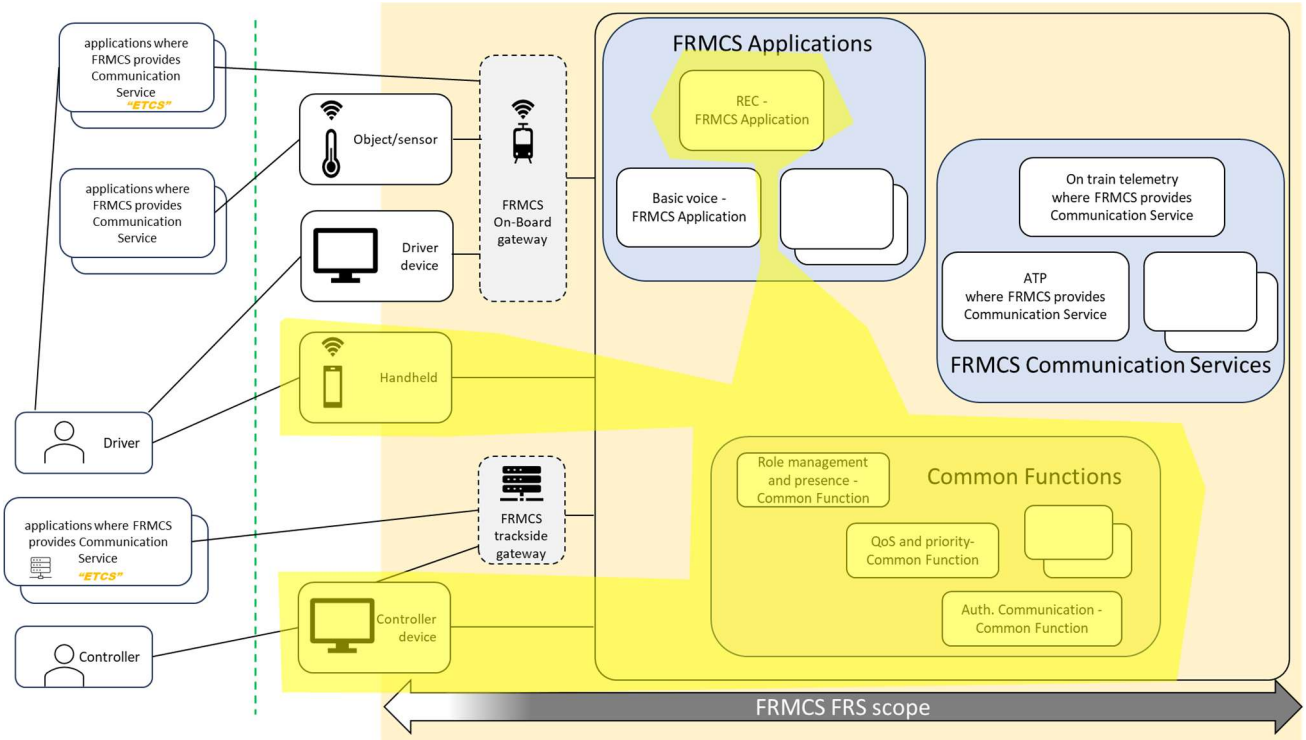


Figure 5-3: FRMCS FRS scope for REC

5.3 FRMCS Applications & Communication Services framework and management

5.3.0 Figure 5-4 shows the FRMCS Application & Communication Service Management principles. (I)

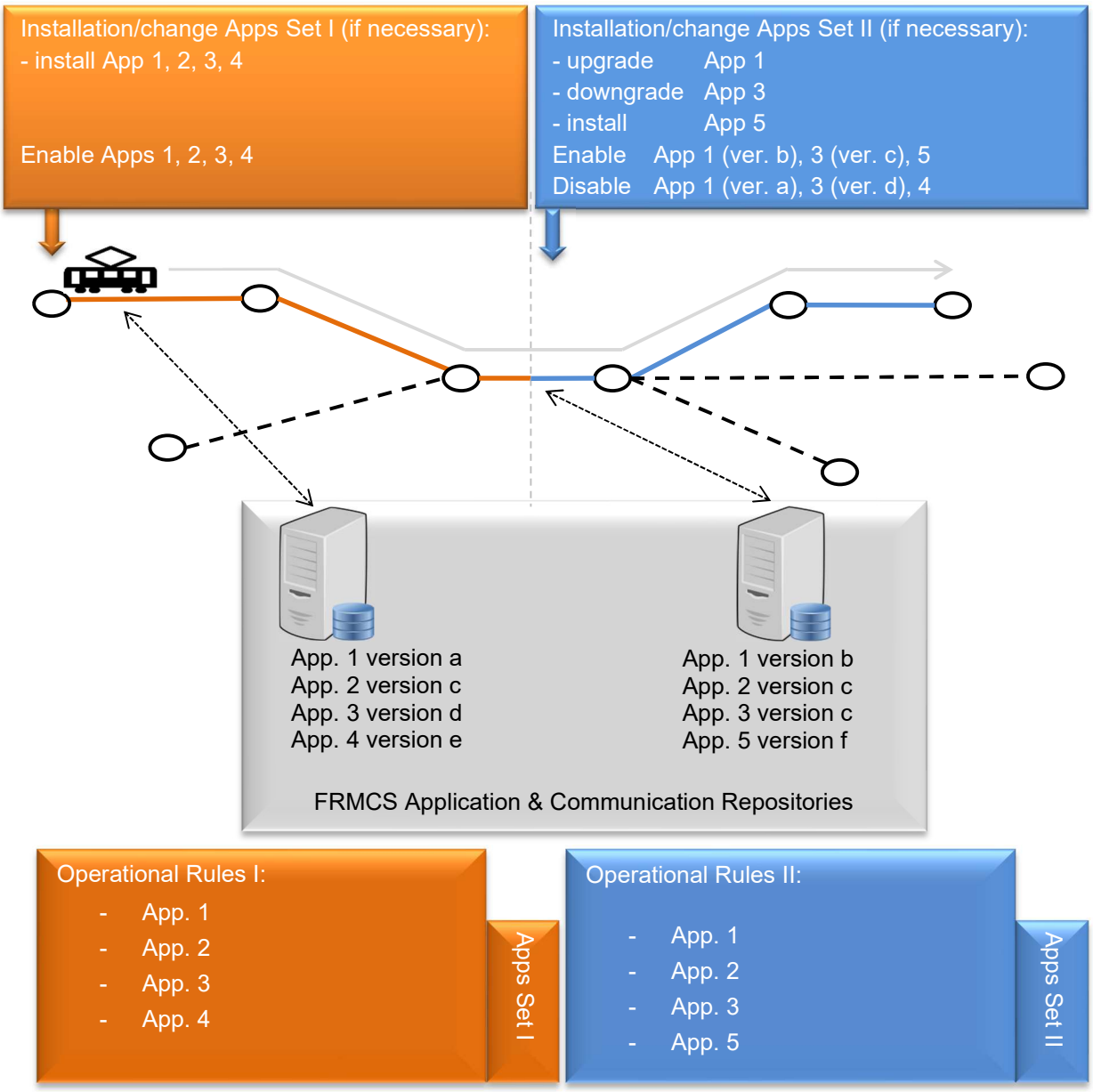


Figure 5-4: FRMCS Application & Communication Service Management principles

5.3.1 The FRMCS Application & Communication Service Management performs the following tasks: (I)

a) Provide an FRMCS Application & Communication Service repository, containing FRMCS Applications & Communication Services to provide to the User device in need of an FRMCS Application or an FRMCS Communication Service. This includes the check to verify that the endorsement of the FRMCS Application's & Communication Service's functionality was successful;
b) Provide version management, determining:
    i. What valid version(s) of FRMCS Applications & Communication Services are (i.e.: to check that FRMCS Application version in the User device and in the infrastructure are compatible);
    ii. For devices under its responsibility, what FRMCS Application or FRMCS Communication Service version is to be used and provide the FRMCS Application or FRMCS Communication Service of the correct version when required;
c) Provide configuration version management: determining what configuration parameters are valid for that specific FRMCS Application or FRMCS Communication Service and area.

5.3.2 The FRMCS Application & Communication Service Management can be performed by e.g.: (I)

a) The IM that is responsible for a domain;
b) An RU for railway specific FRMCS Applications & Communication Services;
c) An appointed organisation.

5.3.3 Version management is performed according to the following functional guidelines. (I)

a) Version compatibility is determined by the FRS system version (baseline) applicable to the FRMCS Applications & Communication Services;
b) When the FRMCS Application & Communication Service Management detects that a User device has an incompatible version, it initiates provisioning of the correct version of the FRMCS Application or FRMCS Communication Service to the User device.
   Incompatibility is defined as:
    i. The FRMCS Application or FRMCS Communication Service version on the device is a lower version than considered compatible to the infrastructure;
    ii. The FRMCS Application or FRMCS Communication Service version on the device is a higher version than considered compatible to the infrastructure (note: this can happen during migration phases when a Train travels between IM-area's that are and are not equipped with a newer FRS system version).
c) FRMCS Applications & Communication Services in a newer FRS system version can fulfil the requirements of an older FRS system version (i.e. is backwards compatible). In this case, the FRMCS Application & Communication Service Management considers this 'older' FRMCS Application or Communication Service to be compatible;

d) FRMCS User devices can contain different versions of a specific FRMCS Application or FRMCS Communication Service. It is not needed to delete the FRMCS Application or FRMCS Communication Service from the User device. Enabling of the correct FRMCS Application or FRMCS Communication Service version is a task of the FRMCS Application or FRMCS Communication Service Management.

5.4 FRMCS Application & Communication Service Management requirements

5.4.1 The FRMCS System shall provide FRMCS Application & Communication Service Management capable of performing the following tasks: (M-Vx)

a) Ensuring that FRMCS Application or FRMCS Communication Service and configuration version applicable for the specific location is available for the User;
b) Ensuring that the valid applicable FRMCS Application or FRMCS Communication Service and configuration versions are obtained either automatically or with a minimum of human interaction;
c) Ensure that the FRMCS Application & Communication Service Management does not impact the User Device operation (e.g.: FRMCS Applications & Communication Services are available before commencement of a trip, no restart or interruptions of communications during operation).

5.4.2 The User Device FRMCS Application & Communication Service Management process will not impact the existing functionalities, i.e. no need for recertification of the User Device. (I-V3)

5.4.3 An Authorised User shall be able to provide to the FRMCS System the valid FRMCS Applications & Communication Services including configurations for a certain area. (M-Vx)

5.4.4 The FRMCS System shall provide (access to) a database containing which FRMCS Application & Communication Service / configuration versions are valid for specified criteria(s). (M-V3)

5.5 FRMCS Application & Communication Service Management guidelines

5.5.1 The FRMCS Application & Communication Service Management guarantees that the FRMCS User Device uses the valid FRMCS Applications & Communication Services including configuration for a Train route (which can include more than one IM domains). (I-V3)

5.5.2 The FRMCS Application & Communication Service Management guarantees that the valid FRMCS Application or FRMCS Communication Service is activated on the FRMCS User Device for the specific IM domain. (I-V3)

5.5.3 The FRMCS Application & Communication Service Management guarantees that the FRMCS User Device uses the valid FRMCS Applications & Communication Services including configuration for a specific responsible organisation within the same domain used by several organisations. (I-V3)

5.5.4 The FRMCS Application & Communication Service Management guarantees that the valid FRMCS Application or FRMCS Communication Service is activated on the FRMCS User Device for the specific responsible organisation within the same domain. (I-V3)

5.5.5 The FRMCS Application & Communication Service Management guarantees that the valid FRMCS Applications & Communication Services including configurations for the specific Train route are available on the User Device. (I-V3)

5.5.6 The responsible organisation (e.g. IM, RU) ensures that the User Device planned for a Train route has performed the process of checking and obtaining the appropriate FRMCS Applications & Communication Services before the start of the mission. (I-V3)

5.5.7 The FRMCS System guarantees that downloading / installing / removing FRMCS Applications & Communication Services have no impact on the User Device operation (e.g. restart or Interruption of Communication). (I-V3)

5.5.8 FRMCS Application & Communication Service Management functionality is active permanently on each FRMCS User Device to support the check of the validity of FRMCS Applications & Communication Services and configuration. (I-V3)

5.5.9 The trigger(s) for the check of the validity of FRMCS Applications & Communication Services is to be configurable. (I-V3)

5.5.10 A trigger for checking the validity of an FRMCS Application or FRMCS Communication Service is one of the following: (I-V3)

a) Upon request from the User's Device FRMCS Application & Communication Service manager;
b) Intentionally deleted.
c) Intentionally deleted.
d) Upon starting a maintenance function of the User Device;
e) Upon a domain change;
f) Upon request from the repository on trackside, e.g. when a new FRMCS Application or FRMCS Communication Service is available on the repository.

5.5.11 Intentionally deleted.

5.5.12 Intentionally deleted

5.5.13 FRMCS Application & Communication Service Management functionality only accesses authorised FRMCS Application & Communication Services repositories. (I-V3)

5.5.14 FRMCS Application & Communication Service Management functionality accesses at least the FRMCS Application & Communication Service repositories responsible for storing FRMCS Applications & Communication Services needed for the domains where FRMCS User Device is expected to operate. (I-V3)

5.5.15 If enabled by configuration, FRMCS Application & Communication Service Management functionality accesses third party FRMCS Application & Communication Service repositories in order to obtain additional FRMCS Applications or FRMCS Communication Services. (I-V3)

5.5.16 A Railway Undertaking and/or an Infrastructure Manager can provide FRMCS Application & Communication Service repositories or provide FRMCS Applications & Communication Services to repositories. (I-V3)

5.5.17 The FRMCS Application & Communication Service repository contains FRMCS Applications & Communication Services (including their configuration) that are verified. (I-V3)

5.5.18 Verified FRMCS Applications & Communication Services are: (I-V3)

a) FRMCS Applications & Communication Services that perform the intended function with the required level of security;
b) FRMCS Applications & Communication Services that do not perform malicious functions, hamper functionality or imply other functions to perform sub-optimally regarding the FRMCS Application & Communication Service Management itself, other FRMCS Applications, & Communication Services or devices;
c) FRMCS Applications & Communication Services for which the version management is set (including to which FRS version they are designed, when applicable).

5.5.19 All the requirements applicable for FRMCS Application & Communication Service Management are applicable to the FRMCS Application & Communication Service manager (performing the FRMCS Application & Communication Service Management task on the FRMCS User Device) itself. (I-V3)

5.5.20 The technical and legal means to verify the FRMCS Applications & Communication Services are outside the scope of the FRS, e.g. the FRMCS SRS includes the technical details and the TSIs in the EU include this in the legal framework. (I-V3)

6 FRMCS functional addressing

6.1 Generic requirements

6.1.1 The FRMCS System shall support temporary registrations and permanent registrations of Functional Identities. (M)

6.1.2 Temporary registrations are functions, which are registered in the FRMCS System for a limited time (e.g. Train number, Controller or team member). (I)

6.1.3 Permanent registrations are functions, which are registered in the FRMCS System permanently (e.g. vehicle, trackside equipment or specific User profiles). (I)

6.1.4 For the FRMCS functional addressing, Organisation Code shall be used in EU. (M)

6.1.4i Intentionally deleted.

6.1.4ii For Organisation Code, based on the use case, the specific IM or the RU identifiers shall be used. (M)

6.1.4iii For non-railway users and in case(s) of emergency, other organisations may express need(s) for similar capabilities where some Organisation Code is necessary. (I-V3)

6.1.5 For the FRMCS functional addressing, Vehicle Identity according to the vehicle number specified in EIN shall be used in the EU. (M)

6.1.6 The “Function Label” defines the type of Role of the User (human (e.g. Driver) or Machine (e.g. sensor). (I)

6.1.7 The “Identification Label” defines a specific identity (e.g. vehicle number) and/or a notation (e.g. shutningteam1). (I)

6.1.8 The “Location Label” indicates a specific location or area (e.g. area ID). (I)

6.1.8i The “Equipment Label” defines the identity of a specific object (e.g. display on a platform, diagnoses). (I)

6.1.8ii The usage of the Labels within Functional Identities depends on the individual Identities defined in the FRMCS functional addressing. (I)

6.1.8iii The following types of Functional Identities can be distinquished: (I)

a) Train Functional Identity;
b) Controller Functional Identity;
c) Team Functional Identity;
d) Vehicle Functional Identity;
e) Trackside Equipment Functional Identity;

6.1.9 Assignment of the individual parameters to the labels are according to Table 6-1. (I)

LocationLabel	IdentificationLabel	EquipmentLabel	FunctionLabel	Organisation Code
• *Area ID*	• *Train Identity* • *Vehicle Identity* • *Team Identity*	• *On-Board Equipment Identity* • *Trackside Equipment Identity*	• *Function*	• *OC*

Table 6-1: Assignment of the individual attributes to the labels

6.1.10 In Appendix D more information is given of the use of labels within a Functional Identity. (I)

6.1.10i The FRMCS System shall support the configuration of mapping between the FRMCS Functional Identities and the GSM-R functional numbers and enable the correct implementation of such mapping configuration. (M-V3)

6.1.11 The Functional Identity shall consist of Alphanumeric Characters. (M)

6.1.12 In Appendix F an overview is given how to construct Functional Identities and the different labels within that. (I)

6.2 Functional Identity types

6.2.1 Temporary Registrations

6.2.1.1 Train Functional Identity

6.2.1.1.1 A Train Functional Identity shall consist of the following labels: (M)

a) Identification Label;
b) Function Label;
c) Organisation Code.

6.2.1.1.2 Identification Label shall contain the following attribute: (M)

a) Train Identity.

6.2.1.1.3 Function Label shall contain one of the following attributes: (M)

a) Leading Driver;
b) Driver 2;
c) Driver 3;
d) Driver 4;
e) Driver 5 – reserved for Banking;
f) Intercom;
g) Public Address;
h) Chief Conductor;
i) Second Conductor;
j) Third Conductor;
k) Fourth Conductor;
l) Train crew 5 – 10;
m) Catering staff chief;
n) Catering 2 – 10;
o) Railway security services chief;
p) Railway security 2 – 10.

6.2.1.1.4 For Function Labels, the FRMCS System shall support the adding of additional functions (e.g. international harmonization and/or national use). (M)

6.2.1.1.5 Location Label is not used, because a Train Functional Identity is not location dependent. (I)

6.2.1.1.6 Intentionally deleted.

6.2.1.2 Controller Functional Identity

6.2.1.2.1 A Controller Functional Idendity shall consist of the following labels: (M)

a) Location Label;
b) Function Label;
c) Organisation Code.

6.2.1.2.2 Location Label shall contain one of the following attributes: (M)

a) Area ID.

6.2.1.2.3 Function Label shall contain one of the following attributes: (M)

a) Primary Controller;
b) Secondary Controller;
c) Power supply Controller;
d) Switchman;
e) Platform inspector;
f) Railway undertaking dispatcher;
g) Technical inspector;
h) Train preparation;
i) Emergency manager.

6.2.1.2.4 For Function Labels, the FRMCS System shall support the adding of additional functions (e.g. international harmonization and/or national use). (M)

6.2.1.2.5 Identification Label is not used, because a Controller Functional Identity depends on the location. (I)

6.2.1.3 Team Functional Identity

6.2.1.3.1 A team Functional Identity shall consist of the following labels: (M)

a) Location Label;
b) Identification Label;
c) Function Label;
d) Organisation Code.

6.2.1.3.2 Location Label shall contain one of the following attributes: (M)

a) Area ID.

6.2.1.3.3 Identification Label shall contain the following attributes: (M)

a) Team Identity.

6.2.1.3.3i Examples of Team Identities are: (I-V3)

b) Shunting team 1;
c) Shunting team 2;
d) Shunting team 3;
e) Maintanence team 1;
f) Maintanence team 2;
g) Maintanence team 3;
h) Railway security team 1;
i) Railway security team 2;
j) Railway security team 3;

k) etc.

6.2.1.3.4 Intentionally deleted.

6.2.1.3.5 Function Label shall contain one of the following attributes: (M)
a) Driver;
b) Team leader;
c) Team member 2-10.

6.2.1.3.6 Intentionally deleted.

6.2.1.3.7 The FRMCS System shall support the adding of additional Function Labels (e.g. international harmonization and/or national use). (M)

6.2.2 Permanent Registrations

6.2.2.1 Vehicle Functional Identity

6.2.2.1.1 A Vehicle Functional Identity shall consist of the following labels: (M)
a) Identification Label;
b) Equipment Label;
c) Function Label;
d) Organisation Code.

6.2.2.1.2 Identification Label shall use the following attribute: (M)
a) Vehicle Identifier.

6.2.2.1.3 Equipment Label shall use the following attribute: (M)
a) On-Board Equipment Identity.

6.2.2.1.4 The FRMCS System shall support the adding of additional Equipment Labels (e.g. international harmonization and/or national use). (M)

6.2.2.1.5 The FRMCS System shall allow a responsible party for the vehicle to define which attributes can be included in the Function Label. (M)

6.2.2.1.5i Function Label shall contain one of the following attributes:
a) Driver; (M-V3)
b) Vehicle Equipment Function 2-25. (M)

6.2.2.1.6 For Function Labels, the FRMCS System shall support the adding of additional functions (e.g. international harmonization and/or national use). (M)

6.2.2.1.7 Location Label (LL) is not used for a Vehicle Functional Identity. (I)

6.2.2.2 Trackside Equipment Functional Identity

6.2.2.2.1 A Trackside Equipment Functional Identity (e.g. device or sensor) shall consist of the following Labels: (M)
a) Location Label;
b) Equipment Label;
c) Function Label;
d) Organisation Code.

6.2.2.2.2 Location Label shall contain one of the following attributes: (M)
a) Area ID.

6.2.2.2.3 Equipment Label shall use the following attribute: (M)
a) Trackside Equipment Identity.

6.2.2.2.4 The FRMCS System shall support the adding of additional Equipment Labels (e.g. international harmonization and/or national use). (M)

6.2.2.2.5 Function Label shall contain one of the following attributes: (M)

a) Intentionally deleted;
b) Intentionally deleted;
c) Trackside Equipment Function 1-25;
d) Intentionally deleted.

6.2.2.2.6 For Function Labels, the FRMCS System shall support the adding of additional functions (e.g. international harmonization and/or national use). (M)

6.2.2.2.7 Intentionally deleted.

6.2.2.2.8 Intentionally deleted.

6.2.2.2.9 For an ATP application, the Equipment Label and the Function Label shall be used. (M-V3)

6.2.2.2.10 For an ATO application, the Equipment Label and the Function Label shall be used. (M-V3)

6.2.2.3 Intentionally deleted

6.2.2.3.0 Intentionally deleted.

6.2.2.3.1 Intentionally deleted.

6.2.2.3.2 Intentionally deleted.

6.2.2.3.3 Intentionally deleted.

6.2.2.3.4 Intentionally deleted.

6.2.2.3.5 Intentionally deleted.

6.2.2.3.6 Intentionally deleted.

6.2.2.3.7 Intentionally deleted.

6.2.2.3.8 Intentionally deleted.

6.2.2.3.9 Intentionally deleted.

6.2.2.4 Identity of a User for presentation

6.2.2.4.1 When a User or a group of Users has multiple Functional Identities, the Functional Identity presented to other participants of a certain communication shall be selected by the FRMCS Application. (M-V3)

6.2.2.4.2 The order for the Functional Identity of a User used for presentation shall be based on all of the following rules unless required otherwise by an FRMCS Application:

a) If available, a Functional Identity is preferred over User Identity; (M)
b) If available, temporary Functional Identities are preferred over permanent Functional Identities; (M)
c) If no Functional Identity is available, a User Identity is preferred over a Subscriber Identity. (M-V3)

6.3 Group Identity

6.3.1 Group Identity is used to address a group of Users located in a certain area, e.g. (I)

a) To call all Train Drivers of a specific company in a defined area or station, or;
b) To transmit messages to the Drivers of the Trains entering a particular sector, to inform the Drivers to reduce speed e.g. due to low energy capacity, or;
c) To call Public Adress of the Trains Identity a defined area to inform the passengers in case of an incident.

6.3.2 A Group Identity shall consist of the following labels: (M-V3)

a) Function Label.

6.3.3 The FRMCS system shall support the Group Identities as defined in Appendix K. (M-V3)

6.4 Short Dialling Codes

6.4.1 With the functional addressing scheme used in FRMCS, the User needs to enter the full functional address to initiate a communication. This seems inconvenient for the User. What is desired is that the implementation of a new communication will not require an update of the configuration of the end User device thanks to the use of a Short Dialling Code. (I-V3)

6.4.2 The FRMCS shall allow a User to enter manually a Short Dialling Code on the following types of User devices to initiate a communication. (M-V3)

6.4.3 A Short Dialling Code consists of a 4 digit number. (M-V3)

a) General Purpose FRMCS Handheld;
b) Operational Purpose FRMCS Handheld;
c) On-Board (Cab radio) / Driver FRMCS Terminal.

6.4.4 For Voice Communication FRMCS Applications the Short Dialling Codes defined in Appendix M shall be supported in FRMCS. (M-V3)

7 Introduction to Common Functions and FRMCS Applications & Communication Services

7.1.1 The Functional Requirement Specification contains the requirements for Common Functions and FRMCS Applications & Communication Services. This introduction paragraph gives a reading guide of how this is to be understood by the reader. (I)

7.1.2 First the Common Functions are specified. Examples of Common Functions are Role management and presence, location services or talker control. After that the FRMCS Applications & Communication Services are specified. The Common Functions are used by FRMCS Applications & Communication Services to perform a functional task for the User. It is also possible that Common Functions use other Common Functions to, in the end, perform the required functionality requested by FRMCS Applications & Communication Services. An FRMCS Application or an FRMCS Communication Service can use one or more Common Functions. The User in this context can be a human or a Machine. (I)

7.1.3 In the paragraphs of Common Functions, the functionality of the Common Function is specified (what the Common Function performs). The input and output attributes of Common Functions are not specified in this FRS. These attributes are used by FRMCS Applications & Communication Services to interact with Common Functions but also Common Functions can interact with each other. The exact sequence of interactions amongst Common Functions and between Common Function and FRMCS Application & Communication Services is also not specified. This is considered to be in the area of the *how*, and since the FRS only specifies the *what,* sequences are not specified in this document. Please note that the input and output of a Common Function is considered to be dynamic. Triggered by the FRMCS Application & Communication Services and/or a Common Function it can change. (I)

7.1.4 Another principle is that only FRMCS Applications & Communication Services can interact with Users. Therefore, only in the FRMCS Applications & Communication Services the reader finds HMI requirements but not in the paragraphs of Common Functions. The level of HMI requirements is concentrated to the functional level and/or to the requirements explicitly required to perform the FRMCS Application. The FRS does not specify the HMI itself in detail (which buttons are needed, what is the color and size, etc.). A specification for these aspects is expected to be available. HMI aspects are only specified in FRMCS Applications & Communication Services if there are specific requirements applicable related to the referred FRMCS Application & Communication Services. The generic needs, like having a call accept button, are not specific and it is assumed it is commonly understood that they should exist. (I)

7.1.5 Before reading the specification of FRMCS Applications & Communication Services with voice functionality, it is suggested to first read the paragraph with the Voice Communication function requirements (paragraph 10.1). These requirements are generally applicable to all voice FRMCS Applications & Communication Services. Only the exceptions to this Voice Communication function are expressed as part of the definition of the voice FRMCS Applications & Communication Services. (I)

7.1.6 The Common Functions and FRMCS Applications & Communication Services are specified for On-network use. Where applicable, Off-network use is described specifically per function and FRMCS Application. (I)

7.1.7 The Common Functions are assumed to be constantly active and available for other Common Functions and FRMCS Applications & Communication Services. (I)

7.1.8 The ordering of paragraphs is as follows: (I)

a) Paragraph 8: Common functions;
b) Paragraph 9: Introduction to FRMCS Applications & Communication Services;
c) Paragraph 10: Voice FRMCS Applications & Communication Services;
d) Paragraph 11: Data FRMCS Applications & Communication Services;
e) Paragraph 12: Video FRMCS Applications & Communication Services.

8 Common functions

8.1 Introduction

8.1.1 This paragraph covers the Common Functions. Each Common Function is ordered and specified in the following sections: (I)

a) Introduction: brief description of the Common Function and rationale via information statements;
b) Generic requirements: all requirements for the Common Function (excluding Interworking, Off-network and network maintenance, configuration and monitoring). If required for readability, subsection marking can be used;
c) Requirements for domain change, Interconnection and Interworking: all requirements relevant for domain change, Interconnection and Interworking if any;
d) Requirements for Off-network, if any.
e) Intentionally deleted.

8.2 Common functions

8.2.1 The following Common Functions are specified in this paragraph: (I)

URS reference	Name	Paragraph	Remarks
8.1	Assured Voice Communication	8.2.2	For V3
8.2	Talker control	8.2.3	
8.3	Role management and presence	8.2.4	
8.4	Location services	8.2.5	
8.5	Authorisation of communication	8.2.6	
8.7	Authorisation of FRMCS Applications & Communication Services	8.2.7	For V3
8.8	QoS and priority	8.2.8	
8.9	Deleted	n.a.	
8.10	Assured Data Communication	8.2.9	For Vx
8.11	Inviting-a-user	8.2.10	For V3
8.12	Arbitration	8.2.11	
8.13	Distribution of synchronised time	8.2.12	For V3
10.1	Billing information	8.2.13	For Vx
-	Recording	8.2.14	For V3

Table 8-1: Common Function overview

8.2.2 Assured Voice Communication - Common Function

8.2.2.1 Introduction

8.2.2.1.1 The Assured Voice Communication (AVC) - Common Function provides a clear indication to the Users (via corresponding FRMCS Application) as soon as an end-to-end Voice Communication link is interrupted or as long as the end-to-end communication link is active. (I-V3)

8.2.2.1.2 The Assured Voice Communication is useful especially in situations, where the Users are at risk when the communication is interrupted. Shunting communication during pushing movements is a good use case for the Common Function. (I-V3)

8.2.2.2 Generic requirements

8.2.2.2.1 The AVC - Common Function shall report to the FRMCS Application as soon as the Voice Communication is interrupted for at least one of the participating User(s). (M-V3)

8.2.2.2.2 The AVC - Common Function shall report to the FRMCS Application as soon as the Voice Communication quality is no more fulfilling the minimum quality required to assure an operational communication for at least one of the participating User(s). (M-V3)

8.2.2.2.3 The FRMCS System shall allow authorised communication to use the AVC - Common Function. (M-V3)

8.2.2.3 Requirements for domain change, Interconnection and Interworking

8.2.2.3.1 Intentionally deleted.

Domain change generic

8.2.2.3.2 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.2.3.3 When a User of an FRMCS Application with no active AVC is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application should be able to use the AVC - Common Function excluding the period of domain change by the FRMCS System. (O-Vx)

8.2.2.3.3i Intentionally deleted.

8.2.2.3.4 When a User of an FRMCS Application with an active AVC is moving from an FRMCS Domain to another FRMCS Domain, the AVC - Common Function should be continued in the other domain without drop. (O-Vx)

8.2.2.3.5 When the AVC is dropped during an FRMCS Domain change, the FRMCS Application shall be able to re-establish the communication towards the same recipient(s) with the specified quality of service. (M-Vx)

Domain change FRMCS to GSM-R

8.2.2.3.6 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

8.2.2.3.7 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

8.2.2.3.8 The AVC - Common Function of an FRMCS Domain should be able to interconnect to the AVC - Common Function of another FRMCS Domain. (O-Vx)

Interworking

From FRMCS to GSM-R

8.2.2.3.9 No requirements applicable. (I-V3)

From GSM-R to FRMCS

8.2.2.3.10 No requirements applicable. (I-V3)

8.2.2.4 Requirements for Off-network

8.2.2.4.1 The AVC - Common Function is required in Off-network mode. (M-Vx)

8.2.2.5 Intentionally deleted

8.2.2.5.1 Intentionally deleted.

8.2.2.6 Intentionally deleted.

8.2.2.6.1 Intentionally deleted.

8.2.2.6.2 Intentionally deleted.

8.2.3 Talker control - Common Function

8.2.3.1 Introduction

8.2.3.1.1 The FRMCS System performs mediation between Users competing to have the floor (also known as Floor Control). (I)

8.2.3.1.2 There are different needs for different types of Voice Communication to control the talkers. E.g. in case of REC-Voice Communication the most relevant parties of the communication (e.g. initiator of the communication and responsible Controller) are given priority in talking compared to other parties, while in some other type of communication talking permissions are more open. (I)

8.2.3.1.3 Talker control function provide means to configure various talker configurations for different communications. (I-Vx)

8.2.3.2 Generic requirements

8.2.3.2.1 The talker control - Common Function shall, during a Voice Communication at any point in time and based upon request, be able to determine if a User is allowed to talk. (M-V3)

8.2.3.2.1ai The talker control - Common Function shall determine during a Voice Communication which User(s) are allowed to talk at a certain time based on the Users' requests. (M-V3)

8.2.3.2.1i Intentionally deleted.

8.2.3.2.1ii Intentionally deleted.

8.2.3.2.1iii Intentionally deleted.

8.2.3.2.2 The decision of the talker control - Common Function shall be based on the following parameters set by the FRMCS Application:

a) The talker authorisation assigned to each User; (M-V3)
b) The talker priority assigned to each User; (M)
c) The maximum number of simultaneous talkers. (M-V3)
d) Expiration of a predefined talker duration timer. (M-V3)

8.2.3.2.2i A Voice Communication shall support at least 10 participants to talk at the same time. (M-V3)

8.2.3.2.2ii When more than one simultaneous talker is allowed, operational rules including talker discipline ensure proper communication. (I-Vx)

8.2.3.2.3 Intentionally deleted.

8.2.3.2.3i The initiator of a communication shall be granted the permission to talk at communication setup. (M-V3)

8.2.3.2.3ia A successful grant of permission to talk shall be notified to the FRMCS Application in such a way that it can be used to inform the User by means of audio and/or visual indication. (M-V3)

8.2.3.2.3ii The granting of the initiator to talk first shall end by one of the following events: (M-V3)

a) User releases the granted permission to talk;
b) After talker duration timer expiration;
c) User with higher priority request the permission to talk.

8.2.3.2.3iia No grant to talk shall be revoked if the maximum number of talkers is not reached. If the maximum number of talkers is reached, then the revocation of talker(s) shall be based on talker priority and total time assigned as talker. (M-V3)

8.2.3.2.3iii Intentionally deleted.

8.2.3.2.3iv The talker control - Common Function shall support the change of the parameters provided by the FRMCS Application during the communication. (M-Vx)

8.2.3.2.3v The talker control parameters are changed by the FRMCS Application e.g. on request of an Authorised User. (I-Vx)

8.2.3.2.4 An Authorised User shall be able to overrule the decision of the talker control - Common Function regarding the talker priority assignment and the maximum numbers of simultaneous talkers. (M-Vx)

8.2.3.2.5 The decision of the talker control - Common Function shall be based on the following User triggered events provided by the FRMCS Application:

a) The request of the permission to talk from a User; (M)
b) Intentionally deleted;
c) The release of the granted permission to talk by a User; (M-V3)

d) Intentionally deleted;
e) The request from an Authorized User to change the maximum number of simultaneous talkers; (M-Vx)
f) The Merging of Voice Communications; (M-Vx)
g) The request from an Authorized User to change the talker priority assignment. (M-V3)

8.2.3.2.6 Intentionally deleted.

8.2.3.2.7 Intentionally deleted.

8.2.3.2.8 Intentionally deleted.

8.2.3.2.8i The request from a User for the permission to talk shall include the Functional Identity of this User. (M-V3)

8.2.3.2.9 The talker control - Common Function shall inform the Voice FRMCS Application(s) of the concerned User(s) about the decision on the talker request. (M-V3)

8.2.3.2.10 The talker control - Common Function shall inform the FRMCS Application(s) of the concerned User(s) about the status of the concerned User(s). (M-Vx)

8.2.3.3 General behavior granting permission to talk

8.2.3.3.1 The talker control - Common Function grants the permission to talk by applying the rules depicted on the Figure 8-1 and Figure 8-2. (I-V3)

8.2.3.3.2 Intentionally deleted.

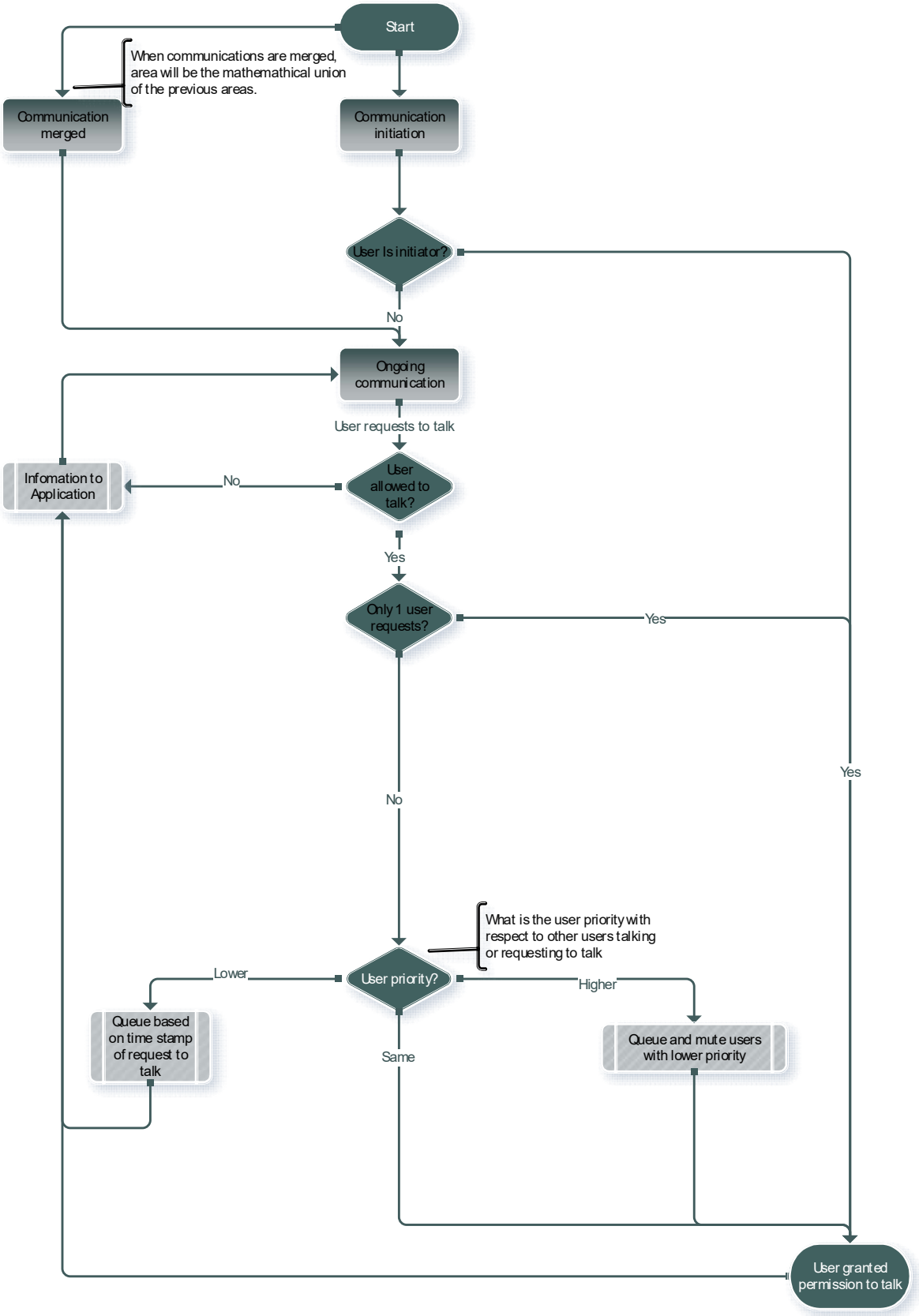


Figure 8-1: Talker control basic stream

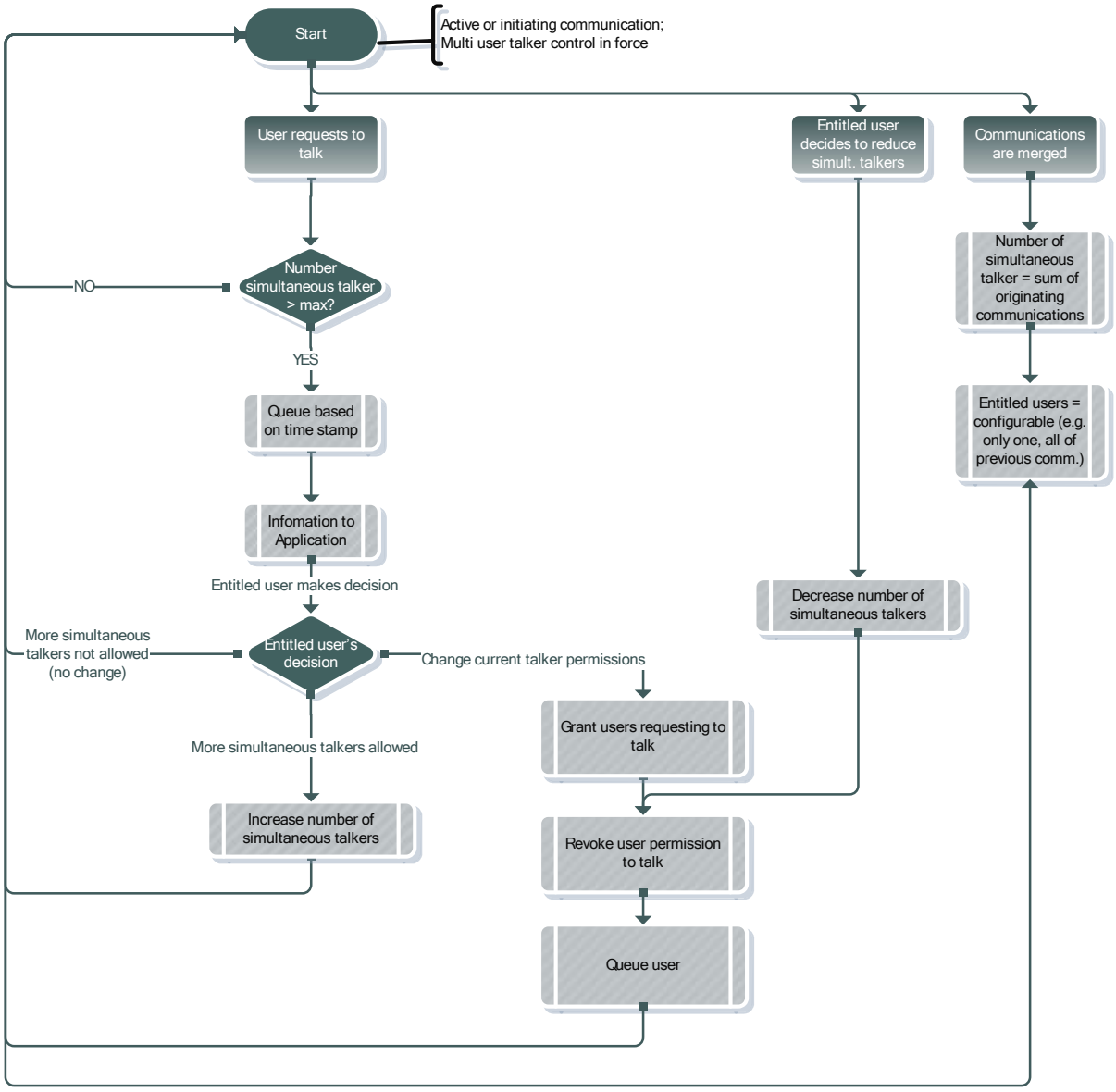


Figure 8-2: Talker control managerial stream

8.2.3.3.3 Upon request, only a User having talker authorisation shall be granted with the permission to talk. (M-V3)

8.2.3.3.4 Intentionally deleted.

8.2.3.3.5 The granting of the permission to talk to User(s) having a priority higher than that of other talkers shall lead to the revoke of the permission to talk for all Users having a lower priority, even in the case the maximum number of simultaneous talkers is not reached. (M-Vx)

8.2.3.3.5i The granting of the permission to talk to Controller(s) having a priority higher than that of other talkers shall lead to the revoke of the permission to talk for all Users having a lower priority. (M-V3)

8.2.3.3.6 All Users having the same priority shall be granted with the permission to talk, thus not exceeding the maximum number of User with the permission to talk simultaneously. (M-V3)

8.2.3.3.7 All the requests to talk from Users having a lower priority than the User(s) currently talking shall be queued based on their priority and on the request time stamp (first in, first granted). (M-Vx)

8.2.3.3.8 Intentionally deleted.

8.2.3.3.9 When during communication the maximum number of simultaneous talking Users is reached, additional request(s) to talk from User(s) shall be queued based on: (M-V3)

a) First the talker priority and;
b) Then the time stamp (first in, first granted).

8.2.3.3.9i The Users shall be informed through the FRMCS Application that the number of simultaneous talker requests exceeds the defined maximum number of simultaneous talkers. (M-V3)

8.2.3.3.10 Based on the input from an Authorised User having the right to change the setting of the talker control - Common Function, the Common Function shall support the following behaviors: (M-Vx)

a) Increase the allowed number of simultaneous talkers;
b) Decrease the allowed number of simultaneous talkers;
c) Set which User keeps / is granted or looses / is not granted (by queuing) the permission to talk.

8.2.3.3.10i When the maximum number of simultaneous talkers is reduced and the reduction results in having more active talkers than permitted, the active talker(s) shall loose their permission to talk as soon as they stop talking until the new maximum number of simultaneous talkers is met. (M-Vx)

8.2.3.3.11 Intentionally deleted.

8.2.3.3.12 When the permission to talk is revoked, the FRMCS Application shall be notified in such a way that the User(s) can subsequently be informed through audible and/or visual indication. (M-V3)

8.2.3.3.13 When the permission to talk is revoked , the User(s) loosing the permission to talk shall be muted after a configurable time. (M-Vx)

8.2.3.3.14 Intentionally deleted.

8.2.3.3.15 Intentionally deleted.

8.2.3.3.16 The talker control - Common Function shall inform the FRMCS Application of User(s) requesting to talk. (M-V3)

8.2.3.3.16i Intentionally deleted

8.2.3.3.17 The talker control - Common Function shall inform all FRMCS Applications of User(s) in the Voice Communication, which User(s) is/are talking. The indication shall contain the Functional Identity of the User(s). (M-V3)

8.2.3.3.18 When a User talker permission status is affected (e.g. lost permission to talk, muted, queued), this shall be reported to the User through the FRMCS Application. (M)

8.2.3.3.19 Intentionally deleted.

8.2.3.3.20 Upon Merging of communications: (M-Vx)

a) The number of simultaneous talkers of the new communication shall be set to the sum of the number of simultaneous talkers in all of the original communications;
b) All the Authorised Users of the original communications shall become authorised for the Merged communication.

8.2.3.3.21 Intentionally deleted.

8.2.3.4 Requirements for domain change, Interconnection and Interworking

8.2.3.4.1 Intentionally deleted.

8.2.3.4.2 Intentionally deleted.

Domain change generic

8.2.3.4.3 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.3.4.4 When a User of an FRMCS Application with an active communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use the talker control - Common Function excluding the period of domain change. (M)

Domain change FRMCS to GSM-R

8.2.3.4.5 No requirements applicable. (I)

Domain change GSM-R to FRMCS

8.2.3.4.6 No requirements applicable. (I)

Interconnection

Between FRMCS Domains

8.2.3.4.7 For communications spread over multiple FRMCS Domains, it shall be possible for the talker control - Common Function of the domain where the communication has been initiated, to manage using talker control over all domains. (M-Vx)

Interworking

From FRMCS to GSM-R

8.2.3.4.8 When the FRMCS System routes an FRMCS communication to GSM-R user(s), the FRMCS System shall select the type of established group communication in the GSM-R system based on the number of Users allowed to talk in the FRMCS System (e.g: in case no other Users than the initiator/Controller(s) may be allowed to talk in FRMCS, a broadcast call may be initiated). (M-V3)

From GSM-R to FRMCS

8.2.3.4.9 When the FRMCS System routes a GSM-R communication to User(s), the FRMCS System shall be configured according to the type of established group communication in the GSM-R system (e.g: in case of broadcast call in the GSM-R system, no User will be allowed to talk in the FRMCS System). (M-V3)

8.2.3.5 Requirements for Off-network

8.2.3.5.1 The talker control - Common Function shall support the operation in Off-network mode. (M-Vx)

8.2.3.5.2 In Off-network mode the talker control - Common Function shall use a predefined default set of talker control attributes, defined per FRMCS Application. (M-Vx)

8.2.3.5.3 The default set of talker control attributes shall be configurable by the IM/RU. (M-Vx)

8.2.3.6 Intentionally deleted

8.2.3.6.1 Intentionally deleted .

8.2.3.7 Intentionally deleted.

8.2.3.7.1 Intentionally deleted.

8.2.3.7.2 Intentionally deleted.

8.2.3.7.3 Intentionally deleted.

8.2.3.7.4 Intentionally deleted.

8.2.3.7.5 Intentionally deleted.

8.2.3.7.6 Intentionally deleted.

8.2.4 Role management and presence - Common Function

8.2.4.1 Introduction

8.2.4.1.1 The Role management and presence - Common Function is responsible for handling the railway Role management of the Users and devices and User- and Functional Identity registration / deregistration processes. (I)

8.2.4.1.2 The Role management and presence - Common Function is responsible for:

a) Enabling the dynamic allocation of railway operational Roles to the Users; (I)
b) Enabling the addressing of a User based on the Functional Identity; (I)
c) Enabling the addressing of a User based on the User Identity; (I)
d) Providing the presence status related to the User Identity; (I-Vx)
e) Providing the presence status related to the Functional Identity. (I-Vx)

8.2.4.1.3 It is assumed that a Subscriber Identity is allocated to the User's Device upon attachment to the FRMCS System. At this step, the User of the Device is not yet logged into the FRMCS System but the User's Device can already perform communication where only a Subscriber Identity is required. (I-V3)

8.2.4.1.4 Role management makes railway communications more efficient. Some communications even require identification of the Users by their User Identity. This Common Function also enables the routing based on the initiator Functional Identity. (I)

8.2.4.2 Initial Identities assignment

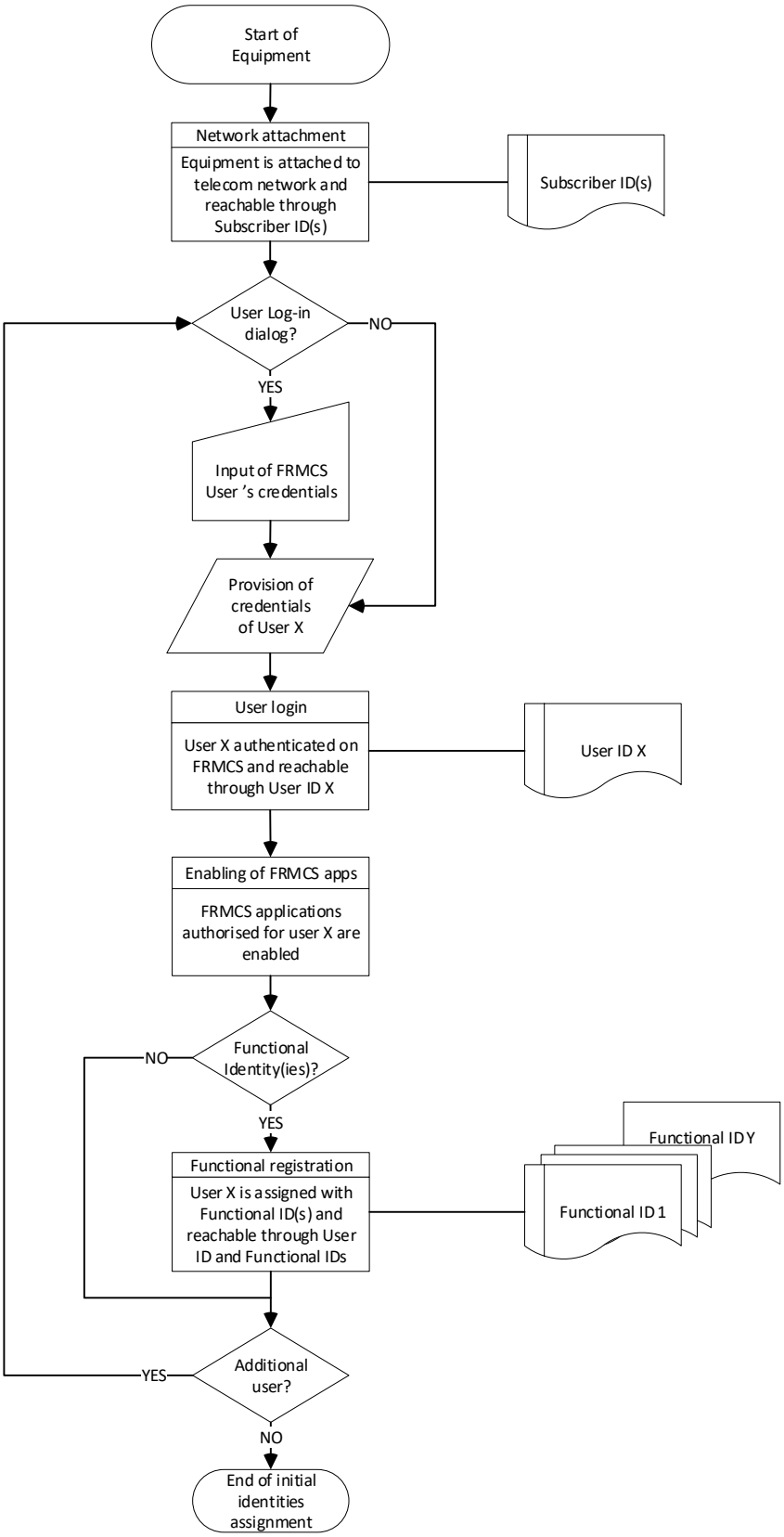


Figure 8-3: Initial FRMCS Identities assignment

8.2.4.2.0 The initial Identities assignment process is depicted in Figure 8-3. (I)

8.2.4.2.1 Several FRMCS Applications can be embedded in the same FRMCS User Device. For example, the cab radio provides the Train Driver with the ability to use REC, Shunting and other types of FRMCS Applications and the fixed terminals system provides the Controller with the ability to use REC, Multi-Train Voice Communications and other FRMCS Applications. (I)

8.2.4.2.2 The FRMCS User Device is responsible to set up the FRMCS communications related to the needs of the User, e.g. the Train Driver requests the initiation of a REC. In that case, the Train Driver is considered as a User for the Device. (I)

8.2.4.2.3 The FRMCS User Device is also setting up some FRMCS communications for its own needs, e.g. to perform software and configuration management. In that case, the FRMCS Application(s) of the FRMCS User Device is (are) considered as the User(s). (I)

8.2.4.2.4 During the start-up phase, the FRMCS User Device shall attach to the FRMCS System. (M-V3)

8.2.4.2.5 Upon a successful attachment to the FRMCS System, a Subscriber Identity is assigned. (O-V3)

8.2.4.2.6 The FRMCS System shall support the following User login methods: (M)

a) By an automatic login through stored/pre-shared credentials;
b) By an explicit input of credentials from a User through a dialog.

8.2.4.2.7 Upon a successful login the User shall be assigned a User Identity. (M)

8.2.4.2.7i Upon a successful login the User shall be able to use authorised FRMCS Applications. (M-V3)

8.2.4.2.8 The User shall have the ability to register Functional Identity(ies) as soon as he is logged in the FRMCS System. (M)

8.2.4.2.9 An FRMCS User Device can have the ability to manage several Users simultaneously. (I)

8.2.4.2.10 An FRMCS User Device can be used for Voice Communication by several Users, e.g. a cab radio used by a Train Driver, through the HMI located in the front cab of the Train and used simultaneously by a Conductor through the other HMI located in the rear cab of the Train. (I)

8.2.4.3 Generic requirements

8.2.4.3.1 The Role management and presence - Common Function shall assign a User Identity to a User according to the credentials. (M)

8.2.4.3.2 The assignment of a User Identity to a User is further called as “User login”. (I)

8.2.4.3.3 The FRMCS System shall be able to define the User’s Role Set. (M-V3)

8.2.4.3.3i For Controllers, the FRMCS System shall support the provisioning of the FRMCS System to change the User’s Role Set during operational usage. (M-V3)

8.2.4.3.3ii The FRMCS System shall support an administrator of the system the change the User's Role Set during operational usage. (M-Vx)

8.2.4.3.4 Intentionally deleted.

8.2.4.3.4i For the Role Set as a list and for one User, the following applies:

a) The list shall contain a fully defined Functional Identities a User can register to (e.g. Controller of area 12345 on Infrabel FRMCS); (M-V3)
b) The list shall contain a partly defined Functional Identities a User can register to, in a way that only some of the labels of the Functional Identities are defined, other being considered as Wild cards. (e.g. Leading Driver). (M-V3)

8.2.4.3.5 Intentionally deleted.

8.2.4.3.6 Intentionally deleted.

8.2.4.3.7 The Role management and presence - Common Function shall support the definition of a Role Set on a per User Identity basis. (M)

8.2.4.3.8 The User Authentication (assignment of a User Identity) is considered as a prerequisite to get a railway Role. The Subscriber Identity is considered as not sufficient to identify who is using this railway communication function. (I)

8.2.4.3.9 The FRMCS System shall be able to enhance the Role management by using one or a combination of the following criteria to define the User's Role Set: (M-Vx)

a) Current User's Location Information;
b) Equipment type;
c) Current time.

8.2.4.3.10 The Role management and presence - Common Function shall provide the User's Role Set information to the FRMCS Application upon request. (M-V3)

8.2.4.3.11 The Role management and presence - Common Function shall assign Functional Identity/ies to a User upon a request by an FRMCS Application. (M-V3)

8.2.4.3.12 The assignment of a Functional Identity to a User is further called as "functional registration". (I)

8.2.4.3.13 During a given period of time as duration and specifically for Controllers, the Role management and presence - Common Function shall allow parallell registration to a given Controller Functional Identity by more than one User. (M-V3)

8.2.4.3.13i During a given period of time as duration and for other type of Functional Identities than Controllers, the Role management and presence - Common Function shall allow parallell registration to a given Functional Identity by more than one User. (M-Vx)

8.2.4.3.14 For a Voice Communication addressed to a Functional Identity shared by several Controllers, the FRMCS System shall handle the communication according to the following ways based on a predefined configuration on this Functional Identity: (M-V3)

a) As soon as one of the Controllers has accepted the communication, the other Controllers shall no more be addressed,except if those Controllers are also addressed through another Identity (see Appendix E);
b) All Controllers shall remain addressed even if one Controller accepts the communication;
c) As soon as one of the Controllers accepts the communication, the communication shall no more be indicated to the other Controllers (that did not accept the communication) as an incoming communication but as an ongoing communication which they are able to join.

8.2.4.3.14i For a Voice Communication addressed to a Functional Identity shared by several Users, the FRMCS System shall handle the communication according to the following ways based on a predefined configuration on this Functional Identity: (M-Vx)

d) As soon as one of the Users has accepted the communication, the other Controllers shall no more be addressed,except if those Controllers are also addressed through another Identity (see Appendix E);
e) All Users shall remain addressed even if one User accepts the communication;
f) As soon as one of the Users accepts the communication, the communication shall no more be indicated to the other Users (that did not accept the communication) as an incoming communication but as an ongoing communication which they are able to join.

8.2.4.3.15 Intentionally deleted.

8.2.4.3.16 The Role management and presence - Common Function shall, upon request of the FRMCS Application, provide the Functional Identity/ies currently assigned to a User. (M)

8.2.4.3.16i The Role management and presence - Common Function shall, upon request of the FRMCS Application, provide the User Identity currently using a specific Functional Identity. (M-V3)

8.2.4.3.16ii The Role management and presence - Common Function shall, upon request of the FRMCS Application, provide the Users Identities currently using a specific Functional Identity. (M-Vx)

8.2.4.3.16iii For Controllers, the Role management and presence - Common Function shall, upon request of the FRMCS Application, provide the Users Identities currently using a specific Functional Identity. (M-V3)

8.2.4.3.17 The Role management and presence - Common Function shall support an FRMCS Application to provide the User with a predefined list of selectable Identities prior to initiate a communication. (M-Vx)

8.2.4.3.18 The FRMCS system shall support the configuration of the predefinition of the list of selectable Identities for each FRMCS Application. (M-Vx)

8.2.4.3.19 The aim of this list is to provide guidance and to speed up the initiation of communications but this does not prevent the User to be able to define other Identities for initiation. (I)

8.2.4.3.20 The relevance of an Functional Identity can depend e.g. on the current railway operational Role of the initiating User or on the location. (I)

8.2.4.3.21 The Role management and presence - Common Function shall support an FRMCS Application to determine all the Identities assigned to a participant of a communication. (M-Vx)

8.2.4.3.21i For Controllers, the Role management and presence - Common Function shall support an FRMCS Application to determine all the Identities assigned to a participant of a communication. (M-V)

8.2.4.3.22 The Role management and prescense - Common Function shall, especially for Controller Functional Identities, have a mechanism that supports automated assignement of Functional Identities as part of a login procedure when performed by the User. (M-V3)

8.2.4.3.23 The Role management and prescense - Common Function shall have a mechanism that supports automated assignement of Functional Identities as part of a login procedure when performed by the User. (M-Vx)

8.2.4.4 User login

8.2.4.4.1 The User Identity shall univocally identify the User. (M)

8.2.4.4.2 The Role management and presence - Common Function shall check the validity of the User's credentials. (M-V3)

8.2.4.4.3 The Role management and presence - Common Function should be able to check the validity of the User's credentials based on information available outside the FRMCS System (e.g. Active Directory). (O-Vx)

8.2.4.5 Functional registration

8.2.4.5.1 The Role management and presence - Common Function shall verify if a User is authorised to register a Functional Identity based on User's current Role Set. (M-V3)

8.2.4.5.2 For Controllers, the Role management and presence - Common Function shall verify what the number of Users allowed to register to a Functional Identity simultaneously (sharing of Functional Identities) is. (M-V3)

8.2.4.5.2i The Role management and presence - Common Function shall verify what the number of Users allowed to register to a Functional Identity simultaneously (sharing of Functional Identities) is. (M-Vx)

8.2.4.5.3 For Controllers, the FRMCS System shall be able to predefine for each Functional Identity the maximum number of Users allowed to share this Functional Identity by using values between 1 and 10. (M-V3)

8.2.4.5.3i The FRMCS System shall support to predefine for each Functional Identity the maximum number of Users allowed to share this Functional Identity by using values between 1 and at least 10. (M-Vx)

8.2.4.5.4 For the number of shared Functional Identities the value 1 means that a Functional Identitiy is not shared with another User. The value 2 means that a Functional Identity is shared among two Users. (I)

8.2.4.5.5 For Controllers, the Role management and presence - Common Function shall reject a functional registration request if the maximum allowed number of sharing Users is exceeded. (M-V3)

8.2.4.5.5i The Role management and presence - Common Function shall reject a functional registration request if the maximum allowed number of sharing Users is exceeded. (M-Vx)

8.2.4.5.6 The Role management and presence - Common Function shall be able to enable and disable a validity time for a functional registration. (M-V3)

8.2.4.5.7 Upon validity timer expiration, the assignment of the Functional Identity to the User Identity shall be revoked. (M-V3)

8.2.4.5.8 The validity timer shall be configurable in steps of one minute with a maximum value of at least one week. (M-V3)

8.2.4.5.9 The validity timer shall be independently configurable for each Function Label. (M-V3)

8.2.4.5.10 The FRMCS System shall be able to assign Functional Identity(ies) to a User that are configured in such a way that a User is unable to deregister them. (M-V3)

8.2.4.5.11 Intentionally deleted.

8.2.4.5.12 The FRMCS System shall be able to enable and disable the automatic registration of a User upon login. (O-V3)

8.2.4.5.13 The FRMCS System shall support the assignment of minimal 6 Functional Identities to a User. (M-V3)

8.2.4.5.14 Some specific Functional Identities require to be registered at all times by one or more User(s) (e.g. Controller Functional Identity) when the FRMCS User Device is switched on. (I)

8.2.4.5.15 For Controllers, the IM system administrator shall be able to predefine for each Functional Identity the minimum registered Users allowed to register to this Functional Identity by using values between 0 and 10. (M-V3)

8.2.4.5.15i The FRMCS System shall be able to predefine for each Functional Identity the minimum registered Users allowed to register to this Functional Identity by using values between 0 and 10. (M-Vx)

8.2.4.5.16 For the minimum number of registered Users the value 0 means that a functional identiy is allowed to be unregistered. The value 1 means that a Functional Identity is registered at least by one User when the FRMCS User Device is switched on. (I)

8.2.4.5.16i The FRMCS System shall support the deregistration of a User from a Functional Identity automatically upon User logout. (M-V3)

8.2.4.5.16ii The FRMCS System shall be able to enable and disable the automatic deregistration of a User upon User logout. (M-V3)

8.2.4.5.16iii The FRMCS System should support to automatically log out the User from the FRMCS System based on a configurable timer expiry. (O-Vx)

8.2.4.5.16iv When the User is logged out automatically, Functional Identity/ies registered by that User shall be deregistered automatically. (M)

8.2.4.5.17 The FRMCS System shall reject a deregistration request if the minimum number of registered Users is already reached for the concerned Functional Identity. (M-Vx)

8.2.4.5.17i For Controllers, the FRMCS System shall reject a deregistration request if the minimum number of registered Users is already reached for the concerned Functional Identity. (M-V3)

8.2.4.5.18 The FRMCS System shall handover the Functional Identity to another predefined User if the minimum number of registered Users is no more fulfilled (e.g. due to FRMCS User Device switch off). (M-Vx)

8.2.4.5.19 The FRMCS System shall be able to set a maximum number of Functional Identities registration per User. (M-V3)

8.2.4.5.20 The FRMCS System shall ensure that each IdentificationLabel is unique in an FRMCS Domain. (M-V3)

8.2.4.5.21 The FRMCS system should inform the Controller about Functional Identities of Users are located in its area of responsibility. (O-V3)

8.2.4.6 Functional transfer

8.2.4.6.1 The Role management and presence - Common Function shall support a User to perform the following actions: (M-Vx)

a) Re-assign a subset of its Functional Identities to another User;
b) Re-assign all of its Functional Identities to another User.

8.2.4.6.2 The Role management and presence - Common Function shall support an Authorised User to perform the following actions: (M-Vx)

a) Re-assign a subset of Functional Identities registered by one User to another User;
b) Re-assign all the Functional Identities registered by one User to another User.

8.2.4.6.3 The FRMCS System shall be able to configure if the transfer of a Functional Identity is conditioned to the acceptation from the target User. (M-Vx)

8.2.4.7 Presence

8.2.4.7.1 The Role management and presence - Common Function shall enable the provision of the current status of a User to Authorised Users (e.g. Controllers) currently logged in the FRMCS System. (M-Vx)

8.2.4.7.2 The Role management and presence - Common Function shall allocate one of the following status to a User Identity not registered in a Functional Identity: (M-Vx)

a) Offline;
b) Available;
c) Busy (in communication);
d) Do not disturb.

8.2.4.7.3 The Role management and presence - Common Function shall allocate one of the following status to a User Identity registered in (at least) one Functional Identity: (M-Vx)

a) Offline;
b) Ready for operation (registered in a railway function).

8.2.4.7.4 The Role management and presence - Common Function shall enable the provision of the current status of a Functional Identity to Users currently logged in the FRMCS System. (M-Vx)

8.2.4.7.5 The Role management and presence - Common Function shall allocate one of the following status to a Functional Identity: (M-Vx)

a) Not registered;
b) Ready for operation (at least one User registered in this function);
c) Transfer pending.

8.2.4.7.6 The status of an User- of Functional Identity shall be automatically set by the FRMCS System except for the value “do not disturb” which shall be set by the User itself. (M-Vx)

8.2.4.8 Requirements for domain change, Interconnection and Interworking

8.2.4.8.1 Intentionally deleted.

Domain change generic

8.2.4.8.2 Intentionally deleted.

8.2.4.8.3 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.4.8.4 When a User of an FRMCS Application with an active communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use the Role management and presence function excluding the period of domain change. (M-V3)

8.2.4.8.5 When an FRMCS Domain is selected, registration of Identities in the new domain shall be performed without any interaction of the User. (M)

Domain change FRMCS to GSM-R

8.2.4.8.6 When the GSM-R system is selected, registration of Identities in the GSM-R system shall be performed without any interaction of the User. (M)

8.2.4.8.7 When the GSM-R system is selected and after successful registration of the Train functional number in the GSM-R system, deregistration of Identities in the FRMCS System shall be performed without any interaction of the User. (M-V3)

8.2.4.8.8 It is acceptable that the Train Identity and the functional number are the same during the domain change procedure. (I)

Domain change GSM-R to FRMCS

8.2.4.8.9 When an FRMCS Domain is selected, registration of Identities in the FRMCS System shall be performed without any interaction of the User. (M)

8.2.4.8.10 For a User not being a Controller, upon registering the Functional Identity/ies in the FRMCS System, the FRMCS System shall ensure that this Functional Identity/ies is not already used in FRMCS. (M-V3)

8.2.4.8.10i For Controllers, upon registering the Functional Identity/ies in the FRMCS System, the FRMCS System shall allow that multiple Functional Identity/ies can be registered to one Controller in FRMCS. (M-V3)

8.2.4.8.11 For a User not being a Controller, if the Functional Identity/ies is/are already registered in the FRMCS System, the FRMCS System shall reject the new registration(s). (M-V3)

8.2.4.8.12 When an FRMCS Domain is selectedand after successful registration of the Train Identity in the FRMCS System, deregistration of Identities in the GSM-R system shall be performed without any interaction of the User. (M-V3)

8.2.4.8.13 It is acceptable that the Train Identity and the functional number are the same during the domain change procedure. (I)

Interconnection

Between FRMCS Domains

8.2.4.8.14 No requirements applicable. (I)

Interworking

8.2.4.8.15 Intentionally deleted

8.2.4.8.16 Intentionally deleted.

8.2.4.8.17 The FRMCS System should allow an External System to retrieve Location Information from the FRMCS System when relevant for the Role management and presence - Common Function. (O-V3)

8.2.4.8.18 Allowing an External System to retrieve Location Information from the FRMCS System can be used to present the Train Identity for local use (e.g. Train numbers including signal number in the UK). (I)

From FRMCS to GSM-R

8.2.4.8.19 Intentionally deleted.

From GSM-R to FRMCS

8.2.4.8.20 Intentionally deleted.

8.2.4.9 Requirements for Off-network

8.2.4.9.1 No specific requirements. (I-Vx)

8.2.4.10 Intentionally deleted

8.2.4.10.1 Intentionally deleted.

8.2.4.11 Intentionally deleted.

8.2.4.11.1 Intentionally deleted.

8.2.4.11.2 Intentionally deleted.

8.2.5 Location services - Common Function

8.2.5.1 Introduction

8.2.5.1.1 The identification of the location of Users require a mechanism to retrieve, store and provide the Location Information including Train Route Settings of each User. (I)

8.2.5.1.2 Location Information is an essential data for various FRMCS Applications, both for within the FRMCS System as well as outside the FRMCS System. (I)

8.2.5.1.3 Location service - Common Function allows the correct identification of affected or involved Users or devices where the establishment or routing of communication is dependent on Location Information, for example for Railway Emergency Communications. (I)

8.2.5.2 Generic requirements

8.2.5.2.1 On request for a specific User Identity, the location service - Common Function shall support the provision of the Location Information of this User's device. (M-V3)

8.2.5.2.2 The Location Information shall be accessible by:

a) An FRMCS Application; (M)
b) An External System. (M-Vx)

8.2.5.2.3 The location service - Common Function shall support the following elements: (M)

a) User's geographical horizontal position;
b) Intentionally deleted;
c) User's velocity (speed and direction in the horizontal space);
d) Intentionally deleted.

8.2.5.2.4 The location service - Common Function should support the following elements:

a) User's Train Route Setting (max. speed of the User, consecutive Train route sections and their attributes); (O-Vx)
b) Railway infrastructure element(s) linked to the User's position (e.g. track section ID, station ID, signal box ID, track kilometer marking); (O-V3)
c) Other infrastructure element(s) linked to the User's position; (O-Vx)
d) User's geographical vertical position. (O-Vx)

8.2.5.2.5 The FRMCS System is able to support the elements above, but at some time not all the information might be available. (I)

8.2.5.2.6 Each Location Information element shall be accompanied by both: (M)

a) The level of accuracy of the Location Information element;
b) The time stamp of the Location Information element.

8.2.5.2.6i The location services - Common Function shall support the use of information provided by the following sources: (M)

a) GNSS;
b) Radio cell Identity.

8.2.5.2.6ii The location services - Common Function should support the use of information provided by other sources (e.g. interlocking system, ATP, sensor, RFID). (O-Vx)

8.2.5.2.7 The location services - Common Function shall support the use of information provided by information source(s) to perform one or a combination of the following actions: (M)

a) Enhance the accuracy;
b) Add other type of Location Information.

8.2.5.2.8 Intentionally deleted.

8.2.5.2.9 The location services - Common Function shall provide, upon request by an FRMCS Application, the identity/ies of the User(s) matching the following criteria:

a) User’s current Geographical Position included in a given polygon; (M)
b) User’s future expected Geographical Position in a given polygon and given period of time; (M-Vx)
c) User’s velocity included in a given range. (M-Vx)

8.2.5.2.9i The location services - Common Function should provide, upon request by an External System, the identity/ies of the User(s) matching the following criteria: (O-Vx)

a) User’s current Geographical Position included in a given polygon;
b) User’s future expected Geographical Position in a given polygon and given period of time;
c) User’s velocity included in a given range.

8.2.5.2.10 The location services - Common Function should provide, upon request by an FRMCS Application, the identity/ies of the User(s) matching the following criteria:

a) User’s current Geographical Position linked to a railway infrastructure element(s) (such as a balise or a level crossing); (O-V3)
b) User’s future Geographical Position linked to a railway infrastructure element(s) (such as a balise or a level crossing) in a given period of time; (O-V3)
c) User’s Geographical Position linked to other infrastructure element(s). (O-Vx)

8.2.5.2.10i The location services - Common Function should provide, upon request by an External System, the identity/ies of the User(s) matching the following criteria: (O-Vx)

a) User’s current Geographical Position linked to a railway infrastructure element(s) (such as a balise or a level crossing);
b) User’s future Geographical Position linked to a railway infrastructure element(s) (such as a balise or a level crossing) in a given period of time;
c) User’s Geographical Position linked to other infrastructure element(s).

8.2.5.2.11 The FRMCS System shall be able to configure the periodicity to be applied by the User to report its Location Information depending on a combination of the following criteria: (M-Vx)

a) The concerned railway track section;

b) The operational Role of the User;
c) Intentionally deleted.

8.2.5.2.11i The FRMCS System shall be able to configure for an FRMCS Domain one of the following criteria to set the location periodicity to be applied by the User to report its Location Information. (M)
a) Time interval between location reports;
b) Distance travelled between location reports.

8.2.5.2.12 The FRMCS System shall be able to select one of the following criteria to set the location reporting periodicity independently for each railway track section: (M-Vx)
a) Time interval between location reports;
b) Distance travelled between location reports.

8.2.5.2.13 The required location reporting periodicity is not the same for a trackside worker as for a Train Driver and could also depend on the type of track line (e.g. conventional vs high speed). (I)

8.2.5.2.14 In case of a Driver, the User's Geographical Position shall be the position of the Train, unless otherwise specified per FRMCS Application. (M)

8.2.5.2.14i In case of a Driver, the User's Geographical Position shall be the position of the Driver in the Train, unless otherwise specified per FRMCS Application. (M-Vx)

8.2.5.2.15 Examples of the position of a Driver: (I)
a) For the leading Driver, the position is that of the front of the Train;
b) For the Driver 2, the position is that of the 2nd engine of the Train, whether this engine is in the back of the Train or behind the first engine.

8.2.5.3 Requirements for domain change, Interconnection and Interworking

8.2.5.3.1 Intentionally deleted.

Domain change generic

8.2.5.3.2 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.5.3.3 When a User of an FRMCS Application with an active communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use the location services - Common Function excluding the period of domain change. (M)

Domain change FRMCS to GSM-R

8.2.5.3.4 No requirements applicable. (I)

Domain change GSM-R to FRMCS

8.2.5.3.5 No requirements applicable. (I)

Interconnection

Between FRMCS Domains

8.2.5.3.6 For communications spread over multiple FRMCS Domains (e.g. REC-Alert), each FRMCS Domain shall use its own location services - Common Function to address the communication to the intended User(s). (M)

Interworking

From FRMCS to GSM-R

8.2.5.3.7 No requirements applicable. (I)

From GSM-R to FRMCS

8.2.5.3.8 No requirements applicable. (I)

8.2.5.4 Requirements for Off-network

8.2.5.4.1 The location services - Common Function shall support the operation in Off-network mode (M-Vx)

8.2.5.5 Intentionally deleted

8.2.5.5.1 Intentionally deleted.

8.2.5.6 Intentionally deleted.

8.2.5.6.1 Intentionally deleted.

8.2.5.6.2 Intentionally deleted.

8.2.5.6.3 Intentionally deleted.

8.2.5.6.4 Intentionally deleted.

8.2.6 Authorisation of communication - Common Function

8.2.6.1 Introduction

8.2.6.1.1 The FRMCS System is configurable, so that access to voice, data and Video Communications can be controlled through the use of Identities. (I)

8.2.6.1.2 Authorisation of communication - Common Function allows the FRMCS Operators to control and regulate communications in order to avoid disruption/distraction to the Users (for example Drivers), preventing unauthorised communication and to minimise network load. (I)

8.2.6.2 Generic requirements

Authorisation of communication (access matrix)

8.2.6.2.0i The FRMCS System shall allow a User to communicate with other User(s). (M)

8.2.6.2.0ii The FRMCS System shall allow a Non-FRMCS User to communicate with User(s). (M-Vx)

8.2.6.2.0iia The FRMCS System shall allow a Non-FRMCS User to communicate with a Controller within FRMCS. (M-V3)

8.2.6.2.0iii The FRMCS System shall allow a User to communicate with Non-FRMCS User(s). (M-Vx)

8.2.6.2.0iiia The FRMCS System shall allow a Controller within to communicate with Non-FRMCS User(s). (M-V3)

8.2.6.2.0iv The authorisation to initiate a communication to a specific User shall be based on a configurable set of rules using one or a combination of the following criteria:

a) Type of the Functional Identity of the initiator; (M)
b) Type of the Functional Identity of the Addressed User; (M)
c) Labels included in the Functional Identity of the initiator; (M-V3)
d) Labels included in the Functional Identity of the Addressed User; (M-V3)
e) Functional Identity related to the FRMCS User Device; (M-Vx)
f) User Identity of the initiator; (M)
g) User Identity of the Addressed User. (M)

8.2.6.2.0v The authorisation to invite a specific User to a communication shall be based on a configurable set of rules using on one or a combination of the following criteria:

a) Type of the Functional Identity of the initiator; (M-V3)
b) Type of the Functional Identity of the Addressed User; (M-V3)
c) Labels included in the Functional Identity of the initiator; (M-V3)
d) Labels included in the Functional Identity of the Addressed User; (M-V3)
e) Functional Identity related to the FRMCS User Device; (M-Vx)
f) User Identity of the initiator; (M-V3)
g) User Identity of the Addressed User. (M-V3)

8.2.6.2.0vi The authorisation to initiate a communication involving a non-FRMCS User(s) shall be based on a configurable set of rules using one or a combination of the following criteria:

a) Functional Identity of the initiator; (M-Vx)
b) Functional Identity of the Addressed User; (M-Vx)
c) Functional Identity related to the FRMCS User Device; (M-Vx)
d) User Identity of the initiator; (M-Vx)
e) User Identity of the Addressed User. (M-Vx)

8.2.6.2.0vii When the verification is positive, the authorisation of communication - Common Function shall grant the requested communication. (M)

8.2.6.2.0viii When the verification is negative, the authorisation of communication - Common Function shall deny the requested communication and inform the requesting FRMCS Application about the reason of denial. (M-V3)

<u>Authorisation of communication functions per User and per FRMCS Application</u>

8.2.6.2.1 The authorisation of communication - Common Function shall enable only authorised Users to initiate Voice Communications. (M)

8.2.6.2.1i The authorisation of communication - Common Function shall enable only authorised Users to initiate Data Communications. (M)

8.2.6.2.1ii The authorisation of communication - Common Function shall enable only authorised Users to initiate Video Communications. (M-Vx)

8.2.6.2.2 The authorisation of communication - Common Function shall enable only authorised Users to Merge communications. (M-Vx)

8.2.6.2.3 The authorisation of communication - Common Function shall enable only authorised Users to terminate Voice Communications. (M)

8.2.6.2.3i The authorisation of communication - Common Function shall enable only authorised Users to terminate Data Communications (M)

8.2.6.2.3ii The authorisation of communication - Common Function shall enable only authorised Users to terminate Video Communications. (M-Vx)

8.2.6.2.4 The authorisation of communication - Common Function shall enable only authorised Users to leave Voice Communications. (M-V3)

8.2.6.2.4i The authorisation of communication - Common Function shall enable only authorised Users to leave Data Communications. (M-Vx)

8.2.6.2.4ii The authorisation of communication - Common Function shall enable only authorised Users to leave Video Communications. (M-Vx)

8.2.6.2.5 The authorisation of communication - Common Function shall enable only authorised Users to reject Voice Communications. (M-V3)

8.2.6.2.5i The authorisation of communication - Common Function shall enable only authorised Users to reject Data Communications. (M-Vx)

8.2.6.2.5ii The authorisation of communication - Common Function shall enable only authorised Users to reject Video Communications. (M-Vx)

8.2.6.2.6 The authorisation of communication - Common Function shall enable an authorised User to invite authorised Users to join Voice Communications. (M-V3)

8.2.6.2.6i Intentionally deleted.

8.2.6.2.6ii The authorisation of communication - Common Function shall enable only authorised Users to invite authorised Users to join Data Communications. (M-Vx)

8.2.6.2.6iii Intentionally deleted.

8.2.6.2.6iv The authorisation of communication - Common Function shall enable only authorised Users to invite authorised Users to join Video Communications. (M-Vx)

8.2.6.2.6v Intentionally deleted.

8.2.6.2.7 The authorisation of communication - Common Function shall enable only authorised Users to kick out Users from Voice Communications. (M-Vx)

8.2.6.2.7i The authorisation of communication - Common Function shall enable only authorised Users to kick out Users from Data Communications. (M-Vx)

8.2.6.2.7ii The authorisation of communication - Common Function shall enable only authorised Users to kick out Users from Video Communications. (M-Vx)

8.2.6.2.8 The authorisation of communication - Common Function shall enable only authorised Users to put Users on hold in Voice Communications. (M-Vx)

8.2.6.2.8i The authorisation of communication - Common Function shall enable only authorised Users to block Users and not buffer Data Communications. (M-Vx)

8.2.6.2.8ii The authorisation of communication - Common Function shall enable only authorised Users to block Video Communications. (M-Vx)

8.2.6.2.9 Intentionally deleted.

8.2.6.2.10 Intentionally deleted.

8.2.6.2.11 Intentionally deleted.

8.2.6.2.12 Intentionally deleted.

8.2.6.2.13 Intentionally deleted.

8.2.6.2.14 Intentionally deleted.

8.2.6.2.15 Intentionally deleted.

8.2.6.2.16 An example of a full Functional Identity is a specific Driver on a specific Train. An example of a label of a Functional Identity is all Drivers. (I)

8.2.6.2.17 Intentionally deleted.

8.2.6.2.18 The decision to grant or deny Merging of communications shall be configurable and based on types of communications. (M-Vx)

8.2.6.2.19 E.g. Merging of Controller to Driver communication with a multi-Train communication can be allowed but Merging of Controller to Driver communication with Railway Emergency Communication can be denied. (I)

8.2.6.2.20 E.g. communication from any Driver to public services can be restricted in general (black list), but access to certain specific public services can be allowed separately (white list). (I)

8.2.6.2.21 Intentionally deleted.

8.2.6.2.22 Intentionally deleted.

8.2.6.2.23 After Merging, each User shall keep the rules configured by the authorisation of communication - Common Function for the part of the Merged communication corresponding to the User's initial communication. (M-Vx)

8.2.6.2.24 Example: when a REC-voice and a normal voice are Merged, the User(s) using the normal Voice Communication is/are not allowed to terminate the REC-voice but only the User's communication leg. The REC-voice will remain for the other Users. (I-Vx)

8.2.6.3 Requirements for domain change, Interconnection and Interworking

8.2.6.3.1 Intentionally deleted.

Domain change generic

8.2.6.3.2 Intentionally deleted.

8.2.6.3.3 When an FRMCS Domain is selected, the impact of change of settings by the authorisation of communication - Common Function shall be performed without any interaction of the User. (M)

Domain change FRMCS to FRMCS

8.2.6.3.4 When a User of an FRMCS Application with an active communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use authorisation of communication - Common Function excluding the period of domain change. (M)

Domain change FRMCS to GSM-R

8.2.6.3.5 No requirements applicable. (I)

Domain change GSM-R to FRMCS

8.2.6.3.6 No requirements applicable. (I)

Interconnection

Between FRMCS Domains

8.2.6.3.7 No requirements applicable. (I)

Interworking

From FRMCS to GSM-R

8.2.6.3.8 No requirements applicable. (I)

From GSM-R to FRMCS

8.2.6.3.9 No requirements applicable. (I)

8.2.6.4 Requirements for Off-network

8.2.6.4.1 The authorisation of communication shall be available in both On-network and Off-network conditions for Users. (M-Vx)

8.2.6.4.2 In Off-network conditions a default profile defined by the FRMCS Operator is used. (I-Vx)

8.2.6.5 Intentionally deleted

8.2.6.5.1 Intentionally deleted

8.2.6.6 Intentionally deleted.

8.2.6.6.1 Intentionally deleted.

8.2.6.6.2 Intentionally deleted.

8.2.7 Authorisation FRMCS Applications & Communication Services - Common Function

8.2.7.1 Introduction

8.2.7.1.1 The FRMCS System is configurable to authorize a User to access FRMCS Applications & Communication Services in order to prevent unauthorised usage and minimise network load. The FRMCS Operator controls the configuration. (I-V3)

8.2.7.1.2 In a cross-border situation configurations of the networks are controlled in cooperation by FRMCS Operators of concerned networks. (I-V3)

8.2.7.1.3 When on the FRMCS User device an FRMCS Application or FRMCS Communication Services is requested to be started, the FRMCS performs a verification against the set of authorised FRMCS Applications & Communication Services. If the verification is positive, the FRMCS Application or FRMCS Communication Services starts. (I-V3)

8.2.7.2 Generic requirements

8.2.7.2.1 FRMCS Applications & Communication Services that are authorised shall be made available for the User. (M-V3)

8.2.7.2.2 The authorisation FRMCS Applications & Communication Services - Common Function shall inform the corresponding FRMCS Application or FRMCS Communication Services if it is no longer authorised for a User. (M-V3)

8.2.7.2.3 Intentionally deleted

8.2.7.2.4 The authorisation FRMCS Applications & Communication Services - Common Function shall contain a configurable set of rules used to determine which FRMCS Applications or FRMCS Communication Services are authorised based on one or a combination of the following criteria:

a) Functional Identity related to the User; (M-V3)
b) Functional Identity related to the FRMCS User Device; (M-V3)
c) User Identity; (M-V3)
d) Subscriber Identity; (O-V3)
e) User location; (M-V3)
f) Allowances to use the FRMCS Application by the manager of the FRMCS Application (such as IM or RU). (M-V3)

8.2.7.2.5 The authorisation FRMCS Applications & Communication Services - Common Function shall update the set of authorised FRMCS Applications & Communication Services upon the occurrence of one of the following events: (M-V3)

a) The FRMCS User Device is powered on/off;
b) The User logs in/out;
c) A Functional Identity is registered/deregistered;
d) The location of the User is moved into or out of a predefined area (where the FRMCS Application is authorised);
e) The User attaches to a (new) FRMCS System which can support the FRMCS Application;
f) After a defined time frame.

8.2.7.2.6 If an FRMCS Application or FRMCS Communication Services requires interaction with another FRMCS Application or FRMCS Communication Services, both FRMCS Applications or FRMCS Communication Services are configured as authorised for the concerned User. (I-V3)

8.2.7.2.7 The FRMCS System shall provide User(s) with an updated list of authorised FRMCS Applications & Communication Services. (M-V3)

8.2.7.2.8 The FRMCS System should provide User(s) with an updated list of denied FRMCS Applications & Communication Services with the reason of denial. (O-V3)

8.2.7.3 Requirements for domain change, Interconnection and Interworking

8.2.7.3.1 Intentionally deleted.

Domain change generic

8.2.7.3.2 Intentionally deleted.

8.2.7.3.3 When an FRMCS Domain is selected, the necessary (re)setting of authorisation of FRMCS Application & Communication Services shall be performed without any interaction of the User. (M-V3)

Domain change FRMCS to FRMCS

8.2.7.3.4 No requirements applicable. (I-V3)

Domain change FRMCS to GSM-R

8.2.7.3.5 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

8.2.7.3.6 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

8.2.7.3.7 For domain change FRMCS to FRMCS, configurations of the authorisation of FRMCS Application & Communication Services - Common Function is defined in cooperation by FRMCS Operators of concerned domains. (I-V3)

Interworking

From FRMCS to GSM-R

8.2.7.3.8 No requirements applicable. (I-V3)

From GSM-R to FRMCS

8.2.7.3.9 No requirements applicable. (I-V3)

8.2.7.4 Requirements for Off-network

8.2.7.4.1 The authorisation of FRMCS Application & Communication Services - Common Function shall be available in both On-network and Off-network conditions for Users. (M-Vx)

8.2.7.4.2 In Off-network conditions a default profile defined by the FRMCS Operator is used. (I-Vx)

8.2.7.5 Intentionally deleted

8.2.7.5.1 Intentionally deleted

8.2.7.6 Intentionally deleted.

8.2.7.6.1 Intentionally deleted.

8.2.7.6.2 Intentionally deleted.

8.2.8 QoS and priority - Common Function

8.2.8.1 Introduction

8.2.8.1.1 In order to fulfil the required level of communication quality, the FRMCS System has the ability to manage the Quality of Service (QoS) characteristics of a given FRMCS Application and its corresponding communications. (I)

8.2.8.1.2 The FRMCS System supports that communications of higher priority can get precedence over communications with lower priority and have the ability to pre-empt other communications. (I)

8.2.8.1.3 The QoS and priority - Common Function shall include and support the following parameters and values: (M)

a) Latency: LOW, NORMAL or BEST EFFORT;
b) Reliability: HIGH, MEDIUM or NORMAL;
c) Throughput: LOW or MEDIUM;
d) Session setup time: NORMAL or IMMEDIATE;
e) Priority: ordered by category.

8.2.8.1.4 The QoS and priority - Common Function shall include and support the following parameters and values: (M-Vx)

a) Latency: ULTRA-LOW, LOW, NORMAL or BEST EFFORT;
b) Reliability: ULTRA-HIGH, HIGH, MEDIUM or NORMAL;
c) Throughput: LOW, MEDIUM or HIGH;
d) Session setup time: NORMAL or IMMEDIATE;
e) Priority: ordered by category.

8.2.8.1.5 The mapping of the qualitative indicators for QoS can be found in the FRMCS SRS. (I)

8.2.8.2 Generic requirements

8.2.8.2.1 The QoS and priority - Common Function shall identify the required QoS characteristics and priority of the corresponding communication. (M)

8.2.8.2.2 The FRMCS System shall manage the QoS characteristics for each communication established by a specific FRMCS Application. (M)

8.2.8.2.3 The FRMCS System shall enable the use of priorities for each communication. (M)

8.2.8.2.3i The FRMCS System shall support the categorisation of FRMCS Applications according to Appendix J. (M)

8.2.8.2.4 The FRMCS System monitors the performance of the QoS and priority parameters of the communication. (I-V3)

8.2.8.2.5 The QoS and priority - Common Function shall indicate QoS degradations to the FRMCS Application requiring it. (M-Vx)

8.2.8.2.6 When the required QoS is not achieved, the FRMCS System supports the FRMCS Application to rerequest the communication (with degraded QoS). (I-V3)

8.2.8.2.6i When the required QoS is not achieved, the FRMCS System support the FRMCS Application to release the communication. (I-V3)

8.2.8.2.7 Intentionally deleted.

8.2.8.2.8 Intentionally deleted.

8.2.8.2.9 The FRMCS System shall support the FRMCS Operator to get statistics about the communication pre-emption, QoS degradation and occurrences of denials. (M-Vx)

8.2.8.2.10 A User shall not experience any interruption or divergent behavior in the usage of an FRMCS Application due to a transition between networks (seamless User experience). (M-Vx)

8.2.8.3 Requirements for domain change, Interconnection and Interworking

8.2.8.3.1 Intentionally deleted.

8.2.8.3.2 Intentionally deleted.

Domain change generic

8.2.8.3.3 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.8.3.4 When a User of an FRMCS Application with an active communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use the QoS and priority - Common Function excluding the period of domain change. (M)

Domain change FRMCS to GSM-R

8.2.8.3.5 No requirements applicable. (I)

Domain change GSM-R to FRMCS

8.2.8.3.6 No requirements applicable. (I)

Interconnection

Between FRMCS Domains

8.2.8.3.7 No requirements applicable. (I)

Interworking

From FRMCS to GSM-R

8.2.8.3.8 For user-to-user/multi-user communication, in the direction from the FRMCS System to the GSM-R system, the priority levels shall be mapped and then transferred. (M-V3)

8.2.8.3.9 The priority level from the FRMCS System shall be mapped to the GSM-R system priority level by the FRMCS System. (M)

From GSM-R to FRMCS

8.2.8.3.10 For user-to-user/multi-user communication, in the direction from the GSM-R system to the FRMCS System, the GSM-R priority level shall be mapped and then transferred. (M)

8.2.8.3.11 The priority level from the GSM-R system shall be mapped to the FRMCS system priority level by the FRMCS system. (M)

8.2.8.4 Requirements for Off-network

8.2.8.4.1 No specific requirements, only best effort principle. (I-Vx)

8.2.8.5 Intentionally deleted.

8.2.8.5.1 Intentionally deleted.

8.2.8.5.2 Intentionally deleted.

8.2.8.6 Intentionally deleted.

8.2.8.6.1 Intentionally deleted.

8.2.8.6.2 Intentionally deleted.

8.2.9 Assured Data Communication - Common Function

8.2.9.1 Introduction

8.2.9.1.1 The Assured Data Communication (ADC) - Common Function provides a clear indication to the Users (via corresponding FRMCS Application) as soon as an end-to-end Data Communication link is interrupted or as long as the end-to-end communication link is active (I-Vx)

8.2.9.1.2 The Assured Data Communication is useful especially in situations, where the Users are at risk when the communication is interrupted. Shunting Data Communication during pushing movements is a good use case for the Common Function . (I-Vx)

8.2.9.2 Generic requirements

8.2.9.2.1 The ADC - Common Function shall report to the FRMCS Application as soon as Data Communication is interrupted for at least one of the participating User(s). (M-Vx)

8.2.9.2.2 The ADC - Common Function shall report to the FRMCS Application as soon as the Data Communication quality is no more fulfilling the minimum quality required to assure an operational communication for at least one of the participating User(s). (M-Vx)

8.2.9.2.3 The FRMCS System shall allow authorised Data Communication to use the ADC - Common Function. (M-Vx)

8.2.9.3 Requirements for domain change, Interconnection and Interworking

8.2.9.3.1 Intentionally deleted.

Domain change generic

8.2.9.3.2 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.9.3.3 When a User of an FRMCS Application with no active ADC is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application should be able to use the ADC - Common Function excluding the period of domain change. (O-Vx)

8.2.9.3.3i Intentionally deleted.

8.2.9.3.4 When a User of an FRMCS Application with an active ADC is moving from an FRMCS Domain to another FRMCS Domain, the ADC - Common Function should be continued in the other domain without drop. (O-Vx)

8.2.9.3.5 When the ADC is dropped during an FRMCS Domain change, the FRMCS Application shall be able to re-establish the communication towards the same recipient(s) with the specified quality of service. (M-Vx)

Domain change FRMCS to GSM-R

8.2.9.3.6 No requirements applicable. (I-Vx)

Domain change GSM-R to FRMCS

8.2.9.3.7 No requirements applicable. (I-Vx)

Interconnection

Between FRMCS Domains

8.2.9.3.8 The ADC - Common Function of an FRMCS Domain should be able to interconnect to the ADC - Common Function of another FRMCS Domain. (O-Vx)

Interworking

From FRMCS to GSM-R

8.2.9.3.9 No requirements applicable. (I-Vx)

From GSM-R to FRMCS

8.2.9.3.10 No requirements applicable. (I-Vx)

8.2.9.4 Requirements for Off-network

8.2.9.4.1 The ADC - Common Function is required in Off-network mode. (M-Vx)

8.2.9.5 Intentionally deleted

8.2.9.5.1 Intentionally deleted

8.2.9.6 Intentionally deleted.

8.2.9.6.1 Intentionally deleted.

8.2.9.6.2 Intentionally deleted.

8.2.10 Inviting-a-user - Common Function

8.2.10.1 Introduction

8.2.10.1.1 The Users of an ongoing Voice Communication can have a need for any other User to join the ongoing communication. By inviting-a-user - Common Function a User can send an invite to other User(s) inviting them to join the ongoing Voice Communication. (I-V3)

8.2.10.1.2 The User(s) is/are able to receive, reject, accept or ignore the invite. (I-V3)

8.2.10.1.3 An example of using this Common Function is: during an ongoing multi-user communication, a User has a need to inform a Controller that the User is wanted in the communication. The Controller receives the invite and takes a decision to join or not to join the ongoing communication. (I-V3)

8.2.10.1.4 Intentionally deleted.

8.2.10.2 Generic requirements

8.2.10.2.1 The FRMCS System should support the initiating User of a communication to invite other User(s) to join an ongoing Voice Communication. (O-V3)

8.2.10.2.1i The FRMCS System shall support any authorised User of an ongoing Voice Communication to invite other User(s) to join an ongoing Voice Communication. (M-V3)

8.2.10.2.2 Intentionally deleted.

8.2.10.2.3 Intentionally deleted.

8.2.10.3 Requirements for domain change, Interconnection and Interworking

8.2.10.3.1 Intentionally deleted.

Domain change generic

8.2.10.3.2 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.10.3.3 When a User of an FRMCS Application with an active communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use the inviting-a-user - Common Function excluding the period of domain change. (M-Vx)

Domain change FRMCS to GSM-R

8.2.10.3.4 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

8.2.10.3.5 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

8.2.10.3.6 The initiating User of an ongoing Voice Communication in an FRMCS Domain shall be able to invite User(s) located in another FRMCS Domain. (M-Vx)

8.2.10.3.6i Any authorised User of an ongoing Voice Communication located in an FRMCS Domain shall be able to invite User(s) located in another FRMCS Domain. (M-Vx)

Interworking

From FRMCS to GSM-R

8.2.10.3.7 No requirements applicable. (I-V3)

From GSM-R to FRMCS

8.2.10.3.8 No requirements applicable. (I-V3)

8.2.10.4 Requirements for Off-network

8.2.10.4.1 No specific requirements. (I-Vx)

8.2.10.5 Intentionally deleted

8.2.10.5.1 Intentionally deleted

8.2.10.6 Intentionally deleted.

8.2.10.6.1 Intentionally deleted.

8.2.10.6.2 Intentionally deleted.

8.2.11 Arbitration - Common Function

8.2.11.1 Introduction

8.2.11.1.1 The FRMCS System performs arbitration between communications competing for the attention of the User through visible and audible indication. (I)

8.2.11.1.2 The arbitration - Common Function supports to prioritise between competing voice, data and Video Communications on the end User device in order to ensure that the User is always involved in the most relevant communication based on the User's current operational. (I)

8.2.11.1.3 This Common Function also saves the human User from interacting with the HMI in order to keep the attention on the railway operations when required. (I)

8.2.11.1.4 This Common Function is specified to cover the case where a human User manages the competing communications. (I)

8.2.11.2 Generic requirements

8.2.11.2.1 The arbitration - Common Function shall determine whether the resources of a User device (display, handset, loudspeaker, etc.) are shared or exclusively assigned when more than one communication, related to the same or to different FRMCS Applications, are active. (M)

8.2.11.2.2 Intentionally deleted.

8.2.11.2.2i Regardless of the audio components of the Drivers HMI (loudspeaker(s), handset(s)), only one Voice Communication at a time shall be connected to the User. (M)

8.2.11.2.3 The arbitration - Common Function does not cover selection of specific HMI resource for communication when more than one of the same type is available. This needs to be done by configuration of the HMI resources. (I)

8.2.11.2.3i The arbitration - Common Function shall determine if an incoming communication is automatically connected to a User not being involved in a communication, the outcome being one of the following: (M)

a) The communication is automatically connected;
b) The communication is not automatically connected.

8.2.11.2.4 Intentionally deleted.

8.2.11.2.5 The arbitration within one communication, for example adding video to the Voice Communication, is handled by the FRMCS Application itself. (I)

8.2.11.2.6 Intentionally deleted.

8.2.11.2.7 Intentionally deleted.

8.2.11.2.7i For a Driver, the FRMCS System shall support the arbitration rules specified by the arbitration tables in Appendix I. (M)

8.2.11.2.7ii For a Driver, the FRMCS System shall allowthe configuration of the arbitration rules specified by the arbitration tables in Appendix I. (M-V3)

8.2.11.2.8 The definition of the arbitration rules can be part of regulation. (I)

8.2.11.2.9 Where the defined arbitration rules do not cover a communication arbitration case (e.g. when a new FRMCS Application requests to communicate), a default arbitration rule defined shall be applied (e.g. never presented while User connected to another communication and never automatically connected). (M-V3)

8.2.11.2.10 The arbitration - Common Function shall apply the predefined arbitration rules taking into account all communications, connected or in the queue, of the concerned User device. (M-V3)

8.2.11.2.11 If a communication is queued for a User due to arbitration rules, the other involved User(s) in the communication shall be informed. (M-V3)

8.2.11.2.12 For a Driver, the outcome of the arbitration - Common Function can be configured according to Appendix I to cover specific operational needs for different FRMCS-Domains. (I-V3)

8.2.11.2.13 A subset of the outcomes may be subject to harmonisation by appointed organisations. (I-V3)

8.2.11.2.14 The FRMCS System shall support an IM system administrator to configure the outcome of the arbitration rules. (M-Vx)

8.2.11.2.15 The FRMCS System shall support an IM system administrator to configure for each FRMCS Application which arbitration rules apply. (M-Vx)

8.2.11.2.16 The FRMCS System should be able to configure arbitration rules on a per FRMCS Application category basis. (O-Vx)

8.2.11.3 Arbitration for multiple communications, one device

8.2.11.3.1 When a communication is addressed to a User not connected to any communication, the configured arbitration rules shall determine which of the following behavior applies: (M)

a) Communication is presented audibly and visibly;
b) Communication is presented audibly and visibly and automatically connected.

8.2.11.3.2 When a communication is addressed to a User already connected to a communication, the configured arbitration rules shall determine, taking into account the connected communication(s), which of the following behavior applies:

a) Incoming communication is presented audibly and visibly automatically connected, previously connected communication is queued (User is addressed but not connected); (M)
b) Incoming communication is automatically Merged with the connected communication; (M-Vx)
c) Incoming communication is presented audibly and visibly, automatically connected, previously connected communication is kept connected; (M)
d) Incoming communication is not presented, not connected, User is kept addressed by the communication as long as eligible; (M)
e) Incoming communication is presented audibly and visibly, connected communication is kept connected; (M)
f) Incoming communication is rejected. (M-V3)

8.2.11.3.3 When a communication is initiated by a User already connected to a communication, the configured arbitration rules shall determine which of the following behavior applies:

a) Outgoing communication is established and previously connected communication is queued; (M-V3)
b) Outgoing communication is established and automatically Merged with the previously connected communication; (M-Vx)
c) Outgoing communication is established and the previously connected communication is kept connected; (M)
d) Outgoing communication is not established. (M)

8.2.11.3.4 When the status of a connected communication changes (terminated, left or put on hold), the configured arbitration rules for each queued communication shall be re-evaluated to determine which behavior is now applicable for the queued incoming communications. (M)

8.2.11.3.5 Intentionally deleted.

8.2.11.3.6 Intentionally deleted.

8.2.11.3.7 In the case an incoming communication has not been presented to the User due to an arbitration rule, this communication (if still active) shall be presented as soon as no arbitration rule is preventing it. Otherwise, the User shall be informed about having missed a communication because of arbitration process. (M)

8.2.11.4 Arbitration for one User, multiple devices

8.2.11.4.1 The expected behavior of a communication being performed on more than one User device, leads to the User having the same understanding irrespective of the device used. (I)

8.2.11.4.2 Arbitration for multiple communications should also apply for each of the multiple devices in which a User is logged in. (O-V3)

8.2.11.4.2i For a Data Communication addressed to a User logged in on several devices having the corresponding FRMCS Application active, the configured arbitration rules should present and automatic connect the Data Communication on/to all the User’s devices. (O-V3)

8.2.11.4.3 For a Voice Communication addressed to a User logged in on several devices having the corresponding FRMCS Application active, the configured arbitration rules should determine which of the following behavior applies: (O-V3)

a) Presentation on all the User's devices;
b) Presentation on all the User's devices and automatic connection to the current User's Default Device.

8.2.11.4.4 If automatic connection to the User's Default Device is not successful, the communication should be automatically connected to another device of the User. (O-V3)

8.2.11.4.5 The FRMCS System should allow a User to select the default device (e.g. a button, putting the device in a cradle). (O-V3)

8.2.11.5 Delayed presentation of a communication

8.2.11.5.1 A visual notification shall be kept active during the whole communication on User's devices which are not connected to the communication in order to support the User to participate the ongoing communication(s) from one of these devices. (M-Vx)

8.2.11.5.2 In the case an incoming communication has not been presented to the User due to an arbitration rule, this communication (if still active) shall be presented as soon as no arbitration rule is preventing it. Otherwise, the User shall be informed about having missed a communication because of arbitration process. (M)

8.2.11.6 Requirements for domain change, Interconnection and Interworking

8.2.11.6.1 Intentionally deleted.

8.2.11.6.2 Intentionally deleted.

Domain change generic

8.2.11.6.3 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.11.6.4 When a User of an FRMCS Application with an active communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use the arbitration - Common Function excluding the period of domain change. (M)

Domain change FRMCS to GSM-R

8.2.11.6.5 No requirements applicable. (I)

Domain change GSM-R to FRMCS

8.2.11.6.6 No requirements applicable. (I)

Interconnection

Between FRMCS Domains

8.2.11.6.7 No requirements applicable. (I)

Interworking

From FRMCS to GSM-R

8.2.11.6.8 For a communication outgoing from FRMCS System towards the GSM-R system, the FRMCS System shall be able to use the matching priority level amongst those available in the GSM-R system. (M)

From GSM-R to FRMCS

8.2.11.6.9 For a communication outgoing from the GSM-R system towards the FRMCS System, the FRMCS Operator shall be able to define arbitration rules based on the priority level available in the GSM-R system. (M)

8.2.11.7 Requirements for Off-network

8.2.11.7.1 The arbitration - Common Function shall operate in both On-network and Off-network conditions. (M-Vx)

8.2.11.7.2 When arbitration - Common Function is operated in Off-network, the functionality is limited in arbitration performed by FRMCS User Device only. (M-Vx)

8.2.11.8 Intentionally deleted.

8.2.11.8.1 Intentionally deleted.

8.2.11.8.2 Intentionally deleted.

8.2.11.8.3 Intentionally deleted.

8.2.11.8.4 Intentionally deleted.

8.2.11.8.5 Intentionally deleted.

8.2.11.9 Intentionally deleted.

8.2.11.9.1 Intentionally deleted.

8.2.11.9.2 Intentionally deleted.

8.2.12 Distribution of synchronised time - Common Function

8.2.12.1 Introduction

8.2.12.1.1 Centralised and synchronised time service is required to provide other Common Functions, FRMCS Applications or O&M functions/tools with a reliable time source. (I-V3)

8.2.12.1.2 The FRMCS System distributes the synchronised time information to FRMCS User Device and FRMCS Applications. (I-V3)

8.2.12.1.3 For example, for voice FRMCS Applications the FRMCS System require system wide and centralised synchronised time service in order to provide required security levels. Synchronised time is needed for analysing various audit logs, backup and restore functions. (I-V3)

8.2.12.1.4 Location services provided by the FRMCS System require synchronised time service. When the positioning is provided by an On-Board equipment (e.g. odometry) which is not intrinsically time- synchronised, centralised time service is required. (I-V3)

8.2.12.2 Generic requirements

8.2.12.2.1 Distribution of synchronised time - Common Function provides synchronised and accurate reference time supporting operational needs. (I-V3)

8.2.12.2.2 Distribution of synchronised time - Common Function shall provide reference time to authorised Common Functions and FRMCS Applications & Communication Services as per Appendix G. (M-V3)

8.2.12.2.2i Distribution of synchronised time - Common Function shall deny the request for reference time to unauthorised Common Functions, FRMCS Applications & Communication Services as per Appendix G. (M-V3)

8.2.12.2.3 Intentionally deleted.

8.2.12.2.4 Distribution of synchronised time - Common Function shall provide accuracy information of the reference time. (M-V3)

8.2.12.2.5 Distribution of synchronised time - Common Function shall provide the reference time and the accuracy information upon a request from an FRMCS Application. (M-V3)

8.2.12.2.6 The following methods shall be supported to provide the reference time and the accuracy information: (M-V3)

a) Single provision;
b) Periodical provision.

8.2.12.2.7 Distribution of synchronised time - Common Function shall retrieve its reference time with a recognised upstream time source. (M-V3)

8.2.12.2.7ai Distribution of synchronised time - Common Function shall retrieve its reference time with a secure upstream time source. (M-Vx)

8.2.12.2.7i The time source used for the distribution of synchronised time - Common Function shall be unique within a given time zone. (M-V3)

8.2.12.2.8 A secure and recognised upstream time source can be a global navigation satellite system or an atomic clock, or a defined single clock within an FRMCS System boundary. (I-V3)

8.2.12.2.9 The reference time provided by the distribution of synchronised time - Common Function shall be interoperable with standardised time protocols. (M-Vx)

8.2.12.2.10 Network Time Protocol (NTP) is an example of such a standardised time protocol. (I-V3)

8.2.12.2.11 The reference time provided by the distribution of synchronised time - Common Function is authentic. (I-V3)

8.2.12.2.12 The FRMCS Operator is able to monitor the accuracy of the centralised and synchronised time received from upstream time source. (I-V3)

8.2.12.3 Requirements for domain change, Interconnection and Interworking

8.2.12.3.1 Intentionally deleted.

Domain change generic

8.2.12.3.2 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.12.3.3 When a User of an FRMCS Application with an active communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use the distribution of synchronised time - Common Function excluding the period of domain change. (M-V3)

Domain change FRMCS to GSM-R

8.2.12.3.4 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

8.2.12.3.5 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

8.2.12.3.6 For communications spread over multiple FRMCS Domains, it shall be possible for the distribution of synchronised time - Common Function of the domain where the communication has been initiated, to manage time synchronisation over all domains. (M-Vx)

Interworking

From FRMCS to GSM-R

8.2.12.3.7 No requirements applicable. (I-V3)

From GSM-R to FRMCS

8.2.12.3.8 No requirements applicable. (I-V3)

8.2.12.4 Requirements for Off-network

8.2.12.4.1 FRMCS User Device and FRMCS Applications used Off-network shall synchronise their internal time information regularly (when used On-network) with the reference time distributed by the FRMCS System to achieve best possible time accuracy for later Off-network use. (M-Vx)

8.2.12.5 Intentionally deleted.

8.2.12.5.1 Intentionally deleted.

8.2.12.6 Intentionally deleted.

8.2.12.6.1 Intentionally deleted.

8.2.12.6.2 Intentionally deleted.

8.2.13 Billing information - Common Function

8.2.13.1 Introduction

8.2.13.1.1 To be defined in a later version of the specification. (I-Vx)

8.2.14 Recording - Common Function

8.2.14.1 Introduction

8.2.14.1.1 It's possible to enable the recording of communication content and the communication related data (metadata) in order to support analysis. (I-V3)

8.2.14.1.2 This Common Function enables and allows recording of different types of voice, data or Video Communication for post-incident/accident analysis, Training, operational improvement, staff supervision or any other purpose. (I-V3)

8.2.14.2 Intentionally deleted.

8.2.14.3 Intentionally deleted.

8.2.14.4 Intentionally deleted.

8.2.14.4.1 Intentionally deleted.

8.2.14.4.2 Intentionally deleted.

8.2.14.4.3 Intentionally deleted.

8.2.14.4.4 Intentionally deleted.

8.2.14.4.5 Intentionally deleted.

8.2.14.4.6 Intentionally deleted.

8.2.14.4.7 Intentionally deleted.

8.2.14.4.8 Intentionally deleted.

8.2.14.5 Intentionally deleted.

8.2.14.5.1 Intentionally deleted.

8.2.14.5.2 Intentionally deleted.

8.2.14.5.3 Intentionally deleted.

8.2.14.5.4 Intentionally deleted.

8.2.14.5.5 Intentionally deleted.

8.2.14.5.6 Intentionally deleted.

8.2.14.5.7 Intentionally deleted.

8.2.14.5.8 Intentionally deleted.

8.2.14.6 Intentionally deleted.

8.2.14.6.1 Intentionally deleted.

8.2.14.7 Intentionally deleted.

8.2.14.7.1 Intentionally deleted.

8.2.14.8 Intentionally deleted.

8.2.14.8.1 Intentionally deleted.

8.2.14.8.2 Intentionally deleted.

8.2.14.2 Generic requirements

8.2.14.2.1 The FRMCS System shall be able to record Voice Communications content and metadata. (M-V3)

8.2.14.2.1i The FRMCS System shall be able to record Data Communications metadata. (M-V3)

8.2.14.2.2 The FRMCS System shall enable the configuration per FRMCS Application for which type of communication the content is recorded. (M-V3)

8.2.14.2.3 The FRMCS System shall enable the configuration for which FRMCS Applications the communications metadata is recorded. (M-V3)

8.2.14.2.4 The FRMCS System shall record the following metadata, when applicable for the communication:

a) Initiator's Subscriber Identity; (O-V3)
b) Initiator's User Identity; (M-V3)
c) Initiator's Functional Identity; (M-V3)
d) Initiator's Location Information upon initiation (not applicable for Controller); (M-V3)
e) Addressed Users Subscriber Identity; (O-V3)
f) Addressed Users User Identity; (M-V3)
g) Addressed Users Functional Identity; (M-V3)
h) Addressed Users Location Information (not applicable for Controller); (M-V3)
i) Timestamp of initiation of the communication; (M-V3)
j) Timestamp of termination of the communication; (M-V3)
k) Timestamp of a User connecting to the communication; (M-V3)
l) Timestamp of a User disconnecting from a communication; (M-V3)
m) Timestamp for any request to talk; (O-Vx)
n) Timestamp for any revoke to talk; (O-Vx)
o) Initiating area identification (e.g. REC); (M-V3)
p) Addressed area identification (e.g. REC); (M-V3)
q) Timestamp of Merging of communications. (M-Vx)
r) Priority level. (M-V3)
s) Cause of termination. (M-V3)

8.2.14.2.4i The FRMCS system shall record the metadata per FRMCS Application according to Appendix L. (M-V3)

8.2.14.2.5 The Location Information history of the Users shall be recorded when these Users are involved in a communication, needed for investigations. (M-Vx)

8.2.14.2.5i The Location Information history of the Users shall be recorded when these Users are not involved in a communication. (M-Vx)

8.2.14.2.6 When further investigation of the communication is required, the FRMCS System loggings provide additional details. (I-V3)

8.2.14.2.7 For FRMCS Applications configured to be recorded, the communications content and metadata shall be recorded and stored. (M-V3)

8.2.14.2.8 The FRMCS System provides the capabilities to allow the implementor to be GDPR compliant. (I-V3)

8.2.14.2.9 In order to determine the exact order of event for post analysis, the timestamp provided in the recorded FRMCS metadata shall have a maximum inaccuracy of 10 milliseconds compared to the time of day. (M-V3)

8.2.14.3 Requirements for domain change, Interconnection and Interworking

8.2.14.3.1 Intentionally deleted.

Domain change generic

8.2.14.3.2 Intentionally deleted.

Domain change FRMCS to FRMCS

8.2.14.3.3 When a User of an FRMCS Application is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS Application shall always be able to use the recording - Common Function excluding the period of domain change. (M-V3)

Domain change FRMCS to GSM-R

8.2.14.3.4 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

8.2.14.3.5 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

8.2.14.3.6 No requirements applicable. (I-V3)

Interworking

From FRMCS to GSM-R

8.2.14.3.7 No requirements applicable. (I-V3)

From GSM-R to FRMCS

8.2.14.3.8 No requirements applicable. (I-V3)

8.2.14.4 Requirements for Off-network

8.2.14.4.1 To be defined in a later version of the specification. (I-Vx)

8.2.14.5 Intentionally deleted

8.2.14.5.1 Intentionally deleted

8.2.14.6 Intentionally deleted.

8.2.14.6.1 Intentionally deleted.

8.2.14.6.2 Intentionally deleted.

9 Introduction to FRMCS Applications & Communication Services

9.1 Introduction

9.1.1 In the following paragraph the various Voice Communication, Data Communication and Video Communication FRMCS Applications & Communication Services are specified. The ordering is: (I)

a) paragraph 0: Voice Communication FRMCS Applications & Communication Services;
b) paragraph 11: Data Communication FRMCS Applications & Communication Services;
c) paragraph 12: Video Communication FRMCS Applications & Communication Services.

9.1.2 Each FRMCS Application & Communication Service is ordered and specified in the following sections: (I)

a) Introduction: brief description of the FRMCS Application & Communication Service via information statements;
b) Generic requirements: all requirements for the FRMCS Application & Communication Service. If required for readability subsection marking can be used;
c) HMI requirements: specific requirements of the FRMCS Application & Communication Service that are relevant for HMI characteristics. The HMI itself is not specified here;
d) Requirements for domain change, Interconnection and Interworking: all requirements relevant for domain change, Interconnection and Interworking, if any;
e) Requirements for Off-network.
f) Intentionally deleted.

9.2 FRMCS Applications & Communication Services

9.2.1 The following FRMCS Applications & Communication Services are specified in this document: (I)

URS Ref.	FRMCS Application & Communication Service	FRMCS Application or Communication Service	Paragraph	Type	Category	Remarks
-	**Generic Voice Communication**	FRMCS Application	10.2	Voice	Critical	
-	**Generic Data Communication**	FRMCS Communication Service	11.2	Data	Critical	For V3
-	**Generic Video Communication**	FRMCS Communication Service	12.2	Video	Critical	For Vx
-	**Role management and presence**	FRMCS Application	11.3	Data	Critical	
5.1	**On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train**	FRMCS Application	10.3	Voice	Critical	
5.2	**On-Train incoming Voice Communication from the Controller towards a Train Driver**	FRMCS Application	10.4	Voice	Critical	
5.3	**Multi-Train Voice Communication for Drivers**	FRMCS Application	10.5	Voice	Critical	
5.4	**Banking Voice Communication**	FRMCS Application	10.6	Voice	Critical	For V3
5.5	**Trackside Maintenance Voice Communication**	FRMCS Application	10.7	Voice	Critical	For Vx
5.6	**Shunting Voice Communication**	FRMCS Application	10.8	Voice	Critical	For V3
5.7	**Public Emergency Call**	FRMCS Application	10.9	Voice	Critical	For Vx
5.8	**Ground to ground Voice Communication**	FRMCS Application	10.10	Voice	Critical	
5.9	**Automatic Train Protection communication**	FRMCS Communication Service	11.4	Data	Critical	
5.10	**Automatic Train Operation communication**	FRMCS Communication Service	11.5	Data	Critical	
5.11	**Data Communication for Possession Management**	FRMCS Communication Service	11.6	Data	Critical	For Vx
5.12	**Trackside Maintenance Warning System communication**	FRMCS Communication Service	11.7	Data	Critical	For Vx
5.13	**Remote control of engines communication**	FRMCS Communication Service	11.8	Data	Critical	For Vx
5.14	**Monitoring and control of critical infrastructure**	FRMCS Communication Service	11.9	Data	Critical	

URS Ref.	FRMCS Application & Communication Service	FRMCS Application or Communication Service	Paragraph	Type	Category	Remarks
5.15	**Railway Emergency Communication**	FRMCS Application	10.11	Voice&Data	Critical	
5.16	**On-Train safety device to ground communication**	FRMCS Application	11.34	Data	Critical	For V3
5.17	**Public Train emergency communication**	FRMCS Application	10.13	Voice&Data	Critical	For Vx
5.18	**Working alone**	FRMCS Application	10.14	Voice&Data	Critical	For Vx
5.19 5.20	**Access to recording of communications**	FRMCS Communication Service	11.10	Data	Critical	For Vx Note: URS application 5.19 and 5.20 are merged into one FRMCS Communication Service in the FRS
5.21	**Shunting Data Communication**	FRMCS Communication Service	11.12	Data	Critical	For Vx
5.22	**Train integrity monitoring Data Communication**	FRMCS Communication Service	11.13	Data	Critical	For Vx
5.23	**Public Emergency Warning**	FRMCS Communication Service	11.14	Data	Critical	For Vx
5.24	**On-Train outgoing Voice Communication from Train Staff towards a Ground User**	FRMCS Application	10.15	Voice	Critical	For V3
5.25	**On-Train incoming Voice Communication from a Ground User towards Train Staff**	FRMCS Application	10.16	Voice	Critical	For V3
5.26	**Railway Staff emergency communication**	FRMCS Application	10.17	Voice&Data	Critical	For Vx
5.27	**Critical real time video**	FRMCS Communication Service	12.3	Video	Critical	For Vx
5.28	**Critical Advisory Messaging services- safety related Data Communication**	FRMCS Communication Service	11.15	Data	Critical	For V3
5.29	**Virtual coupling Data Communication**	FRMCS Communication Service	11.16	Data	Critical	For Vx
5.30	**Train Parking Protection**	FRMCS Communication Service	11.17	Data	Critical	For Vx
5.31	**Key Management System Data Communication**	FRMCS Communication Service	11.18	Data	Critical	
5.32	**Urgent On-Train outgoing Voice Communication from**	FRMCS Application	10.18	Voice	Critical	

URS Ref.	FRMCS Application & Communication Service	FRMCS Application or Communication Service	Paragraph	Type	Category	Remarks
	the Train Driver towards the Controller(s) of the Train					
5.33	**Urgent Multi-Train Voice Communication for Drivers**	FRMCS Application	10.19	Voice	Critical	
6.1	**Deleted**		n.a.	n.a.	n.a.	
6.2	**Deleted**		n.a.	n.a.	n.a.	
6.3	**Multi-Train Voice Communication for Drivers excluding Ground User(s)**	FRMCS Application	10.20	Voice	Performance	For Vx
6.4	**On-Train Voice Communication**	FRMCS Application	10.21	Voice	Performance	For V3
6.5	**Lineside Telephony**	FRMCS Application	10.22	Voice	Performance	For Vx
6.6	**On-Train Voice Communication towards passengers (Public Address)**	FRMCS Application	10.23	Voice	Performance	For V3
6.7	**Station Public Address**	FRMCS Application	10.24	Voice	Performance	For Vx
6.8	**Communication at stations and Depots**	FRMCS Application	10.25	Voice	Performance	For Vx
6.9	**On-Train Telemetry communications**	FRMCS Communication Service	11.19	Data	Performance	
6.10	**Infrastructure Telemetry communications**	FRMCS Communication Service	11.20	Data	Performance	For Vx
6.11	**On-Train remote equipment control**	FRMCS Communication Service	11.21	Data	Performance	For Vx
6.12	**Monitoring and Control of Non-Critical Infrastructure**	FRMCS Communication Service	11.22	Data	Performance	For Vx
6.13	**Non-critical real time video**	FRMCS Communication Service	12.4	Video	Performance	For Vx
6.14	**Wireless on-Train Data Communication for Train Staff**	FRMCS Communication Service	11.23	Data	Performance	For Vx
6.15	**Wireless Data Communication for Railway Staff on platforms**	FRMCS Communication Service	11.24	Data	Performance	For Vx
6.16	**Deleted**			n.a.	n.a.	
6.17	**Train Driver advisory -Train performance Data Communication**	FRMCS Communication Service	11.25	Data	Performance	For Vx
6.18	**Train Departure Data Communications**	FRMCS Communication Service	11.26	Data	Performance	For Vx
6.19	**Messaging services**	FRMCS Application	11.27	Data	Performance	For V3
6.20	**Transfer of data**	FRMCS Communication Service	11.28	Data	Performance	For V3

URS Ref.	FRMCS Application & Communication Service	FRMCS Application or Communication Service	Paragraph	Type	Category	Remarks
6.21	**Record and broadcast of information**	FRMCS Application	11.29	Data	Performance	For Vx
6.22	**Transfer of CCTV archives**	FRMCS Communication Service	11.30	Data	Performance	For Vx
6.23	**Non-critical real time Video Communication**	FRMCS Communication Service	12.4	Video	Performance	For Vx
6.24	**Augmented reality Data Communication**	FRMCS Communication Service	11.31	Data	Performance	For Vx
6.25	**Real time translation of speech Data Communication**	FRMCS Communication Service	11.32	Data	Performance	For Vx
6.26	**Passenger Information System Data Communication**	FRMCS Communication Service	11.33	Data	Performance	For V3
7.1	**Information Help Point for Public**	FRMCS Application	tbd	Voice	Business	For Vx
7.2	**Emergency Help Point for Public**	FRMCS Application	tbd	Voice	Business	For Vx
7.3	**Wireless internet on-Train for passengers**	FRMCS Communication Service	tbd	Data	Business	For Vx
7.4	**Wireless internet for passengers on platforms**	FRMCS Communication Service	tbd	Data	Business	For Vx

Table 9-1: FRMCS Applications & Communication Services overview

9.2.2 Please note that in column “remarks” it is marked in which version of the FRS the FRMCS Application & Communication Service is covered. (I)

9.2.3 In Appendix G an overview is given which Common Function shall be used for which FRMCS Application or FRMCS Communication Service. (M)

9.3 Generic HMI aspects

9.3.1 In this chapter fundamental HMI requirements are specified to help fulfil the operational needs for the User. (I)

9.3.2 Application specific HMI requirements are described in the relevant FRMCS Application or FRMCS Communication Service section. (I)

9.3.3 In addition, HMI aspects are also partly covered in the voice and Data Communication function sections. (I)

9.3.4 The HMI offers the possibility to present communication related audible and/or visual information to the User initiating, receiving or participating in a communication. (I)

9.3.5 Examples of communication related information to be presented on the HMI are: (I)

a) Status of the intended recipient;
b) Functional Identity of the currently connected User/s, meaningfully grouped (e.g. local User, Controller(s), other Drivers, other staff);
c) Information relating to the location of the currently connected User/s;
d) Status of the request to talk (granted, rejected or revoked);
e) List of active talker(s);
f) Current number of simultaneous talkers;
g) Change between On-network and Off-network mode;
h) Status of communication, such as on-hold, call waiting, call terminated, call rejected, microphone muted/unmuted, etc.
i) List of intended recipients of communication, based on information available in the FRMCS System.

9.3.6 The FRMCS System shall support the selection of the active HMI component(s) or resource in a Voice Communication by the following methods: (M)

a) Without any User’s intervention based on the configuration of the device and on the type of communication E.g. an incoming REC-Voice Communication can be configured to be connected automatically to the external loudspeaker of the Driver’s cabin though handset is currently used by the User for an ongoing communication;
b) By the User. E.g. the User can choose to accept an incoming communication to the handset by picking it up, though already ongoing communicating was connected to the external loudspeaker and microphone.

9.3.7 The User shall have the ability to divert the ongoing communication to an alternative HMI component or resource of the same device (e.g. loudspeaker). (M)

10 Voice FRMCS Applications & Communication Services

10.0 Intentionally deleted

10.0.1 Intentionally deleted.

10.0.2 Intentionally deleted.

10.1 Voice Communication functions for FRMCS Applications & Communication Services

10.1.1.1 The aim of this section is to define the requirements related to the Common Functions which are implemented to support the FRMCS Applications & Communication Services requiring a Voice Communication. The Voice Communication FRMCS Applications & Communication Services which are specified in the chapter allow all or some of the functions specified in this section. Therefore, in order to avoid the duplication of equivalent requirements all along this paragraph, the functional specification of each Voice Communication FRMCS Applications & Communication Services refers to the Common Functions defined hereafter. Moreover, some of the Common Functions described in this section are referring to Common Functions already described in paragraph 8. The requirements related to the common Voice Communication functions are structured in three different phases/contexts of a Voice Communication (initiating, addressing and User handling phase). The diagrams aim to help the reader to understand the different functional steps required but certainly not to define the technical implementation of the FRMCS System. For each context, the diagram describes the possible use cases and outcomes from one specific involved User point of view. (I)

10.1.1.2 The FRMCS System shall provide a means to establish Voice Communications between 2 or more Users. (M)

10.1.1.3 All Voice Communication functions shall be applicable for all Voice Communication FRMCS Applications & Communication Services, unless otherwise specified per FRMCS Application or FRMCS Communication Service. (M)

10.1.1.4 All Voice Communication functions shall work by default in On-network mode. (M-Vx)

10.1.1.5 Specific Off-network mode requirements are specified in the corresponding FRMCS Application or FRMCS Communication Service. (I-Vx)

10.1.2 User initiating a Voice Communication

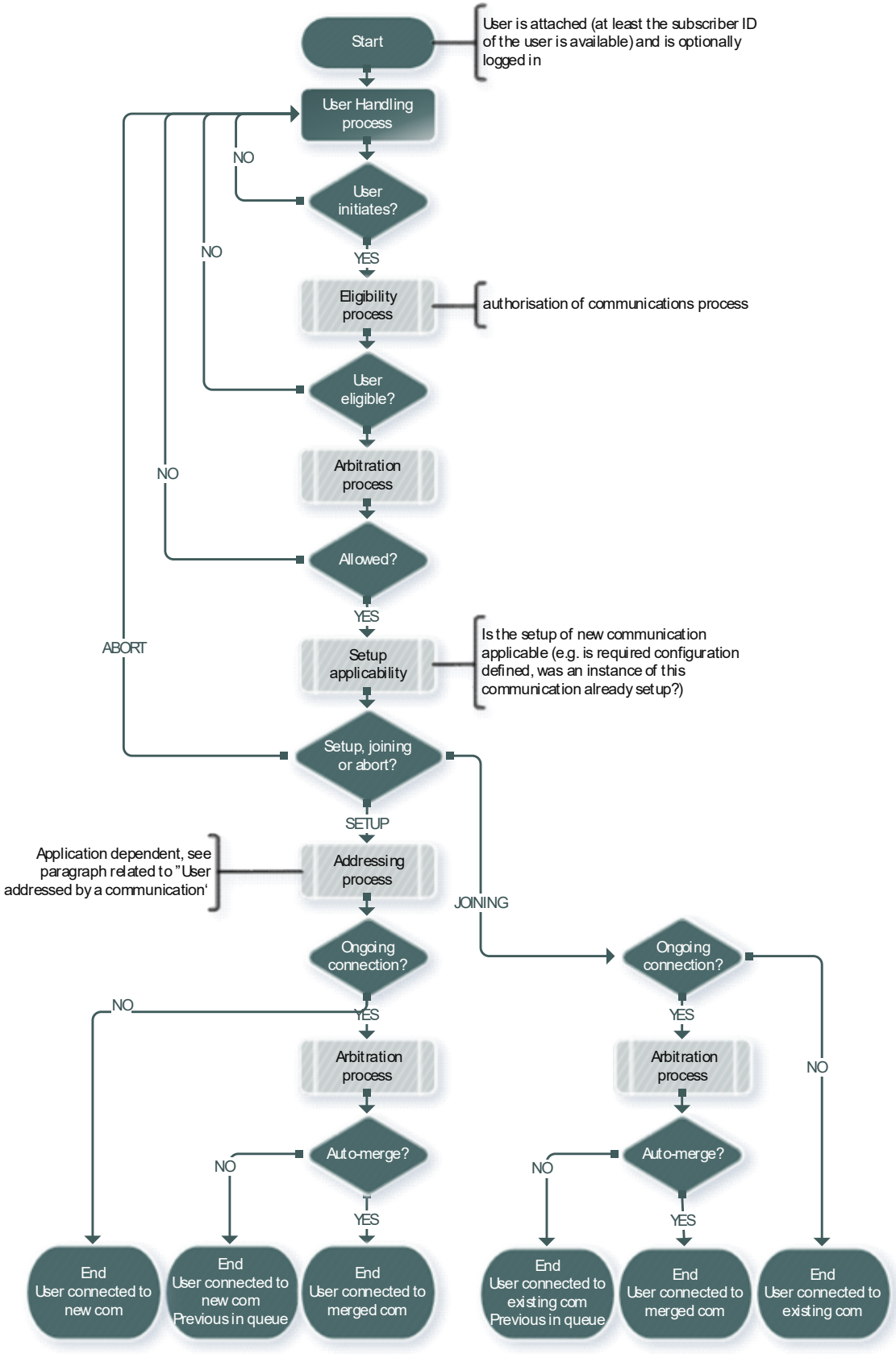


Figure 10-2: User initiating a communication

10.1.2.0 In Figure 10-2 the process and all possible steps for the User initiating a communication are given. The requirements in this section specify all steps in this process. (I-V3)

10.1.2.1 As a start of Figure 10-2, it is assumed that the User is attached to the FRMCS System, has a valid Subscriber Identity and is optionally logged in. (I)

10.1.2.2 Prior to the initiation of the communication by the User, the role management and presence - Common Function should support the User to be aware of the status of other Users classified on the basis of the following: (O-Vx)

a) Functional Identities elements (e.g. Role, area) of the Users;
b) Location Information of other Users.

10.1.2.3 A User shall be able to initiate a Voice Communication by providing the identity of the Addressed User through the HMI. (M)

10.1.2.4 Intentionally deleted.

10.1.2.5 The User eligibility depends on the result of the authorisation of communication - Common Function process and could also depend on the addressing mechanism. (I)

10.1.2.6 For a Driver, the arbitration - Common Function shall check if the initiation of the communication is compliant to the Appendix I based on other ongoing communications for this User. (M)

10.1.2.7 Upon a communication initiation by the User, the FRMCS System shall check the communication setup applicability with one of the following outcomes:

a) The results is that the User's request is aborted; (M)
b) The results is that a new communication is set up; (M)
c) The results is that the User is joining an existing communication. (M-V3)

10.1.2.8 For joining of the communication the further outcome shall be one of the following:

a) The User is connected to the existing communication and the previously connected communication is put in the User's queue; (M)
b) The User is connected to the communication Merging the existing one and the previously connected one; (M-Vx)
c) The User is connected to the existing communication. (M)

10.1.2.9 To setup of a communication, depending on the connection status of the User and – if applicable – on the result of the arbitration - Common Function related to auto-Merge decision process, the outcome shall be one of the following: (M-Vx)

a) The User is connected to the new communication;
b) The User is connected to the new communication and the previously connected communication is put in the User's queue;
c) The User is connected to the communication Merging the new one and the previously connected one.

10.1.2.10 Once connected, the initiating User shall be able to invite other User(s) to join the ongoing communication. (M)

10.1.3 User addressed by a Voice Communication

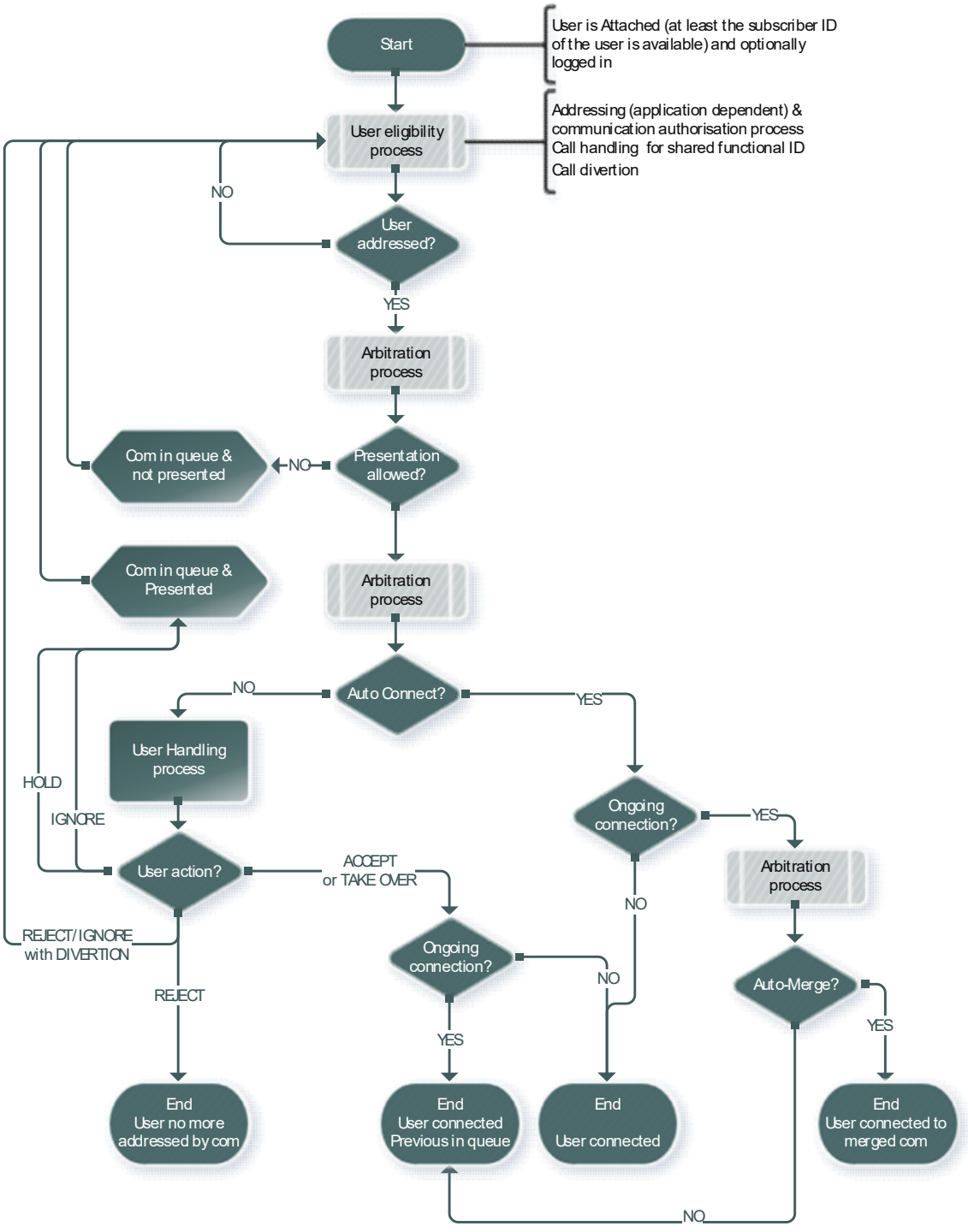


Figure 10-3: User addressed by a communication

10.1.3.0 In Figure 10-3 the process and all possible steps for the User addressed by a communication are given. The requirements in this section specify all steps in this process. (I-V3)

10.1.3.1 As a start of Figure 10-3, it is assumed that the User is attached to the FRMCS System and is optionally logged in. (I)

10.1.3.1i As a start of Figure 10-3, it is assumed that the User has a valid Subscriber Identity. (I-V3)

10.1.3.2 Reception of invitation to a communication is considered as a User addressed to the corresponding communication. (I)

10.1.3.3 At the setup of a Voice Communication, the FRMCS System shall check the User eligibility to be a participant of the communication. (M)

10.1.3.4 The User eligibility shall be determined, based on the following:

a) The addressing mechanism of the related Voice Communication; (M)
b) The result of the authorisation of communication - Common Function process; (M)
c) For User other than Controller, the predefined behavior for the addressed shared Functional Identity; (M-Vx)
d) For Controller, the predefined behavior for the addressed shared Functional Identity. (M-V3)

10.1.3.5 When the User is eligible to be a participant, the User is addressed by the communication. (I)

10.1.3.6 When the User is already involved in a communication(s) the new communication is queued for the User. (I)

10.1.3.7 The arbitration - Common Function shall check if a communication in the User’s queue is to be presented to the User. (M)

10.1.3.8 Depending on the result of the arbitration - Common Function related to presentation process, the outcome shall be one of the following: (M)

a) The communication is presented (audibly and visually);
b) Intentionally deleted;
c) The communication is not presented but kept in the User’s queue.

10.1.3.9 The aim of the visual only presentation is to avoid excessive disturbance for the User. Full presentation can also imply audible indications and vibrations depending on the User settings. (I)

10.1.3.10 The FRMCS System shall provide the following information to the User addressed by a communication: (M)

a) The Functional Identity of the initiator or inviting User selected by the FRMCS Application;
b) The User Identity of the initiator or inviting User but only if no Functional Identity is registered by this User;
c) The concerned FRMCS Application & Communication Service.

10.1.3.11 The FRMCS System shall provide a User with the Functional Identity(ies) through which it is addressed by a communication. (M-V3)

10.1.3.12 The applicability of a registered Functional Identity is determined by the FRMCS Application & Communication Service. (I)

10.1.3.13 The arbitration - Common Function shall check if a communication in the queue is to be connected. (M)

10.1.3.14 When a communication is subject to presentation on several devices of the User, a visual indication shall be kept during the whole communication on the User's devices which are not connected in order to allow the User to take over the connected communication from one of these devices. (M-Vx)

10.1.3.15 Connecting a communication without User's confirmation is defined as an Auto Connect. (I)

10.1.3.16 Depending on the result of the arbitration - Common Function related to Auto Connect decision process, the outcome shall be one of the following: (M-V3)

a) The connection results from the User Handling process;
b) The connection is performed automatically.

10.1.3.17 Depending on the connection status of the User (ongoing connection or not), the outcome shall be one of the following: (M-V3)

a) In case of no ongoing connection, the User is automatically connected to the communication (auto-Merge process not applicable);
b) In case of an ongoing connection, a decision is taken by the arbitration - Common Function.

10.1.3.18 The arbitration - Common Function shall check if a communication in the queue shall be Merged with an already connected communication without User's confirmation. (M-Vx)

10.1.3.19 Merging two ongoing communications without User's confirmation is defined as Auto-Merge. (I)

10.1.3.20 Depending on the result of the arbitration - Common Function related to auto-Merge decision process, the outcome shall be one of the following: (M-Vx)

a) The User is automatically connected to the communication and the previously connected communication is put in the User's queue;
b) The User is connected to the communication Merging the new joined one and the previously connected one.

10.1.3.20i Prior to the presentation of a communication to a User, the FRMCS System shall support automatic divertion of communication to another User if one of the following divertion has been activated by an authorised User: (M-Vx)

a) Divertion of all incoming communications;
b) Divertion of communication if the User is already connected to another communication;
c) Divertion of communication if the User is not reachable.

10.1.3.21 Upon presentation of a communication, the User shall be able to select one of the following actions:

a) To accept the communication, the User is connected to the communication, previously connected communication (if applicable) is put in the User's queue; (M)
b) To reject the communication, the User is no longer addressed by the communication; (M)

c) To put on hold the communication, the User is not connected but the communication is kept in the User's queue and is still visually presented; (M-V3)
d) To ignore the communication (do nothing), the communication is kept in the User's queue but automatically rejected after a predefined delay or the communication initiator stopped the attempt. (M-V3)

10.1.3.22 Intentionally deleted.

10.1.3.22i The FRMCS System shall support divertion of communication to another User if the corresponding divertion has been activated by an authorised User in the following cases: (M-Vx)
a) The User rejects the presented communication;
b) The User ignores the presented communication (do nothing).

10.1.3.23 In the case that the User ignores a communication, the delay for automatic rejection shall be configurable, in a range of 10 seconds up to 8 hours. (M)

10.1.3.24 In the case that a User is addressed several times for the same communication due to the fact that this communication is addressed to several Identities assigned to this User, the communication shall only be presented once. (M)

10.1.3.24i In the case the User is addressed several times for the same communication, the first identity addressed by the FRMCS system shall be presented to other participants of the communication. (M-V3)

10.1.3.25 In the case that a User is addressed several times for the same communication due to the fact that this communication is addressed to several Identities assigned to this User, the User's authorisation for this communication shall be the union of all authorisation defined for these Identities. (M)

10.1.3.25i An example of the union of all authorisation can be when a Controller take over several Roles on the same FRMCS User Device, one of them being authorised to terminate a REC-alert, the Controller is authorised to terminate the REC-alert independent from the identity used within the communication. (I)

10.1.3.26 Before accepting a Voice Communication, the User should have the ability to divert this communication to an alternative HMI component or resource of the same device (e.g. loudspeaker). (O-V3)

10.1.4 User handling of an ongoing Voice Communication

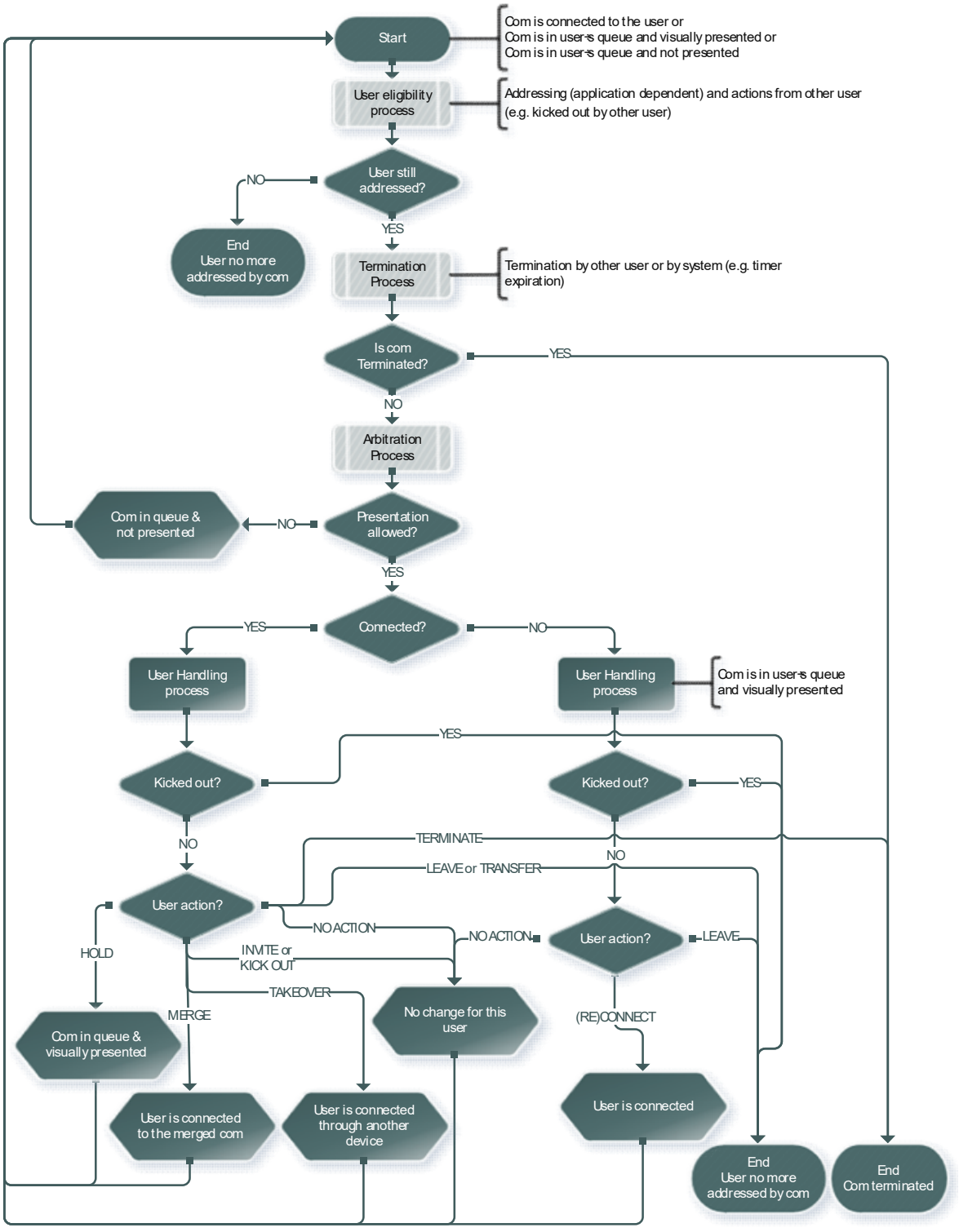


Figure 10-4: User handling of an ongoing communication

10.1.4.0 In Figure 10-4 the process and all possible steps for the User handling of an ongoing communication are given. The requirements in this section specify all steps in this process. (I-V3)

10.1.4.1 As a start of Figure 10-4, it is assumed that the User is connected to a communication, or there is a communication in the queue (either visually presented or not). (I)

10.1.4.2 For a User addressed by a communication for which the eligibility to participate is depending on the User's location, the FRMCS System shall monitor the Geographical Position of the User in order to determine the User's eligibility to be a participant of the communication. (M)

10.1.4.3 The User eligibility shall be determined, based on the following: (M)

a) The addressing mechanism of the related Voice Communication;
b) The actions performed by other Users.

10.1.4.4 If the User is no more eligible, the User shall no longer be addressed. (M)

10.1.4.5 The granted authorisation can be withdrawn e.g. due to the fact the registered function has changed. (I)

10.1.4.6 As long as the communication is ongoing, the FRMCS System shall check if the communication has to be terminated due to system rules (timer expired, etc.), system operator action or User action. (M)

10.1.4.7 Upon termination, the communication shall be stopped. (M)

10.1.4.8 As long as the communication is ongoing, the arbitration - Common Function shall check if the communications which are in the User's queue are to be presented, and if the User is already connected or not to a communication. (M-V3)

10.1.4.9 If presentation is not allowed, the communication shall be queued and not presented. (M)

10.1.4.10 If presentation is allowed, the outcome shall be one of the following: (M-V3)

a) The communication is not connected;
b) The communication is connected.

10.1.4.11 When a Voice Communication has been put on hold, the User shall be able to reconnect later. (M-V3)

10.1.4.12 Any Controller connected to a Voice Communication shall be presented with the relevant identity of the currently talking User(s). (M-V3)

10.1.4.12i Any User connected to a Voice Communication shall be presented with the relevant identity of the currently talking User(s). (M-Vx)

10.1.4.12ii Any User connected to a Voice Communication shall be presented with the User Identity of the currently talking User(s) if no Functional Identity available for this (these) Users. (M-Vx)

10.1.4.13 If not connected, based on User handling, an authorised User shall be able to kick out the User from a communication. In this case the kicked out User is no longer addressed by the communication. (M-Vx)

10.1.4.14 If not connected, based on User handling, when the User is not kicked out, the User shall be able to select one of the following actions:

a) Connect: the User (re-)connects a communication from User's queue; (M)
b) Leave: the User is no longer addressed by the communication; (M-V3)
c) No action: The communication remains in the User's queue. (M)

10.1.4.15 If connected, based on User handling, an authorised User shall be able to kick out another User from a communication. In this case the kicked out User is no longer addressed by the communication either. (M-Vx)

10.1.4.16 If connected, based on User handling, the User shall be able to select one of the following actions:

a) Hold: the User disconnects the communication but keep it in User's queue; (M-V3)
b) Merge: the User merges the connected communication with one of the communications from the User's queue; (M-Vx)
c) Invite by Authorised User: the initiating User invites another User to join the ongoing communication; (M-V3)
d) Kick out: the Authorised User kicks out another User from the communication; (M-Vx)
e) Leave: the User is no longer addressed by the communication; (M-V3)
f) Terminate: the communication is stopped; (M)
g) No action: the User performs no action; (M-V3)
h) Transfer: The Authorised User transfers the connected communication to another User. The User is no longer addressed by the communication after a successful transfer of communication; (M-Vx)
i) Invite by a User who is not the initiator : a User connected to a communication initiated by another User invites other User(s) to join the ongoing communication. (M-Vx)

10.1.4.17 The User who has initiated the Merging of two ongoing communications shall be considered as the initiator of the resulting communication. (M-Vx)

10.1.4.18 In communications handling where the initiator identity has to be taken into account (such as display of initiator identity to other participants, check of authorisation related to the initiator of the communication), the identity of the User who has performed the Merging is to be considered as the initiator. (I)

10.1.4.19 The FRMCS System shall provide a User involved in an ongoing Voice Communication with the ability to request to display the identity/ies, either User or Functional, of the other participants of the communication. (M-Vx)

10.1.4.19i The FRMCS System shall provide a Controller involved in an ongoing Voice Communication with the ability to request to display the identity/ies, either User or Functional, of the other participants of the communication. (M-V3)

10.1.4.20 The FRMCS System shall provide a Controller involved in an ongoing Voice Communication with the ability to request to display all the User- or Functional Identities related to another participant of the communication. (M-V3)

10.1.4.20i The FRMCS System shall provide a User involved in an ongoing Voice Communication with the ability to request to display all the User- or Functional Identities related to another participant of the communication. (M-Vx)

10.1.4.21 The FRMCS System shall provide a Controller involved in an ongoing Voice Communication with the ability to request to display the available Location Information related to another participant of the communication. (O-V3)

10.1.4.22 The FRMCS System shall provide an Authorised User with the ability to invite a User in a Voice Communication by providing the identity of the invited User through the HMI. (M)

10.1.4.22i The FRMCS System shall provide an Authorised User with the ability to invite a User to join an ongoing Voice Communication by providing the identity of the invited User through the HMI. (M-V3)

10.1.4.23 The FRMCS System shall provide a Controller having initiated the Voice Communication with the ability to invite Users to join an ongoing Voice Communication by entering of the identity on the HMI. (M-V3)

10.1.4.23di The FRMCS System shall provide a Controller having initiated the Voice Communication with the ability to invite Users to join an ongoing Voice Communication by selection of the identity from a list presented by the HMI. (M-Vx)

10.1.4.23ai The FRMCS System shall provide an authorised User with the ability to invite Users to join an ongoing Voice Communication by entering of the identity on the HMI. (M-Vx)

10.1.4.23aii The FRMCS System shall provide an authorised User with the ability to invite Users to join an ongoing Voice Communication by selection of the identity from a list presented by the HMI. (M-Vx)

10.1.4.23i The FRMCS System shall provide a User with the ability to transfer a Voice Communication to another User by providing the identity of the other User through the HMI. (M-Vx)

10.1.4.23ii The FRMCS System shall provide a User with the ability to transfer a Voice Communication by selection of the identity from a list presented by the HMI. (M-Vx)

10.1.4.24 Prior to inviting a User to join an ongoing Voice Communication, the FRMCS System shall support the inviting User to be aware of the status of other Users classified on the basis of the following: (M-Vx)

a) Functional Identities elements (Role, area,..) of the Users;
b) Location Information of others Users.

10.1.4.24i For transferring of a communication, the FRMCS System shall support the FRMCS Application & Communication Service to filter the list of other Users displayed based on the following: (M-Vx)

a) Ongoing communication(s);
b) Functional Identities registered by the User.

10.1.4.25 For inviting a User, the FRMCS System shall support the FRMCS Application & Communication Service to filter the list of other Users displayed based on the following: (M-Vx)

a) Ongoing communication(s);
b) Functional Identities registered by the User.

10.1.4.26 A User connected to a Voice Communication shall be able to mute or unmute the microphone. (M)

10.1.4.27 Intentionally deleted.

10.1.4.28 Intentionally deleted.

10.1.4.29 Intentionally deleted

10.1.4.30 Intentionally deleted

10.1.4.31 When a User is connected to the audio stream, the User ability to speak to the Voice Communication depends on the authorisation granted by the talker control - Common Function. (I)

10.1.4.32 Intentionally deleted.

10.1.4.33 The User shall be able to take over a connected Voice Communication from another device having the corresponding FRMCS Application & Communication Service active. (M-Vx)

10.1.4.34 When only one User remains addressed by a Voice Communication, the FRMCS System shall terminate the Voice Communication after a predefined time with a maximum of 8 hours. (M)

10.1.5 User handling of talker control during an ongoing Voice Communication

10.1.5.1 The FRMCS System shall support the following means to manage the talker control:

a) Push-To-Talk functionality; (M)
b) Voice Command mechanism. (O-Vx)

10.1.5.2 The FRMCS User Device shall support at least one the following means to manage the talker control: (M)

a) Push-To-Talk functionality; (M)
b) Voice Command mechanism. (O-Vx)

10.1.6 Usability FRMCS Domain

10.1.6.1 The FRMCS System shall support authorised Users to use available FRMCS Domain(s) to communicate. (M)

10.2 Generic Voice - FRMCS Application

10.2.1 Introduction

10.2.1.1 This FRMCS Application is for Users to perform Voice Communications between two Users or between multiple Users based on recipient identity(/ies) provided by the initiator. (I)

10.2.1.2 This FRMCS Application is for Users to perform Voice Communications between two Users or between multiple Users based on the initiator's Geographical Position. (I)

10.2.1.2i The generic Voice - FRMCS Application can be used for any communication need not explicitly included in this FRS, e.g. specific national needs, a communication between a Controller to a 3rd party, a communication between two Users, a communication between a group of Users, communication not directly related to rail operations. (I)

10.2.1.3 The generic Voice - FRMCS Application is comprehensively captured in this FRMCS section. (I)

10.2.2 Generic requirements

10.2.2.0a When the generic Voice - FRMCS Application is implemented, the requirements of the generic Voice - FRMCS Application as specified in this chapter shall be used. (M)

10.2.2.0 The ability for a User to perform generic Voice Communications, depends on the permissions given by the FRMCS Operator. (I)

10.2.2.1 A User shall be able to initiate a generic Voice Communication to one User. (M)

10.2.2.2 A User shall be able to initiate a generic Voice Communication to multiple Users. (M)

10.2.2.3 A User should be able to initiate a generic Voice Communication to a User outside of the FRMCS System (e.g. PSTN or PBX Non-FRMCS User). (O-V3)

10.2.2.4 A User shall be able to receive a generic Voice Communication. (M)

10.2.2.5 A User should be able to receive a generic Voice Communication based on recipient identity(ies) provided by the initiator from a User outside the FRMCS System (e.g. PSTN or PBX Non-FRMCS User). (O-V3)

10.2.2.6 A User should be able to perform the initiation of a generic Voice Communication by defining each recipient by the Subscriber Identity. (O-V3)

10.2.2.7 A User shall be able to perform the initiation of a generic Voice Communication by defining each recipient by the User Identity. (M)

10.2.2.8 A User shall be able to perform the initiation of a generic Voice Communication by defining the full Functional Identity. (M)

10.2.2.8i A User shall be able to perform the initiation of a generic Voice Communication based on the Functional Identity consisting of labels including Wild card(s). (M-V3)

10.2.2.9 A User shall be able to perform the initiation of a generic Voice Communication by using Group Identity. (M-V3)

10.2.2.10 Intentionally deleted.

10.2.2.10i A User shall be able to perform the initiation of a generic Voice Communication based on the initiator's Geographical Position by providing one of the following input: (M-V3)

a) Functional Identity;
b) Short Dialling Code.

10.2.2.10ii The FRMCS System shall be able to configure generic Voice Communication based on initiator's Geographical Position as following: (M)

a) without corresponding addressed area;
b) with a corresponding addressed area.

10.2.2.10iii For a generic Voice Communication based on initiator's Geographical Position, the FRMCS System shall derive the initiating area based on the initiator's Geographical Position. (M)

10.2.2.10iiia For a generic Voice Communication based on initiator's Geographical Position, the FRMCS System shall derive the initiating area based on Functional Identity. (M-Vx)

10.2.2.10iv For a generic Voice Communication based on initiator's Geographical Position, the FRMCS System shall be able to configure which of the following method shall be used:

a) Derive initiating area from initiator's Geographical Position; (M)
b) Derive initiating area from initiator's Functional Identity. (M-Vx)

10.2.2.10v When a generic Voice Communication based on initiator's Geographical Position without addressed area is used for initiation of the generic Voice Communication, the FRMCS System shall determine the User(s) to be addressed by the communication based on the initiating area. (M)

10.2.2.10vi When a generic Voice Communication based on initiator's Geographical Position with addressed area is used for initiation of the generic Voice Communication, the FRMCS System shall derive the addressed area based on the initiating area. (M)

10.2.2.10vii When a generic Voice Communication based on initiator's Geographical Position with addressed area is used for initiation of the generic Voice Communication, the FRMCS System shall determine the User(s) to be addressed by the communication based on the addressed area. (M)

10.2.2.10viii The concept of initiating and addressed area used for generic Voice Communication are based on those defined for Railway Emergency Communication and multi-Trains communications. (I)

10.2.2.10ix A User shall be able to initiate a generic Voice Communication by selecting one addressed area. (M-V3)

10.2.2.10x A User shall be able to initiate a generic Voice Communication by selecting several addressed areas. (M-Vx)

10.2.2.10xi When a User initiates a generic Voice Communication by selecting several addressed areas, the resulting addressed area shall be the union of the selected addressed areas. (M-Vx)

10.2.2.10xii The FRMCS System shall be able to configure a generic Voice Communication where only the initiating User is allowed to speak (e.g. broadcast communication). (M-V3)

10.2.2.11 Part of a Functional Identity can represent a group of Users e.g. all the Train Drivers of certain Train operator. (I)

10.2.2.12 The FRMCS System should be able to univocally map a Subscriber Identity to a Short Dialling Code. (O-V3)

10.2.2.13 The FRMCS System shall be able to univocally map a User Identity to a Short Dialling Code. (M-V3)

10.2.2.14 The FRMCS System shall be able to univocally map a Functional Identity to a Short Dialling Code. (M-V3)

10.2.2.15 The FRMCS System shall be able to univocally configure a part of Functional Identity to a Short Dialling Code . (M-V3)

10.2.2.15i The FRMCS System shall be able to univocally assign a Short Dialling Code to a generic Voice Communication based on the initiator's Geographical Position. (M-V3)

10.2.2.16 It could happen that a terminal has no screen but only a dial pad e.g. trackside phones. (I)

10.2.2.17 A User shall be able to perform the initiation of a generic Voice Communication dialing a Short Dialling Code. (M-V3)

10.2.2.18 An authorised User involved in an ongoing generic Voice Communication shall be able to invite User(s) to join the communication. (M-V3)

10.2.2.19 A User shall be able to invite a User(s) to an ongoing generic Voice Communication by defining each recipient by the Subscriber Identity. (M-V3)

10.2.2.20 An authorised User shall be able to invite a User(s) to an ongoing generic Voice Communication by defining each recipient by the User Identity. (M-V3)

10.2.2.21 An authorised User shall be able to invite a User(s) to an ongoing generic Voice Communication by defining the recipient(s) by the full Functional Identity. (M-V3)

10.2.2.22 Intentionally deleted.

10.2.2.23 Intentionally deleted.

10.2.2.23i The Functional Identity of the initiator shall be presented to the User addressed by the generic Voice Communication. (M)

10.2.2.23ii The Functional Identity of the called User shall be presented to the User initiating the generic Voice Communication. (M-V3)

10.2.2.24 The User initiation a generic Voice Communication shall be able to choose one of the Functional Identities to be presented to the receiving User(s). (M)

10.2.2.24ai If the User receiving a generic Voice Communication has more than one Functional Identities, the Functional Identity used for addressing the called User, shall be presented to the other participant(s) including the initiator. (M-Vx)

10.2.2.24i A User(s) shall be able to put a generic Voice Communication on hold. (M-V3)

10.2.2.24ii A User who initiates a generic Voice Communication shall be able to terminate this communication. (M)

10.2.2.24iii Intentionally deleted.

10.2.2.24iv A User(s) who receives a generic Voice Communication shall be able to terminate this communication. (M-V3)

10.2.2.25 The following QoS and priority parameters shall be used: (M)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.2.2.26 The FRMCS System shall be able to define addressing rules taking into account the Functional Identity of the initiator of the generic Voice Communication. The addressing rule shall be based on label(s) included in the initiator's Functional Identity. (M-Vx)

10.2.2.27 The FRMCS System shall support the recording of a generic Voice Communication content and its related metadata. (M-V3)

10.2.2.28 The FRMCS system shall be able to enable and disable the talk request and granting mechanism for the Controller(s) involved in a generic Voice Communication. (M-V3)

10.2.2.29 When the talker request and granting mechanism is disabled for Controller(s) involved in a generic Voice Communication, Controller(s) can talk at any time during the communication. (I-V3)

10.2.3 HMI requirements

10.2.3.1 No specific requirements. (I)

10.2.4 Requirements for domain change, Interconnection and Interworking

10.2.4.1 Intentionally deleted.

10.2.4.2 Intentionally deleted.

10.2.4.3 Intentionally deleted.

10.2.4.4 Intentionally deleted.

10.2.4.5 Intentionally deleted.

10.2.4.6 Intentionally deleted.

10.2.4.7 Intentionally deleted.

10.2.4.8 Intentionally deleted.

10.2.4.9 Intentionally deleted.

10.2.4.10 Intentionally deleted.

10.2.4.11 Intentionally deleted.

10.2.4.12 Intentionally deleted.

Domain change generic

10.2.4.13 The User shall be able to manually select an FRMCS Domain. (M)

10.2.4.13i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the User shall be able to manually select the GSM-R system. (M)

10.2.4.14 FRMCS shall without User action support the selection of an FRMCS Domain by an external trigger (e.g. by a balise, Location Information). (M-V3)

10.2.4.14i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the FRMCS System shall support the selection of the GSM-R system by an external trigger without User action (e.g. by a balise, Location Information). (M-V3)

10.2.4.15 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction of the User. (M-V3)

10.2.4.16 The FRMCS System shall provide information to the User when a change of FRMCS Domain and service has occurred. (M)

Domain change FRMCS to FRMCS

10.2.4.17 When a User with no active generic Voice Communication is moving from an FRMCS Domain to another FRMCS Domain, the User shall be able to initiate a generic Voice Communication excluding the period of domain change. (M)

10.2.4.17i Intentionally deleted.

10.2.4.18 When a User with an active generic Voice Communication is moving from an FRMCS Domain to another FRMCS Domain, the Voice Communication shall not be dropped. (M-Vx)

10.2.4.19 When the generic Voice Communication is dropped during an FRMCS Domain change, the User shall be able to re-establish the communication towards the same recipient(s) with the specified quality of service. (M)

Domain change FRMCS to GSM-R

10.2.4.20 When a User is moving from the FRMCS Domain to the GSM-R system, the reregistration of the Functional Identity in the new system should be done automatically. (O-V3)

10.2.4.21 When a User with no active generic Voice Communication is moving from an FRMCS Domain to the GSM-R system, the User shall be able to initiate a generic Voice Communication excluding the period of domain change. (M)

10.2.4.22i Intentionally deleted

10.2.4.22 When a User with an active generic Voice Communication is moving from an FRMCS Domain to the GSM-R system, a drop of the communication is acceptable. (I)

10.2.4.23 When the generic Voice Communication is dropped during an FRMCS to GSM-R Domain change, the User is able to re-establish the communication towards the same recipient(s). (I)

Domain change GSM-R to FRMCS

10.2.4.24 When a User is moving from the GSM-R domain to the FRMCS System, the reregistration of the Functional Identity in the new system should be done automatically. (O-V3)

10.2.4.25 When a User with no active generic Voice Communication is moving from the GSM-R system to an FRMCS Domain, the User shall be able to initiate a generic Voice Communication excluding the period of domain change. (M)

10.2.4.25i Intentionally deleted.

10.2.4.26 When a User with an active generic Voice Communication is moving from the GSM-R system to an FRMCS Domain, a drop of the communication is acceptable. (I)

10.2.4.27 When the generic Voice Communication is dropped during the GSM-R system to an FRMCS Domain change, the User should be able to re-establish the communication towards the same recipient(s) with the specified quality of service. (O)

Interconnection

Between FRMCS Domains

10.2.4.28 A User shall be able to initiate a generic Voice Communication to recipient(s) located in another FRMCS Domain. (M)

Interworking

From FRMCS to GSM-R

10.2.4.29 A User in an FRMCS Domain shall be able to initiate a generic Voice Communication to recipient(s) located in the GSM-R system. (M)

10.2.4.30 It is assumed that the inviting User may not be aware that the invited User is logged in the GSM-R system. (I)

10.2.4.31 The inviting User needs only to provide (e.g. select or dial) FRMCS formatted Identities. The FRMCS System shall perform the translation and the mapping between the corresponding GSM-R Functional Identities. (M)

10.2.4.32 A User shall be able to invite a GSM-R user to join an ongoing Voice Communication by using one of the following:

a) The (MS)ISDN number of the invited GSM-R user; (O-V3)
b) One of the Functional Identities of the invited GSM-R user. (M-Vx)

10.2.4.33 The FRMCS System shall present the Functional Identity of the inviting User to the invited GSM-R user in a format compliant to the GSM-R system numbering plan. (M)

10.2.4.34 When no relevant Functional Identity is available for the initiator/inviting user, one of the following Identities in a GSM-R compatible format shall be presented to the GSM-R user.

a) User Identity; (M)
b) Subscriber Identity. (O-V3)

From GSM-R to FRMCS

10.2.4.35 A user in the GSM-R system shall be able to initiate a generic Voice Communication to recipient(s) located in an FRMCS Domain. (M)

10.2.4.36 It is assumed that the inviting GSM-R user may not be aware that the invited User is logged in the FRMCS System. (I)

10.2.4.37 The inviting GSM-R user needs only to provide (e.g. select or dial) GSM-R formatted Identities. The FRMCS System shall perform the translation and the mapping with the corresponding FRMCS Functional Identities. (M-V3)

10.2.4.38 A User shall be able to receive a communication from a GSM-R user using one of the following addressing methods: (M-V3)

a) The User Identity of the User in a GSM-R compatible format;
b) A GSM-R Functional Identity corresponding to the Functional Identity of the User. Example: 90004120123401 translates to 1234.Leading_driver@2185;
c) The Subscriber Identity of the User in a GSM-R compatible format.

10.2.4.39 The Functional Identity corresponding to the functional number provided by GSM-R system shall be presented to the User. (M-V3)

10.2.4.40 If no functional number is provided by GSM-R system, the (MS)ISDN number shall be presented to the User. If no (MS)ISDN number is available, in case of a GSM-R group call, no (MS)ISDN shall be presented. (M-V3)

10.2.5 Requirements for Off-network

10.2.5.1 To be defined in a later version of the specification. (I-Vx)

10.2.6 Intentionally deleted

10.2.6.1 Intentionally deleted

10.3 On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train - FRMCS Application

10.3.1 Introduction

10.3.1.1 A Driver is able to initiate a Voice Communication to the Controller(s) responsible for the movement of the Train. (I)

10.3.1.2 There are in some countries also a need to call other types of Controllers not directly responsible for the movement of the Train, like power Controller or secondary Controller. (I)

10.3.1.3 The On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train - FRMCS Application is comprehensively captured in this FRMCS Application section. (I)

10.3.1.4 The Train Staff is able to initiate a Voice Communication using the On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train - FRMCS Application to a specific Controller(s) from a fixed On-Board intercom system. (I-V3)

10.3.2 Generic Requirements

10.3.2.1 A Driver shall be able to initiate a Voice Communication to the Controller(s) responsible for the movement of the Train. (M)

10.3.2.1i In the case the Train is equipped with an On-Board intercom system connected to FRMCS, the FRMCS System shall support a member of the Train Staff to initiate an On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train. (M-V3)

10.3.2.1ii The way to interconnect the fixed On-Board intercom system to the FRMCS System is out of scope of this specification. The use of the bus specified within UIC fiches 558 and 568 is an example of implementation. (I-V3)

10.3.2.1iii The Functional Identity assigned to the fixed On-Board intercom system shall be presented to the Addressed Controller(s) of an On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train - FRMCS Application initiated through a fixed On-Board intercom. (M-V3)

10.3.2.2 The Controller(s) receiving the call shall be presented the incoming communication by the following: (M-V3)

a) Functional Identity of the Driver;
b) Type of incoming communication.

10.3.2.3 The Controller(s) receiving the call should be presented the incoming communication by: (O-V3)

a) The Location Information of the Driver.

10.3.2.4 If the Functional Identity of the Driver is not registered in the FRMCS System, the Functional Identity of the vehicle shall be presented. (M-V3)

10.3.2.4i The Functional Identity of the Controller(s) receiving the Voice Communication shall be presented to the Driver. (M-V3)

10.3.2.5 During the call, the Location Information of the initiator presented to the Controller(s) should be updated. (O-Vx)

10.3.2.6 The initiating Driver shall not be presented with status information of the intended recipient(s) prior to initiating the Driver to Controller(s) Voice Communication. (M)

10.3.2.7 The Driver can be presented with the Location Information of the connected Controller(s) during a Driver to Controller(s) Voice Communication. (I)

10.3.2.8 The responsible Controller(s) shall be addressed based on the Geographical Position of the initiator. (M)

10.3.2.8i The responsible Controller(s) should be addressed based on one or a combination of the following:

a) Railway infrastructure element(s) where the initiator is located (e.g. track section ID, station ID, signal box ID, track kilometer marking); (O-V3)
b) Other infrastructure element(s) where the initiator is located. (O-Vx)

10.3.2.9 The responsible Controller(s) should be addressed based on: (O-V3)

a) System configuration on which Controller(function) is responsible for which part of the track, or station, etc.

10.3.2.9i The Driver who initiates a Voice Communication to the Controller(s) shall be able to put this communication on hold. (M-V3)

10.3.2.9ii The Controller(s) who receives a Voice Communication from a Driver shall be able to put this communication on hold. (M-V3)

10.3.2.9iii When multiple Controllers are involved in the Voice Communication, an authorised Controller shall be able to leave the communication. (M-V3)

10.3.2.9iv In a Driver to multiple Controllers Voice Communication, if all Controllers leave the communication, the communication shall be terminated. (M)

10.3.2.9v The Driver who initiates a Voice Communication to the Controller(s) shall be able to terminate this communication. (M)

10.3.2.9vi The Controller who receives a Voice Communication from a Driver shall be able to terminate this communication. (M-V3)

10.3.2.9vii The Driver who initiates a Voice Communication to the Controller(s) shall not be able to invite an additional Controller in this communication. (M-V3)

10.3.2.9viii The Controller who receives a Voice Communication from a Driver shall be able to invite an additional Controller in this communication. (M-V3)

10.3.2.9ix The Controller who receives a Voice Communication from a Driver shall be able to reject this communication. (O-V3)

10.3.2.10 The following QoS and priority parameters shall be used: (M)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.3.2.11 The FRMCS System shall support the recording of an On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train content and its related metadata. (M-V3)

10.3.2.12 The FRMCS system shall be able to disable for a On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) the talk request and granting mechanism for Controller(s). (M-V3)

10.3.2.13 When in a On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) the talk request and granting mechanism is disabled for the Controller(s), Controller(s) can talk at any time while the Driver has to request the permission to talk. (I-V3)

10.3.2.14 If the talker request and granting mechanism is enabled for the Controller(s), the Controller(s) shall have the highest talker priority. (M-V3)

10.3.2.15 The Driver shall have a lower talker priority than the Controller(s). (M-V3)

10.3.3 HMI requirements

10.3.3.1 A single HMI action shall be used to initiate a Voice Communication to the current responsible Controller(s). (M)

10.3.3.2 A single HMI action shall be available to initiate a Voice Communication to other types of Controller(s) such as secondary Controller or power Controller. (M)

10.3.3.3 The Driver shall be able to select from a list the next Controller(s) based on the Train Route Setting. (M-Vx)

10.3.3.4 The Driver shall be able to select from a list the previous Controller(s) based on the Train Route Setting. (M-Vx)

10.3.3.5 A single HMI action shall be used to re-establish a Voice Communication towards a Controller(s) after a Drop of Communication with this Controller(s). (M)

10.3.4 Requirements for domain change, Interconnection and Interworking

10.3.4.1 Intentionally deleted.

10.3.4.2 Intentionally deleted.

Domain change generic

10.3.4.3 The User shall be able to manually select an FRMCS Domain. (M)

10.3.4.3i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the User shall be able to manually select the GSM-R system. (M)

10.3.4.4 The FRMCS System shall without User action support the selection of an FRMCS Domain by an external trigger (e.g. by a balise, Location Information). (M-V3)

10.3.4.4i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the FRMCS System shall support the selection of the GSM-R system by an external trigger without User action (e.g. by a balise, Location Information). (M-V3)

10.3.4.5 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction of the User. (M)

10.3.4.6 The FRMCS System shall provide information to the User when a change of FRMCS Domain and service has occurred. (M)

Domain change FRMCS to FRMCS

10.3.4.7 When a Driver with no active Driver to Controller Voice Communication is moving from an FRMCS Domain to another FRMCS Domain, the Driver shall be able to initiate a Driver to Controller Voice Communication excluding the period of domain change. (M)

10.3.4.7i Intentionally deleted.

10.3.4.8 When a Driver with an active Driver to Controller Voice Communication is moving from an FRMCS Domain to another FRMCS Domain, the Voice Communication shall not be dropped. (M-Vx)

10.3.4.9 When the Driver to Controller communication is dropped during an FRMCS Domain change, the User shall be able to re-establish the communication towards the same Controller(s) with the specified quality of service. (M-Vx)

Domain change FRMCS to GSM-R

10.3.4.10 When a Driver with no active Driver to Controller Voice Communication is moving from an FRMCS Domain to the GSM-R system, the Driver shall be able to initiate a Driver to Controller Voice Communication excluding the period of domain change. (M)

10.3.4.10i Intentionally deleted.

10.3.4.11 When a Driver with an active Driver to Controller Voice Communication is moving from an FRMCS Domain to the GSM-R system, a drop of the communication is acceptable. (I)

10.3.4.12 When the Driver to Controller communication is dropped during an FRMCS to GSM-R domain change, the User is able to re-establish the communication towards the same Controller(s) (I)

Domain change GSM-R to FRMCS

10.3.4.13 When a Driver with no active Driver to Controller Voice Communication is moving from the GSM-R moving from to an FRMCS Domain, the Driver shall be able to initiate a Driver to Controller Voice Communication excluding the period of domain change. (M)

10.3.4.13i Intentionally deleted.

10.3.4.14 When a Driver with an active Driver to Controller Voice Communication is moving from the GSM-R system to an FRMCS Domain, a drop of the communication is acceptable. (I)

10.3.4.15 When the Driver to Controller communication is dropped during the GSM-R system to an FRMCS Domain change, the User should be able to re-establish the communication towards the same Controller(s) with the specified quality of service. (O)

Interconnection

Between FRMCS Domains

10.3.4.16 A Driver shall be able to initiate a Voice Communication to the Controller(s) responsible for the movement of the Train located in another FRMCS Domain. (M)

10.3.4.17 The Driver shall be able to select from a list the next Controller(s) located in another FRMCS Domain, based on the Train Route Setting. (M-Vx)

10.3.4.18 The Driver shall be able to select from a list the previous Controller(s) located in another FRMCS Domain, based on the Train Route Setting. (M-Vx)

Interworking

From FRMCS to GSM-R

10.3.4.19 A Driver in an FRMCS Domain shall be able to initiate a Voice Communication to the Controller(s) located in the GSM-R system responsible for the movement of the Train. (M)

10.3.4.20 The Driver in an FRMCS Domain shall be able to select from a list the next Controller(s) located in the GSM-R system, based on the Train Route Setting. (M-Vx)

10.3.4.21 The Driver in an FRMCS Domain shall be able to select from a list the previous Controller(s) located in the GSM-R system, based on the Train Route Setting. (M-Vx)

From GSM-R to FRMCS

10.3.4.22 A Driver in the GSM-R system shall be able to initiate a Voice Communication to the Controller(s) located in an FRMCS Domain responsible for the movement of the Train. (M)

10.3.5 Requirements for Off-network

10.3.5.1 No specific requirements. (I-Vx)

10.3.6 Intentionally deleted

10.3.6.1 Intentionally deleted

10.4 On-Train incoming Voice Communication from the Controller towards a Train Driver - FRMCS Application

10.4.1 Introduction

10.4.1.1 A Controller is able to initiate a Voice Communication to the Driver of a Train. (I)

10.4.1.2 The On-Train incoming Voice Communication from the Controller towards a Train Driver - FRMCS Application is comprehensively captured in this FRMCS Application section. (I)

10.4.2 Generic Requirements

10.4.2.1 A Controller shall be able to initiate a Voice Communication to a Driver by the Driver's Functional Identity. (M)

10.4.2.2 The Driver shall be able to receive the incoming call from the Controller. (M)

10.4.2.3 The Driver receiving the incoming communication shall be presented with the following:

a) Functional Identity of the Controller; (M)
b) Type of incoming communication. (M-V3)

10.4.2.3ai The Functional Identity of the connected Driver shall be presented to the Controller. (M-V3)

10.4.2.3i The Controller who initiates a Voice Communication towards a Train Driver shall be able to put this communication on hold. (M-V3)

10.4.2.3ii The Driver who receives a Voice Communication from a Controller shall be able to put this communication on hold. (M-V3)

10.4.2.3iii The Controller who initiates a Voice Communication towards a Train Driver shall be able to terminate this communication. (M)

10.4.2.3iv The Driver who receives a Voice Communication from a Controller shall be able to terminate this communication. (M)

10.4.2.3v The Driver who receives a Voice Communication from a Controller shall be able to reject this Communication. (M-V3)

10.4.2.4 The following QoS and priority parameters shall be used: (M)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.4.2.5 The FRMCS System shall support the recording of an On-Train incoming Voice Communication from the Controller towards a Train Driver content and its related metadata. (M-V3)

10.4.2.6 The FRMCS system shall be able to disable for a On-Train incoming Voice Communication from the Controller towards a Train Driver the talk request and granting mechanism for the Controller(s). (M-V3)

10.4.2.7 When in a On-Train incoming Voice Communication from the Controller towards a Train Driver the talk request and granting mechanism is disabled for the Controller(s), the Controller(s) can talk at any time while the Driver has to request the permission to talk. (I-V3)

10.4.2.8 If the talker request and granting mechanism is enabled for the Controller(s), the Controller(s) shall have the highest talker priority. (M-V3)

10.4.2.9 The Driver shall have a lower talker priority than the Controller(s). (M-V3)

10.4.3 HMI requirements

10.4.3.1 No specific requirements. (I)

10.4.4 Requirements for domain change, Interconnection and Interworking

10.4.4.1 Intentionally deleted.

Domain change generic

10.4.4.2 The User shall be able to manually select an FRMCS Domain. (M)

10.4.4.2i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the User shall be able to manually select the GSM-R system. (M)

10.4.4.3 The FRMCS System shall without User action support the selection of an FRMCS Domain by an external trigger (e.g. by a balise, Location Information). (M-V3)

10.4.4.3i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the FRMCS System shall support the selection of the GSM-R system by an external trigger without User action (e.g. by a balise, Location Information). (M-V3)

10.4.4.4 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction of the User. (M-V3)

10.4.4.5 The FRMCS System shall provide information to the User when a change of FRMCS Domain and service has occurred. (M)

Domain change FRMCS to FRMCS

10.4.4.6 When a Driver with no active Controller to Driver Voice Communication is moving from an FRMCS Domain to another FRMCS Domain, the Driver shall be able to receive a Controller to Driver Voice Communication excluding the period of domain change. (M)

10.4.4.6i Intentionally deleted.

10.4.4.7 When a Driver with an active Controller to Driver Voice Communication is moving from an FRMCS Domain to another FRMCS Domain, the Voice Communication should not be dropped. (O-Vx)

10.4.4.8 When the Controller to Driver communication is dropped during an FRMCS Domain change, the Driver shall be able to receive again the communication from the same Controller(s) with the specified quality of service. (M-V3)

Domain change FRMCS to GSM-R

10.4.4.9 When a Driver with no active Controller to Driver Voice Communication is moving from an FRMCS Domain to the GSM-R system, the Driver shall be able to receive a Controller to Driver Voice Communication excluding the period of domain change. (M)

10.4.4.9i Intentionally deleted.

10.4.4.10 When a Driver with an active Controller to Driver Voice Communication is moving from an FRMCS Domain to the GSM-R system, a drop of the communication is acceptable. (I)

10.4.4.11 When the Controller to Driver communication is dropped during an FRMCS to GSM-R domain change, the Driver is able to receive again the communication from the same Controller(s). (I)

Domain change GSM-R to FRMCS

10.4.4.12 When a Driver with no active Controller to Driver Voice Communication is moving from the GSM-R system to an FRMCS Domain, the Driver shall be able to receive a Controller to Driver Voice Communication excluding the period of domain change. (M)

10.4.4.12i Intentionally deleted.

10.4.4.13 When a Driver with an active Controller to Driver Voice Communication is moving from the GSM-R system to an FRMCS Domain, a drop of the communication is acceptable. (I)

10.4.4.14 When the Controller to Driver communication is dropped during GSM-R to an FRMCS Domain change, the Driver shall be able to receive again the communication from the same Controller(s) with the specified quality of service. (M-V3)

Interconnection

Between FRMCS Domains

10.4.4.15 A Controller shall be able to initiate a Voice Communication to a Driver located in another FRMCS Domain by using the Driver's Functional Identity. (M)

Interworking

From FRMCS to GSM-R

10.4.4.16 A Controller in an FRMCS Domain shall be able to initiate a Voice Communication to a Driver located in the GSM-R system by using the Driver's Functional Identity. (M)

From GSM-R to FRMCS

10.4.4.17 A Controller in the GSM-R system shall be able to initiate a Voice Communication to a Driver located in an FRMCS Domain by using the Driver's Functional Identity. (M)

10.4.5 Requirements for Off-network

10.4.5.1 No specific requirements. (I-Vx)

10.4.6 Intentionally deleted

10.4.6.1 Intentionally deleted

10.5 Multi-Train Voice Communication for Drivers - FRMCS Application

10.5.1 Introduction

10.5.1.1 Intentionally deleted.

10.5.1.2 Intentionally deleted.

10.5.1.3 The Multi-Train Voice Communication for Drivers - FRMCS Application is used for operational communication between Drivers and Ground Users(s). (I)

10.5.1.4 The implementation of Multi-Train Voice Communication for Drivers - FRMCS Application is based on operational rules in the specific railway environment. (I)

10.5.1.5 The Multi-Train Voice Communication for Drivers - FRMCS Application is based on the concept of predefined initiating area and predefined addressed area. The initiating area corresponds to the track section where the Multi-Train Voice Communication for Drivers - FRMCS Application is initiated by a User. Based on this initiating area, the FRMCS System will determine a corresponding predefined addressed area where the Users are eligible to be addressed. The eligible Users will be addressed depending on their Functional Identity and optionally on their additional Location Information (Train Route Setting, User's speed and User's direction). Associated to this addressed area, a list of predefined additional Users (e.g. Controllers) will be also addressed. (I)

10.5.1.6 Intentionally deleted.

10.5.1.7 Intentionally deleted.

10.5.1.8 The Multi-Train Voice Communication for Drivers - FRMCS Application is comprehensively captured in this FRMCS Application section. (I)

10.5.2 Intentionally deleted.

10.5.2.1 Intentionally deleted.

10.5.2.2 Intentionally deleted.

10.5.3 Generic requirements

10.5.3.1 A Driver shall be able to initiate a Multi-Train Voice Communication for Drivers with Controller and other Drivers. (M)

10.5.3.2 A Controller shall be able to initiate a Multi-Train Voice Communication for Drivers with Controller(s) and other Drivers. (M)

10.5.3.3 Intentionally deleted.

10.5.3.4 Intentionally deleted.

10.5.3.5 Intentionally deleted.

10.5.3.6 Intentionally deleted.

10.5.3.7 Intentionally deleted.

10.5.3.8 Intentionally deleted.

10.5.3.9 Intentionally deleted.

10.5.3.10 Intentionally deleted.

10.5.3.11 Intentionally deleted.

10.5.3.12 Intentionally deleted.

10.5.3.13 Intentionally deleted.

10.5.3.14 Intentionally deleted.

10.5.3.15 Intentionally deleted.

10.5.3.16 Intentionally deleted.

10.5.3.17 Intentionally deleted.

10.5.3.18 Intentionally deleted.

10.5.3.19 Intentionally deleted.

10.5.3.20 Intentionally deleted.

10.5.3.21 Intentionally deleted.

10.5.3.22 Intentionally deleted.

10.5.3.23 Intentionally deleted.

10.5.3.24 A Controller shall be able to initiate a Multi-Train Voice Communication for Drivers by selecting one addressed area. (M)

10.5.3.24i A Controller shall be able to initiate a Multi-Train Voice Communication for Drivers by selecting several addressed area(s). (M-Vx)

10.5.3.25 When a Controller initiates a Multi-Train Voice Communication for Drivers by selecting several addressed areas, the resulting addressed area shall be the union of the selected addressed areas. (M-Vx)

10.5.3.26 A Controller shall be able to initiate a Multi-Train Voice Communication for Drivers by selecting one of the initiating area. (M-Vx)

10.5.3.26i A Controller shall be able to initiate a Multi-Train Voice Communication for Drivers by selecting several initiating area(s). (M-Vx)

10.5.3.27 When a Controller initiates a Multi-Train Voice Communication for Drivers by selecting several initiating areas, the resulting addressed area shall be the union of the addressed areas corresponding to the selected initiating areas. (M-Vx)

10.5.3.28 A Controller shall be able to initiate a Multi-Train Voice Communication for Drivers for Drivers by providing a specific Train Functional Identity. (M-Vx)

10.5.3.29 When a Controller initiates a Multi-Train Voice Communication for Drivers by providing a specific Train Functional Identity, the addressed area shall be based on the initiating area where this Train is located. (M-Vx)

10.5.3.30 A Controller should be able to initiate a Multi-Train Voice Communication for Drivers by manually defining the addressed area (e.g. by drawing an addressed area on a map or by selecting track sections with start and end location). (O-Vx)

10.5.3.31 When Controller initiates a Multi-Train Voice Communication for Drivers by manually defining the addressed area, the addressed Controllers shall be all the Controllers associated to the predefined addressed areas fully or partially included in the manually defined area. (M-Vx)

10.5.3.32 For a Driver initiated Multi-Train Voice Communication for Drivers, the Geographical Position of the Train shall be used to retrieve the initiating area. (M)

10.5.3.32i For a Driver initiated Multi-Train Voice Communication for Drivers, the User's Geographical Position shall be the position of the Driver in the Train. (M-Vx)

10.5.3.33 For a Driver-initiated Multi-Train Voice Communication for Drivers, one or a combination of the following Location Information elements of the initiating Driver's should be used to retrieve the initiating area:

a) Railway infrastructure element(s) where the initiator is located (e.g. track section ID, station ID, signal box ID, track kilometer marking); (O-V3)
b) Other infrastructure element(s) where the initiator is located. (O-Vx)

10.5.3.34 The Multi-Train Voice Communication for Drivers - FRMCS Application shall address the following Users:

a) Drivers for which the Train is located inside the addressed area; (M)
b) Predefined User(s) for the addressed area, such as Controller(s) by its Functional Identity; (M)
c) Other (handheld) Users which are located inside the addressed area and for which the Function Label matches criteria set by the infrastructure manager. (M-V3)

10.5.3.34i The Multi-Train Voice Communication for Drivers - FRMCS Application shall address the Driver for which the Drivers' User Geographical Position is located inside the addressed area. (M-Vx)

10.5.3.35 The addressing of the Multi-Train Voice Communication for Drivers - FRMCS Application should allow to exclude eligible Drivers based on one or a combination of the following conditions:

a) Train Route Setting; (O-Vx)
b) Intentionally deleted
c) Intentionally deleted

10.5.3.36 The excluded eligible Drivers of the Multi-Train Voice Communication for Drivers - FRMCS Application could be for example:

a) Train Route Setting: Train is routed on a diverging Train route from the initiating area; (I-Vx)
b) Direction: Train moving away from the initiating area; (I)
c) Speed: low speed or stopped Trains. (I)

10.5.3.36i After the initiation phase, the initiator of the Multi-Train Voice Communication for Drivers shall be considered as an Addressed User. (M)

10.5.3.37 It shall be possible to include at setup of the Multi-Train Voice Communication for Drivers additional information (e.g. text, voice prompts) that are permanently presented to the recipients. (M-Vx)

10.5.3.37i It shall be possible during an ongoing Multi-Train Voice Communication for Drivers to change the additional information (e.g. text, voice prompts) that are permanently presented to the recipients. (M-Vx)

10.5.3.37ii It shall be possible during an ongoing Multi-Train Voice Communication for Drivers, if no additional information was inserted at communication setup, to add the additional information (e.g. text, voice prompts) that are permanently presented to the recipients. (M-Vx)

10.5.3.38 It should be possible for an authorised Controller to change the addressed area(s) during an ongoing Multi-Train Voice Communication for Drivers. (O-Vx)

10.5.3.39 The FRMCS System shall monitor the Geographical Position of the Trains in order to determine the Drivers eligibility to participate in the Multi-Train Voice Communication for Drivers - FRMCS Application by addressing the Drivers entering the addressed area and to stop addressing Drivers leaving the addressed area. (M)

10.5.3.40 The ongoing Multi-Train Voice Communication for Drivers shall be permanently indicated to the recipients. (M)

10.5.3.41 An Addressed Driver no longer eligible for the ongoing Multi-Train Voice Communication for Drivers shall be informed and disconnected from the Multi-Train Voice Communication for Drivers. (M)

10.5.3.42 As long as the Multi-Train Voice Communication for Drivers is ongoing, the Controller shall be informed about the Functional Identity of the recipients currently addressed by a Multi-Train Voice Communication for Drivers. (M)

10.5.3.43 As long as the Multi-Train Voice Communication for Drivers is ongoing, the Controller shall be informed about the Functional Identity of the Users no longer addressed by the Multi-Train Voice Communication for Drivers. (M-Vx)

10.5.3.44 It shall be possible for a Controller to Merge two ongoing Multi-Train Voice Communications for Drivers. (M-Vx)

10.5.3.45 After Merging of two Multi-Train Voice Communications for Drivers, the Addressed Users of the resulting Multi-Train Voice Communication for Drivers shall be the union of Users that would have been addressed by each of the initial Multi-Train Voice Communications for Drivers. (M-Vx)

10.5.3.46 A Driver shall be able to put the Multi-Train Voice Communication for Drivers on hold. (M-V3)

10.5.3.47 A Driver shall be able to leave a Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.48 In the case the initiating Driver is moving outside the addressed area of the Multi-Train Voice Communication for Drivers, the ongoing Voice Communication for Drivers shall not be terminated. (M)

10.5.3.49 When the initiating Driver is moving outside the addressed area of the Multi-Train Voice Communication for Drivers, the initiating Driver shall be disconnected and no more be addressed by this Multi-Train Voice Communication for Drivers. (M)

10.5.3.50 A Controller shall be able to put the Multi-Train Voice Communication for Drivers on hold. (M-V3)

10.5.3.51 An authorised Controller shall be able to leave the Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.52 A Controller shall be able to re-join an ongoing Multi-Train Voice Communication for Drivers that the Controller has previously left. (M-V3)

10.5.3.53 An authorised Controller shall be able to terminate the Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.53i The initiator of a Multi-Train Voice Communication for Drivers shall be able to terminate the Multi-Train Voice Communication for Drivers. (M)

10.5.3.54 Intentionally deleted.

10.5.3.54i The FRMCS System shall support the ability to configure which Driver(s) shall be able to terminate the Multi-Train Voice Communication for Drivers:

a) No Driver; (M-Vx)
b) All Drivers; (M-V3)
c) Initiating Driver. (M-Vx)

10.5.3.55 On termination of the Multi-Train Voice Communication for Drivers, all involved Users shall be informed. (M)

10.5.3.56 The FRMCS System shall support the presentation of additional information (e.g. text, voice prompts) to the Addressed Users upon termination of the Multi-Train Voice Communication for Drivers. (M-Vx)

10.5.3.57 Intentionally deleted.

10.5.3.58 The FRMCS System shall be able to configure georeferenced polygons to define the initiating areas used for Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.59 The FRMCS System shall be able to configure georeferenced polygons to define for each initiating area a corresponding addressed area used for Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.60 For each addressed area used for Multi-Train Voice Communication for Drivers, the FRMCS System shall be able to predefine:

a) Controllers who are able to initiate the Multi-Train Voice Communication; (M)
b) Controllers who are to be addressed by the Multi-Train Voice Communication for Drivers; (M)
c) Controllers who are able to leave the Multi-Train Voice Communication for Drivers; (M-V3)
d) Controllers who are able to terminate the Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.61 For each addressed area used for Multi-Train Voice Communication for Drivers, the FRMCS System shall support to predefine the Driver(s) authorised to terminate the Multi-Train Voice Communication, the outcome being the following:
a) No Driver; (M-V3)
b) All Drivers; (M-V3)
c) Initiating Driver (M-Vx)

10.5.3.62 The FRMCS System shall be able to define the Function Labels (e.g. track side worker, shunter) authorised to use the Multi-Train Voice Communication for Drivers - FRMCS Application in the same manner as a Driver does. (M-Vx)

10.5.3.63 The FRMCS System shall be able to define the Function Labels (e.g. like Train traffic Controller, track side work Controller, shunting Controller) authorised to use the Multi-Train Voice Communication for Drivers - FRMCS Application in the same manner as a Controller does. (M-Vx)

10.5.3.64 A Controller shall have the option to address other Driver(s) and Controllers(s) outside the addressed area based on a list of Users eligible for a Multi-Train Voice Communications for Drivers, presented to the Controller by the HMI. The list shall dynamically be generated based on the currently registered Functional Identities of the intended recipients. (M-Vx)

10.5.3.65 When the last User leaves Multi-Train Voice Communication for Drivers, the FRMCS System shall support to define one of the following:
a) Multi-Train Voice Communication is terminated; (M-V3)
b) Multi-Train Voice Communication remains active. (M-Vx)

10.5.3.65i When the last User leaves Multi-Train Voice Communication for Drivers and the Multi-Train Voice Communication remains active, the FRMCS System shall support a timer to terminate the Multi-Train Voice Communication of maximum 8 hours. (M-Vx)

10.5.3.66 The following QoS and priority parameters shall be used for Multi-Train Voice Communication for Drivers: (M)
a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.5.3.67 The FRMCS System shall support the recording of a Multi-Train Voice Communication for Drivers content and its related metadata. (M-V3)

10.5.3.68 A Controller shall be allowed to invite a user in a Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.69 A Driver shall not be allowed to invite a user in a Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.70 A Controller should be allowed to reject a Multi-Train Voice Communication for Drivers. (O-V3)

10.5.3.71 A Driver shall not be allowed to reject a Multi-Train Voice Communication for Drivers. (M-V3)

10.5.3.72 The FRMCS system shall be able to disable for a Multi-Train Voice Communication the talk request and granting mechanism for the Controller(s). (M-V3)

10.5.3.73 When in a Multi-Train Voice Communication the talk request and granting mechanism is disabled for the Controller(s), Controller(s) can talk at any time while the Drivers have to request the permission to talk. (I-V3)

10.5.3.74 If the talker request and granting mechanism is enabled for the Controller(s), the Controller(s) shall have the highest talker priority. (M-V3)

10.5.3.75 The Drivers shall have a lower talker priority than the Controller(s). (M-V3)

10.5.4 HMI requirements

10.5.4.1 The initiation of a Multi-Train Voice Communication for Drivers, the action of putting it on hold or to connect to it is achieved with the minimum of interaction (for example, a single button press or selection from a list). Where selection from a list is determined to be the preferred option, then the list is accessed with the minimum of interaction and is presented in an intuitive manner. (I)

10.5.5 Requirements for domain change, Interconnection and Interworking

10.5.5.1 Intentionally deleted.

10.5.5.2 Intentionally deleted.

10.5.5.3 Intentionally deleted.

10.5.5.4 Intentionally deleted.

Domain change generic

10.5.5.5 The Driver shall be able to manually select an FRMCS Domain. (M)

10.5.5.5i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the User shall be able to manually select the GSM-R system. (M)

10.5.5.6 The FRMCS System shall without User action support the selection of an FRMCS Domain by an external trigger (e.g. by a balise, Location Information). (M-V3)

10.5.5.6i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the FRMCS System shall support the selection of the GSM-R system by an external trigger without User action (e.g. by a balise, Location Information). (M-V3)

10.5.5.7 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction of the User. (M-V3)

10.5.5.8 The FRMCS System shall provide information to the User when a change of FRMCS Domain and service has occurred. (M)

Domain change FRMCS to FRMCS

10.5.5.9 When a Driver with no active Multi-Train Voice Communication for Drivers is moving from an FRMCS Domain to another FRMCS Domain, the Driver shall be able to initiate a Multi-Train excluding the period of domain change. (M)

10.5.5.9i Intentionally deleted.

10.5.5.10 When a Driver with no active Multi-Train Voice Communication for Drivers is moving from an FRMCS Domain to another FRMCS Domain, the Driver shall be able to receive a Multi-Train excluding the period of domain change. (M)

10.5.5.10i Intentionally deleted.

10.5.5.11 When a Driver with an active Multi-Train Voice Communication for Drivers is moving from an FRMCS Domain to another FRMCS Domain within the same addressed area, the Multi-Train shall not be interrupted. (M-Vx)

10.5.5.12 When the Multi-Train Voice Communication for Drivers is interrupted during an FRMCS Domain change, the FRMCS System shall re-address the User automatically as soon as the domain change is completed. (M)

Domain change FRMCS to GSM-R

10.5.5.13 When a Driver with no active Multi-Train Voice Communication for Drivers is moving from an FRMCS Domain to the GSM-R system, the Driver shall be able to initiate a Multi-Train Voice Communication for Drivers excluding the period of domain change.. (M)

10.5.5.13i Intentionally deleted.

10.5.5.14 When a Driver with no active Multi-Train Voice Communication for Drivers is moving from an FRMCS Domain to the GSM-R system, the Driver shall be able to receive a Multi-Train Voice Communication for Drivers excluding the period of domain change. (M)

10.5.5.14i Intentionally deleted.

10.5.5.15 When a Driver with an active Multi-Train Voice Communication for Drivers is moving from an FRMCS Domain to the GSM-R system within the same addressed area, the Multi-Train Voice Communication for Drivers should not be interrupted. (O-Vx)

10.5.5.16 When the Multi-Train Voice Communication for Drivers is interrupted during an FRMCS to GSM-R domain change, the Driver rejoins automatically the Multi-Train as soon as the domain change is completed. (I-V3)

Domain change GSM-R to FRMCS

10.5.5.17 When a Driver with no active Multi-Train Voice Communication for Drivers is moving from the GSM-R system to an FRMCS Domain, the Driver shall be able to initiate a Multi-Train Voice Communication for Drivers excluding the period of domain change. (M)

10.5.5.17i Intentionally deleted.

10.5.5.18 A Driver with no active Multi-Train Voice Communication for Drivers is moving from the GSM-R system to an FRMCS Domain, the User shall be able to receive a Multi-Train Voice Communication for Drivers excluding the period of domain change. (M)

10.5.5.18i Intentionally deleted.

10.5.5.19 When a Driver with an active Multi-Train Voice Communication for Drivers is moving from the GSM-R system to an FRMCS Domain within the same addressed area, the Multi-Train Voice Communication for Drivers should not be interrupted. (O-Vx)

10.5.5.20 When the Multi-Train Voice Communication for Drivers is interrupted during a GSM-R to FRMCS Domain change, the FRMCS System shall re-address the Driver automatically as soon as the domain change is completed. (M)

Interconnection

Between FRMCS Domains

10.5.5.21 Intentionally deleted.

Interworking

From FRMCS to GSM-R

10.5.5.22 The FRMCS System shall enable the Interworking between a Multi-Train Voice Communication for Drivers in the FRMCS System and a voice group communication in the GSM-R system. (M-V3)

10.5.5.23 A Multi-Train Voice Communication for Drivers initiated within the FRMCS Domain shall trigger the initiation of an all Drivers group call in the GSM-R system to establishment communication to GSM-R Drivers and GSM-R Ground User(s). (M)

10.5.5.24 When the Multi-Train Voice Communication for Drivers in the FRMCS Domain is terminated, the all Drivers group call in the GSM-R system shall be terminated. (M-V3)

10.5.5.24i When an authorised User terminates the all Drivers group call in the GSM-R system, the Multi-Train Voice Communication for Drivers in the FRMCS System shall be terminated. (M-Vx)

10.5.5.25 The Multi-Train Voice Communication for Drivers and the GSM-R group call shall be linked together and controlled by the FRMCS System (no changes required in the GSM-R system). (M)

From GSM-R to FRMCS

10.5.5.26 The FRMCS System shall enable the Interworking between a Multi-Train Voice Communication for Drivers in the GSM-R system and a voice group communication in the FRMCS System. (M-V3)

10.5.5.27 The FRMCS System shall route an all Drivers group call initiated within the GSM-R system to the appropriate User(s) by establishing a corresponding Multi-Train Voice Communication for Drivers. (M)

10.5.5.28 When the all Drivers group call in the GSM-R system is terminated, the Multi-Train Voice Communication for Drivers in the FRMCS Domain shall be terminated. (M-V3)

10.5.5.28i When an authorised User terminates the Multi-Train Voice Communication for Drivers in the FRMCS System, the all Drivers group call in the GSM-R system shall be terminated. (M-Vx)

10.5.5.29 The Multi-Train Voice Communication for Drivers and the GSM-R group call shall be linked together and controlled by the FRMCS System (no changes required in the GSM-R system). (M)

10.5.6 Requirements for Off-network

10.5.6.1 No specific requirements. (I-Vx)

10.5.7 Intentionally deleted

10.5.7.1 Intentionally deleted

10.6 Banking Voice Communication - FRMCS Application

10.6.1 Introduction

10.6.1.1 A Driver is able to set up a Voice Communication to all Drivers of the same Train. If needed, a Controller is able to become part of that communication. (I-V3)

10.6.1.2 Banking Voice Communication - FRMCS Application can be a user-to-user or a multi-user communication. (I-V3)

10.6.1.3 The Banking Voice Communication - FRMCS Application is comprehensively captured in this FRMCS Application section. (I-V3)

10.6.2 Generic Requirements

10.6.2.1 All Drivers of the same Train shall receive a notification, once a new functional Train Driver Identity of the same Train is registered. (M-Vx)

10.6.2.2 An Authorised Driver shall be able to set up a Banking Voice Communication to all Drivers of the same Train. (M-V3)

10.6.2.3 The initiating Driver shall be able to invite the responsible Controller(s) for the movement of the Train to an ongoing Banking Voice Communication. (M-V3)

10.6.2.3ai The Authorised Driver shall be able to invite the responsible Controller(s) for the movement of the Train to an ongoing Banking Voice Communication. (M-V3)

10.6.2.3i The IM system administrator shall be able to configure the Drivers who are allowed to use the AVC - Common Function. (M-Vx)

10.6.2.3ii An Authorised Driver shall be able to initiate an assured voice communication during Banking Voice Communication. (M-Vx)

10.6.2.3iii The Geographical Position of the inviting Driver Controllershall be used to address the responsible Controller. (M-V3)

10.6.2.4 An Authorised Controller shall be able to join an ongoing Banking Voice Communication by initiating a communication towards any Driver involved in the ongoing Banking Voice Communication. (M-V3)

10.6.2.5 Connecting an Authorised Controller to an ongoing Banking Voice Communication shall be performed without any interaction of the Drivers. (M-V3)

10.6.2.6 The joining Controller shall be informed that a Banking Voice Communication has been joined. (M-V3)

10.6.2.6i A Controller shall be able to leave an ongoing Banking Voice Communication. (M-V3)

10.6.2.7 A Controller shall not be authorised to terminate a Banking Voice Communication. (M-V3)

10.6.2.7i Drivers shall not be able to leave the Banking Voice Communication. (M-V3)

10.6.2.8 Only the leading Driver shall be able to terminate a Banking Voice Communication. (M-V3)

10.6.2.9 The following QoS and priority parameters shall be used for Banking Voice Communication: (M-V3)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.6.2.10 The FRMCS System shall support the recording of a Banking Voice Communication content and its related metadata. (M-V3)

10.6.3 HMI requirements

10.6.3.1 The initiation of a Banking Voice Communication, the action of putting it on hold or to connect to it is achieved with the minimum of interaction (for example, a single button press or selection from a list). Where selection from a list is determined to be the preferred option, then the list is accessed with the minimum of interaction and is presented in an intuitive manner. (I-V3)

10.6.3.2 Terminating a Banking Voice Communication shall be performed by pressing a key on the HMI of the leading Driver. (M-V3)

10.6.3.3 Putting the handset on hook shall not terminate an ongoing Banking Voice Communication. (M-V3)

10.6.3.4 The activation of AVC - Common Function during an ongoing Banking Voice Communication shall be achieved with a single HMI action. (M-V3)

10.6.3.5 A successful activation of the AVC - Common Function shall be indicated with audible and/or a visible information to the involved Drivers. (M-V3)

10.6.3.6 An interrupted AVC - Common Function during an ongoing Banking Voice Communication shall be indicated on the Driver by an acoustic alarm and a dedicated icon without any User interaction. (M-V3)

10.6.3.7 The Functional Identity/ies of the Driver(s) with interrupted AVC - Common Function shall be indicated to the remaining Driver(s) using AVC - Common Function. (M-V3)

10.6.4 Requirements for domain change, Interconnection and Interworking

10.6.4.1 Intentionally deleted.

10.6.4.2 Intentionally deleted.

10.6.4.3 Intentionally deleted.

10.6.4.4 Intentionally deleted.

Domain change generic

10.6.4.5 The Driver shall be able to manually select an FRMCS Domain. (M-V3)

10.6.4.5i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the User shall be able to manually select the GSM-R system. (M-V3)

10.6.4.6 The FRMCS System shall without User action support the selection of an FRMCS Domain by an external trigger (e.g. by a balise, Location Information). (M-Vx)

10.6.4.6i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the FRMCS System shall support the selection of the GSM-R system by an external trigger without User action (e.g. by a balise, Location Information). (M-Vx)

10.6.4.7 Upon changing FRMCS Domains, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be transparent (no interaction required with the User) for the User. (M-Vx)

10.6.4.8 The FRMCS System shall provide information to the User when a change of FRMCS Domain and service has occurred. (M-V3)

Domain change FRMCS to FRMCS

10.6.4.9 When a Driver with no active Banking Voice Communication is moving from an FRMCS Domain to another FRMCS Domain, the Driver should be able to initiate a Banking Voice Communication excluding the period of domain change by the FRMCS System. (O-V3)

10.6.4.9i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (M-V3)

10.6.4.10 When a Driver with an active Banking Voice Communication is moving from an FRMCS Domain to another FRMCS Domain, the Voice Communication should not be dropped. (O-Vx)

10.6.4.11 When the Banking Voice Communication is dropped during an FRMCS Domain change, the Driver shall be able to re-establish the communication towards the same recipient(s) with the specified quality of service. (M-Vx)

Domain change FRMCS to GSM-R

10.6.4.12 When a Driver is moving from the FRMCS Domain to the GSM-R system, the reregistration of the Functional Identity in the new system shall be done automatically. (M-Vx)

10.6.4.13 When a Driver with no active Banking Voice Communication is moving from an FRMCS Domain to GSM-R, the Driver should be able to initiate a Banking Voice Communication excluding the period of domain change by the FRMCS system. (O-V3)

10.6.4.13i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (M-V3)

10.6.4.14 When a Driver with an active Banking Voice Communication is moving from an FRMCS Domain to GSM-R, a drop of the communication is acceptable. (I-V3)

10.6.4.15 When the Banking Voice Communication is dropped during an FRMCS to GSM-R domain change, the Driver is able to re-establish the communication towards the same recipient(s). (I-V3)

Domain change GSM-R to FRMCS

10.6.4.16 When a Driver is moving from the GSM-R system to the FRMCS Domain, the reregistration of the Functional Identity in the new system shall be done automatically. (M-Vx)

10.6.4.17 When a Driver with no active Banking Voice Communication is moving from the GSM-R system to an FRMCS Domain, the Driver should be able to initiate a Banking Voice Communication excluding the period of domain change by the FRMCS system. (O-V3)

10.6.4.17i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (M-V3)

10.6.4.18 When a Driver with an active Banking Voice Communication is moving from the GSM-R system to an FRMCS Domain, a drop of the communication is acceptable. (I-V3)

10.6.4.19 When the Banking Voice Communication is dropped during the GSM-R system to an FRMCS Domain change, the Driver should be able to re-establish the communication towards the same recipient(s) with the specified quality of service, with the condition that all Users of the Banking Voice Communication are in the same system. (O-V3)

Interconnection

Between FRMCS Domains

10.6.4.20 A Driver should be able to initiate a Banking Voice Communication to recipient(s) located in another FRMCS Domain. (O-Vx)

Interworking

From FRMCS to GSM-R

10.6.4.21 A Banking Voice Communication initiated within the FRMCS System shall trigger the initiation of a group call in the GSM-R system to establishment communication to GSM-R Driver(s) and GSM-R Ground User(s). (M-Vx)

10.6.4.22 The Banking Voice Communication for Drivers including Ground User(s) communication shall be linked together and controlled by the FRMCS System. (M-Vx)

10.6.4.23 Service Interworking between the talker control in the FRMCS System and the GSM-R system is not required. The handling of the talker control is expected to be done independently in the GSM-R and FRMCS Systems. (I-Vx)

From GSM-R to FRMCS

10.6.4.24 The FRMCS Systems shall route a Banking Voice Communication initiated within the GSM-R system to the appropriate FRMCS Driver(s) and FRMCS Ground User(s). (M-Vx)

10.6.4.25 The Banking Voice Communication for Drivers including Ground User(s) communication shall be linked together and controlled by the FRMCS System. (M-Vx)

10.6.4.26 Service Interworking between the talker control in the FRMCS System and the GSM-R system is not required. The handling of the talker control is expected to be done independently in the GSM-R and FRMCS Systems. (I-Vx)

10.6.5 Requirements for Off-network

10.6.5.1 No specific requirements. (I-Vx)

10.6.6 Intentionally deleted

10.6.6.1 Intentionally deleted

10.7 Trackside Maintenance Voice Communication - FRMCS Application

10.7.1 Introduction

10.7.1.1 This section describes the requirements for the Trackside Maintenance Voice Communication - FRMCS Application. This Voice Communication is used for Trackside Maintenance workers to communicate with colleague trackside workers or other Ground Users / Controllers (for example to enable a possession of the line to be taken and subsequently given up once the maintenance activity is complete). (I-Vx)

10.7.1.2 The Trackside Maintenance Voice Communication can be point to point or multi-user and Bi-directional or Uni-directional. (I-Vx)

10.7.1.3 The Trackside Maintenance Voice Communication is based on the concept of an targeted area (the area where Users are likely to receive the Trackside Maintenance voice) and Addressed Users (Users addressed or to be addressed by the Trackside Maintenance Voice Communication). (I-Vx)

10.7.1.4 The targeted area can be a geographical area around the location of the initiator, predefined by configuration in the FRMCS System or automatically defined at session setup time according to specific operational rules. (I-Vx)

10.7.1.5 When the targeted area has been determined, the FRMCS System identifies the Addressed Users eligible to receive the Trackside Maintenance Voice Communication. (I-Vx)

10.7.1.6 The Trackside Maintenance Voice Communication - FRMCS Application is comprehensively captured in this FRMCS Application section. (I-Vx)

10.7.2 Generic Requirements

10.7.2.1 The User shall be able to select from a list the Trackside Maintenance Voice Communication to be initiated or joined. (M-Vx)

10.7.2.2 The Authorised User should be able to initiate a Trackside Maintenance Voice Communication by selecting the targeted area using one of the following methods: (O-Vx)

a) Select a predefined geographical area on a map, or;
b) Draw a geographical area on a map.

10.7.2.3 Users shall, when receiving an incoming Trackside Maintenance Voice Communication, be presented with the following: (M-Vx)

a) Location Information of the originator;
b) Description of the type incoming communication;
c) Functional Identity of the originator.

10.7.2.4 During an ongoing Trackside Maintenance Voice Communication Users shall be presented with the following: (M-Vx)

a) Status of the intended recipient;
b) Functional Identities elements (e.g. Role, area) of the currently connected User(s).

10.7.2.5 During an ongoing Trackside Maintenance Voice Communication Authorised Users shall be presented with Location Information of the currently connected User(s). (M-Vx)

10.7.2.6 During an ongoing Trackside Maintenance Voice Communication User should be presented with Location Information of the currently connected all User(s). (O-Vx)

10.7.2.7 It shall be possible to route the Trackside Maintenance Voice Communication based on one or a combination of the following: (M-Vx)

a) Location of the initiator;
b) Location of the intended recipient;
c) Location of the maintenance activity;
d) Functional Identity of the initiator;
e) Functional Identity of the intended recipient.

10.7.2.7i User(s) involved in a Trackside Maintenance Voice Communication shall be able to put the Voice Communication on hold. (M-Vx)

10.7.2.7ii User(s) involved in a Trackside Maintenance Voice Communication shall be able to leave the Voice Communication. (M-Vx)

10.7.2.7iii An authorised trackside worker shall be able to terminate the Trackside Maintenance Voice Communication. (M-Vx)

10.7.2.7iv An authorised User(s) shall be able to terminate the Trackside Maintenance Voice Communication. (M-Vx)

10.7.2.7v If all Users have left the Trackside Maintenance Voice Communication, the FRMCS System shall terminate the trackside Voice Communication. (M-Vx)

10.7.2.8 The following QoS and priority parameters shall be used: (M-Vx)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.7.2.9 The FRMCS System shall support the recording of a Trackside Maintenance Voice Communication content and its related metadata. (M-Vx)

10.7.3 HMI requirements

10.7.3.1 The User interface needs to be adaptable to the work environment of trackside Users (for example helmet with microphone, work gloves, voice interaction, noise canceling). (I-Vx)

10.7.3.2 The initiation of a Trackside Maintenance Voice Communication is achieved with the minimum of interaction (for example, a single button press or selection from a list). Where selection from a list is determined to be the preferred option, then the list is accessed with the minimum of interaction and is presented in an intuitive manner. (I-Vx)

10.7.4 Requirements for domain change, Interconnection and Interworking

10.7.4.1 A Trackside Maintenance Voice Communication initiated within the FRMCS System shall trigger the initiation of a Voice Communication in the GSM-R system to establishment communication to GSM-R user(s). (M-Vx)

10.7.4.2 The FRMCS Systems shall route a group call dedicated for Trackside Maintenance initiated within the GSM-R system to the appropriate User(s). (M-Vx)

10.7.4.3 The Trackside Maintenance Voice Communication and the GSM-R Trackside Maintenance group call shall be linked together and controlled by the FRMCS System. (M-Vx)

10.7.4.4 Service Interworking between the talker control in the GSM-R system and the FRMCS System is not required. The handling of the talker control is expected to be done independently in the GSM-R and FRMCS Systems. (I-Vx)

10.7.5 Requirements for Off-network

10.7.5.1 No specific requirements. (I-Vx)

10.7.6 Intentionally deleted

10.7.6.1 Intentionally deleted

10.8 Shunting Voice Communication - FRMCS Application

10.8.1 Introduction

10.8.1.1 The Shunting Voice Communication is used for operational Voice Communications within one or more Shunting Team(s). (I-V3)

10.8.1.2 Shunting Teams are a composition of shunting Drivers, shunting leaders, shunting workers. Authorised Controllers and other Authorised Ground Users can be associated to Shunting Teams. (I-V3)

10.8.1.3 The Shunting Voice Communication - FRMCS Application is comprehensively captured in this FRMCS Application section. (I-V3)

10.8.2 Generic Requirements

10.8.2.1 The shunting team composition shall be created based on shunting team identification, as part of functional identities. (M-V3)

10.8.2.2 It shall be possible to predefine shunting teams and their associated User(s) (e.g. Controller(s) and/or Ground User(s)) by the IM system administrator. (M-V3)

10.8.2.3 The IM system administrator shall be able to configure the shunting team members who are allowed to use the AVC - Common Function. (M-V3)

10.8.2.4 The IM system administrator shall be able to configure the shunting team members who are allowed to use the invite-a-user - Common Function. (M-V3)

10.8.2.5 A Shunting Team member shall be able to initiate a Shunting Voice Communication with the Shunting Team the User is registered to (Team Identity). (M-V3)

10.8.2.6 An entitled Shunting Team member shall be able to invite additional user(s) to the an existing Voice Communication. (M-V3)

10.8.2.6i When inviting a controller (s). (M-V3)

10.8.2.7 After registration of a new Shunting Team member the User shall automatically join the ongoing Shunting Voice Communication . (M-V3)

10.8.2.8 An entitled shunting team member shall be able to initiate an assured voice communication. (M-V3)

10.8.2.9 An entitled Controller shall be able to initiate a Shunting Voice Communication to a Shunting Team. (M-V3)

10.8.2.10 An entitled Controller shall be able to join an ongoing Shunting Voice Communication . (M-V3)

10.8.2.11 During an ongoing shunting voice communication users shall be presented with:

a) Status of the intended recipient, and; (M-Vx)
b) Functional identities elements (e.g. role, area) of the currently connected user(s). (M-V3)

10.8.2.12 A member of an ongoing shunting communication should be informed about users that are currently speaking. (O-Vx)

10.8.2.13 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.8.2.14 A shunting team member shall be able to leave an ongoing shunting voice communication. (M-V3)

10.8.2.15 Only the Shunting Team leader shall be able to terminate the Shunting Voice Communication. (M-V3)

10.8.2.16 If only one shunting team member is remaining in the shunting voice communication, the FRMCS system shall automatically terminate the shunting voice communication. (M-V3)

10.8.2.17 The FRMCS System shall support the recording of a Shunting Voice Communication content and its related metadata. (M-V3)

10.8.3 HMI requirements

10.8.3.1 The activation of AVC - Common Function during an ongoing Shunting Voice Communication shall be achieved with a single HMI action. (M-V3)

10.8.3.2 A successful activation of the AVC - Common Function shall be indicated with audible and/or a visible information to the involved Shunting Team members. (M-V3)

10.8.3.3 An interrupted AVC - Common Function during an ongoing Shunting Voice Communication shall be indicated on the User Device by an acoustic alarm and a dedicated icon without any User interaction. (M-V3)

10.8.3.4 The Functional Identity/ies of the User(s) with interrupted AVC - Common Function should be indicated to the remaining Shunting Team members using AVC - Common Function. (O-V3)

10.8.3.5 The User interface needs to be adaptable to the work environment of trackside Users (for example helmet with microphone, work gloves, voice interaction, noise canceling). (I-V3)

10.8.4 Requirements for domain change, Interconnection and Interworking

10.8.4.1 It is considered that all Shunting Team members are part of the FRMCS System. It is possible that driver(s) may use the GSM-R system during shunting voice communication. (I-Vx)

10.8.4.2 The driver(s) of a shunting team, that are attached to the GSM-R-System, shall be registered to dedicated functional identity (e.g. CT6) that is related to the FRMCS shunting team. (M-Vx)

10.8.4.3 The FRMCS system shall include the driver(s) of a shunting team in the GSM-R system in an ongoing shunting voice communication upon registration of the functional identity (e.g. CT6). (M-Vx)

10.8.4.4 When a driver attached to GSM-R initiates shunting communication in the FRMCS system, the driver shall use a dedicated identity (e.g. a short code or CT6 in GSM-R) relevant in the FRMCS system to initiate the shunting communication. (M-Vx)

10.8.4.5 Service interworking between the talker control in the GSM-R system and the FRMCS system is not required because the communication within the GSM-R system is a point-to-point call. (I-Vx)

Domain change generic

10.8.4.6 The user shall be able to manually select a FRMCS domain . (M-Vx)

10.8.4.6i When the FRMCS User Device supports both the FRMCS system and the GSM-R system, the user shall be able to manually select the GSM-R system. (M-Vx)

10.8.4.7 The FRMCS system shall without user action support the selection of a FRMCS domain by an external trigger (e.g. by a balise, location information). (M-Vx)

10.8.4.7i When the FRMCS User Device supports both the FRMCS system and the GSM-R system, the FRMCS system shall support the selection of the GSM-R system by an external trigger without user action (e.g. by a balise, location information). (M-Vx)

10.8.4.8 Upon changing FRMCS domains, the necessary service (re)configuration actions (e.g. (de)registering of identities, (re)setting authorisation of communication and FRMCS Application) shall be transparent (no interaction required with the user) for the user. (M-Vx)

10.8.4.9 The FRMCS system shall provide information to the user when a change of FRMCS domain and service has occurred. (M-Vx)

Domain change FRMCS to FRMCS

10.8.4.10 When a user with no active shunting voice communication is moving from a FRMCS domain to another FRMCS domain, the user should be able to initiate a shunting voice communication excluding the period of domain change by the FRMCS system. (O-Vx)

10.8.4.10i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (O-Vx)

10.8.4.11 When a user with an active shunting voice communication is moving from a FRMCS domain to another FRMCS domain, the voice communication should not be dropped. (O-Vx)

10.8.4.12 When the shunting voice communication is dropped during a FRMCS domain change, the user shall be able to re-establish the communication towards the same recipient(s) with the specified quality of service. (M-Vx)

Domain change FRMCS to GSM-R

10.8.4.13 When a user is moving from the FRMCS domain to the GSM-R system, the reregistration of the functional identity in the new system shall be done automatically. (M-Vx)

10.8.4.14 When a user with no active shunting voice communication is moving from a FRMCS domain to GSM-R, the user should be able to initiate a shunting voice communication excluding the period of domain change by the FRMCS system. (O-Vx)

10.8.4.14i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (O-Vx)

10.8.4.15 When a user with an active shunting voice communication is moving from a FRMCS domain to GSM-R, a drop of the communication is acceptable. (I-Vx)

10.8.4.16 When the shunting voice communication is dropped during a FRMCS to GSM-R domain change, the user is able to re-establish the communication towards the same recipient(s). (I-Vx)

Domain change GSM-R to FRMCS

10.8.4.17 When a user is moving from the GSM-R system to the FRMCS domain, the reregistration of the functional identity in the new system should be done automatically. (O-Vx)

10.8.4.18 When a user with no active shunting voice communication is moving from the GSM-R system to a FRMCS domain, the user should be able to initiate a shunting voice communication excluding the period of domain change by the FRMCS system. (O-Vx)

10.8.4.18i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (O-Vx)

10.8.4.19 When a user with an active shunting voice communication is moving from the GSM-R system to a FRMCS domain, a drop of the communication is acceptable. (I-Vx)

10.8.4.20 When the shunting voice communication is dropped during the GSM-R system to a FRMCS domain change, the user should be able to re-establish the communication towards the same recipient(s) with the specified quality of service. (O-Vx)

Interconnection

Between FRMCS domains

10.8.4.21 A User should be able to initiate a Shunting Voice Communication to recipient(s) located in another FRMCS domain. (O-Vx)

Interworking

From FRMCS to GSM-R

10.8.4.22 It is considered that all shunting team members are part of the FRMCS system. It is possible that driver(s) may use the GSM-R system during shunting voice communication. (I-Vx)

10.8.4.23 The driver(s) of a shunting team, that are attached to the GSM-R-System, should be registered to dedicated functional identity (e.g. CT6) that is related to the FRMCS shunting team. (O-Vx)

10.8.4.24 The FRMCS system should include the driver(s) of a shunting team in the GSM-R system in an ongoing shunting voice communication upon registration of the functional identity (e.g. CT6). (O-Vx)

10.8.4.25 Service interworking between the talker control in the FRMCS system and the GSM-R system is not required. The handling of the talker control is expected to be done independently in the GSM-R and FRMCS systems. (I-Vx)

From GSM-R to FRMCS

10.8.4.26 It is considered that all shunting team members are part of the FRMCS system. It is possible that driver(s) may use the GSM-R system during shunting voice communication. (I-Vx)

10.8.4.27 When a driver attached to the GSM-R system initiates shunting communication in the FRMCS system, the driver should use a dedicated identity (e.g. a short code or CT6 in GSM-R) relevant in the FRMCS system to initiate the shunting communication. (O-Vx)

10.8.4.28 The FRMCS systems should route a shunting voice communication initiated by a driver attached in the GSM-R system to the appropriate FRMCS shunting team members. (O-Vx)

10.8.4.29 Service interworking between the talker control in the FRMCS system and the GSM-R system is not required. The handling of the talker control is expected to be done independently in the GSM-R and FRMCS systems. (I-Vx)

10.8.5 Requirements for Off-network

10.8.5.1 To be defined in a later version of the specification. (I-Vx)

10.8.6 Intentionally deleted

10.8.6.1 Intentionally deleted

10.9 Public Emergency Call - FRMCS Application

10.9.1 Introduction

10.9.1.1 To be defined in a later version of the specification. (I-Vx)

10.10 Ground to ground Voice Communication - FRMCS Application

10.10.1 Introduction

10.10.1.1 This section describes the requirements for the Ground to ground Voice Communication - FRMCS Application. Ground to ground Voice Communication is used for i.e. Controller to Controller communication or any other point to point or multi-user Ground User Voice Communication. (I)

10.10.1.2 The requirements for this FRMCS Application are covered by section 10.2. (I)

10.10.1.3 The Ground to ground Voice Communication - FRMCS Application is comprehensively captured in this FRMCS Application section.

10.10.2 Requirements for domain change, Interconnection and Interworking

Domain change generic

10.10.2.1 No specific requirements. It is assumed that a Ground User will not change domain. (I)

Interconnection

Between FRMCS Domains

10.10.2.1i A Ground User being a Controller shall be able to initiate a Ground to ground Voice Communication to other Ground User(s) located in another FRMCS Domain. (M-V3)

10.10.2.2 A Ground User shall be able to initiate a Ground to ground Voice Communication to other Ground User(s) located in another FRMCS Domain. (M-Vx)

Interworking

From FRMCS to GSM-R

10.10.2.2i A Ground User being a Controller in an FRMCS Domain shall be able to initiate a Ground to ground Voice Communication to other Ground User(s) located in the GSM-R system. (M-V3)

10.10.2.3 A Ground User in an FRMCS Domain shall be able to initiate a Ground to ground Voice Communication to other Ground User(s) located in the GSM-R system. (M-Vx)

10.10.2.4 It is assumed that the inviting User may not be aware that the invited User is logged in the GSM-R system. (I)

10.10.2.4i For a Controller, the inviting User needs only to provide (e.g. select or dial) FRMCS formatted Identities. The FRMCS System shall perform the translation and the mapping between the corresponding GSM-R Functional Identities. (M-V3)

10.10.2.5 The inviting User needs only to provide (e.g. select or dial) FRMCS formatted Identities. The FRMCS System shall perform the translation and the mapping between the corresponding GSM-R Functional Identities. (M-Vx)

10.10.2.5i A Controller shall be able to invite a GSM-R Ground User to join an ongoing Ground to ground Voice Communication by using one of the following: (M-V3)

a) The (MS)ISDN number of the invited GSM-R user;
b) One of the Functional Identities of the invited GSM-R user.

10.10.2.6 A User shall be able to invite a GSM-R Ground User to join an ongoing Ground to ground Voice Communication by using one of the following: (M-Vx)

a) The (MS)ISDN number of the invited GSM-R user;
b) One of the Functional Identities of the invited GSM-R user.

10.10.2.7 The FRMCS System shall present the Functional Identity of the inviting User to the invited GSM-R Ground User in a format compliant to the GSM-R system numbering plan. (M)

10.10.2.8 When no relevant Functional Identity is available for the initiator/inviting User, one of the following Identities in a GSM-R compatible format shall be presented to the GSM-R Ground User. (M)

a) User Identity; (M)
b) Subscriber Identity. (O-V3)

From GSM-R to FRMCS

10.10.2.9 A Ground User in a the GSM-R system shall be able to initiate a Ground to ground Voice Communication to other Ground User(s) located in the FRMCS System. (M)

10.10.2.10 It is assumed that the inviting GSM-R user may not be aware that the invited User is logged in the FRMCS System. (I)

10.10.2.11 The inviting GSM-R user needs only to provide (e.g. select or dial) GSM-R formatted Identities. The FRMCS System shall perform the translation and the mapping with the corresponding FRMCS Functional Identities. (M)

10.10.2.11i An FRMCS Controller shall be able to receive a Ground to ground Voice Communication from a GSM-R Ground User using one of the following addressing methods:

a) The User Identity of the FRMCS Ground User in a GSM-R compatible format; (M-V3)
b) A GSM-R Functional Identity corresponding to the Functional Identity of the FRMCS Ground User. Example: 90004120123401 translates to 1234.Leading_driver@2185; (M-V3)
c) The Subscriber Identity of the User in a GSM-R compatible format. (O-V3)

10.10.2.12 An FRMCS Ground User shall be able to receive a Ground to ground Voice Communication from a GSM-R Ground User using one of the following addressing methods:

a) The User Identity of the FRMCS Ground User in a GSM-R compatible format; (M-Vx)
b) A GSM-R Functional Identity corresponding to the Functional Identity of the FRMCS Ground User. Example: 90004120123401 translates to 1234.Leading_driver@2185; (M-V3)
c) The Subscriber Identity of the User in a GSM-R compatible format. (O-Vx)

10.10.2.13 The Functional Identity corresponding to the functional number provided by GSM-R system shall be presented to the FRMCS Ground User. (M)

10.10.2.14 If no functional number is provided by GSM-R system, the (MS)ISDN number shall be presented to the FRMCS Ground User, when available. (M)

10.11 Railway Emergency Communication - FRMCS Application

10.11.1 Introduction

10.11.1.1 Railway Emergency Communication (REC) is used for communication during an emergency situation, it is considered as a high priority communication and has distinct means for set-up and presentation. (I)

10.11.1.2 The implementation of REC is based on operational rules in the specific railway environment. (I)

10.11.1.3 The behavior for call handling is defined by operational rules and the operational rules are reflected in parameters and values in the Common Functions. (I)

10.11.1.4 The REC - FRMCS Application and the Common Functions are configurable in order to fulfil local operational rules. (I)

10.11.1.5 A REC consists of a REC-alert (which is always set up) including an optional information (e.g. text, voice prompts). After the REC-alert has been set up, one or more subsequent optional REC-voice or one or more subsequent optional REC-Data Communication(s) can be added, as shown in Figure 10-4. Please note that during the migration phase the REC-voice is automatically initiated together with a REC-alert. After the migration phase the not automatically linking is optional. (I)

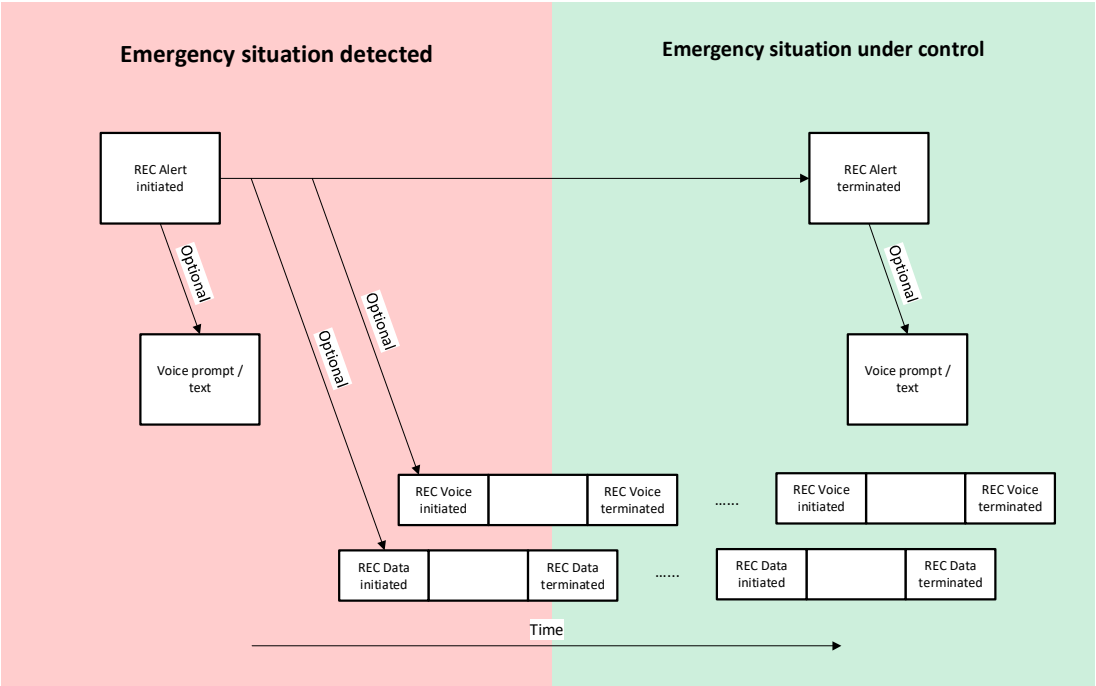


Figure 10-5: REC stages

10.11.1.5i In addition, mixing REC-voice and REC-data in the same REC-alert is useful for railway operation in emergency cases. (I)

10.11.1.6 The REC is based on the concept of predefined initiating area and predefined addressed area, as depicted in Figure 10-6. The initiating area corresponds to the track section where the REC is initiated by a User. This initiating area is linked to the danger location. Due to the reaction time of the moving User and due to other potential inaccuracies, the location of the danger will slightly differ from the place where the REC is initiated. In some cases, the danger location could even be located outside of the initiating area. Based on this initiating area, the FRMCS System will determine a corresponding predefined addressed area where the Users are eligible to be alerted. The eligible Users will be alerted depending on their Functional Identity and on their additional Location Information (Train Route Setting, User's speed and User's direction). Associated to this addressed area, a list of predefined additional Users (e.g. Controllers) will be also alerted. (I).

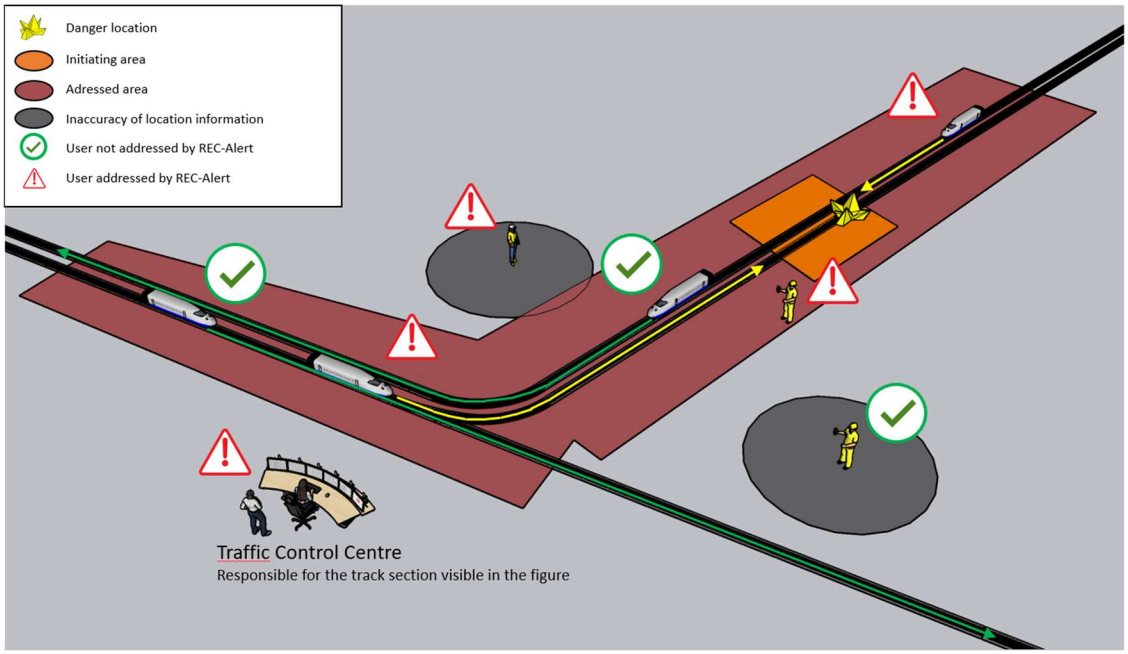


Figure 10-6: REC concept overview

10.11.1.7 The list of Users addressed by the REC is determined and continuously adapted based on the predefined addressing rules for which a safety margin is applied. The addressing rules can be adjusted (fine-tuned) further on by the Controller when knowledge of the actual emergency situation evolves. (I)

10.11.1.8 The size and shape of the initiating and addressed areas are defined by the infrastructure manager, based on various criteria like line speed, track characteristics, reaction time of the User as well as type of Location Information available for the User (position, direction, Train Route Setting…) and their corresponding level of accuracy. (I)

10.11.1.9 Intentionally deleted.

10.11.1.10 For some Users (e.g. Train Driver, trackside worker or shunter), the Location Information available for the initiating User's is used to determine the corresponding initiating area. (I)

10.11.1.11 For some Users (e.g. Controller, sensor-based system), the initiating area or addressed area is provided by the initiating's User. (I)

10.11.1.12 REC-alert is considered to be a Data Communication utilising the Data Communication function. (I)

10.11.1.13 Being involved in a REC-alert does not prevent a User from initiating a new REC-alert as long as allowed by the arbitration - Common Function (I)

10.11.1.14 Being involved in a REC-alert does not prevent a User from initiating another communication, as long as allowed by the arbitration - Common Function (I)

10.11.1.15 Intentionally deleted.

10.11.1.16 Intentionally deleted.

10.11.1.17 The optional REC-Data Communication can include, for example, pre-recorded messages, pictures, etc. (I)

10.11.1.18 An External System is able to initiate a REC. The initiating method to be used and the selected area(s) are similar to a Driver (moving detection system, e.g. collision detector) or to a Controller (stationary detection system, e.g. railway crossing obstruction detector). Additional information (e.g. text, voice prompts) can be included in the REC-alert. It is assumed that REC-voice or REC-data is not invoked by the External System. Usually the Controller is terminating this REC. (I)

10.11.1.19 The Railway Emergency Communication - FRMCS Application is comprehensively captured in this FRMCS Application section. (I)

10.11.2 Generic requirements

10.11.2.1 A Controller shall be able to initiate a REC-alert. (M)

10.11.2.2 A Driver shall be able to initiate a REC-alert. (M)

10.11.2.3 Intentionally deleted.

10.11.2.4 A Controller shall be able to initiate a REC-alert by selecting one addressed area. (M)

10.11.2.4a A Controller shall be able to initiate a REC-alert by selecting several addressed areas. (M-Vx)

10.11.2.4i When a Controller initiates a REC-alert by selecting several addressed areas, the resulting addressed area shall be the union of the selected addressed areas. (M-Vx)

10.11.2.5 A Controller shall be able to initiate a REC-alert by selecting one initiating area. (M-Vx)

10.11.2.5i Intentionally deleted

10.11.2.5ii A Controller shall be able to initiate a REC-alert by providing a specific Train Functional Identity. (M-Vx)

10.11.2.6 When a Controller initiates a REC-alert by providing a specific Train Functional Identity, the addressed area shall be based on the initiating area where this Train is located. (M-Vx)

10.11.2.6i A Controller should be able to initiate a REC-alert by manually defining the addressed area (e.g. by drawing an addressed area on a map or by selecting track sections with start and end location). (O-Vx)

10.11.2.6ii When a Controller initiates a REC-alert by manually defining the addressed area, the addressed Controllers shall be all the Controllers associated to the predefined addressed areas fully or partially included in the manually defined area. (M-Vx)

10.11.2.7 For a Driver initiated REC-alert, the Geographical Position of the Train shall be used to retrieve the initiating area. (M)

10.11.2.7ai For a Driver initiated REC-alert, the used Geographical Position shall be the front of the Train. (M-Vx)

10.11.2.7i For a Driver-initiated REC-alert, one or a combination of the following Location Information elements of the initiating Driver's should be used to retrieve the initiating area: (O-Vx)

a) Railway infrastructure element(s) where the initiator is located (e.g. track section ID, station ID, signal box ID, track kilometer marking);
b) Other infrastructure element(s) where the initiator is located.

10.11.2.8 The REC-alert shall address the following:

a) Drivers for which the Train is located inside the addressed area; (M)
b) Intentionally deleted;
c) Predefined Controller(s) for the addressed area by its Functional Identity. (M)
d) Other (handheld) Users which are located inside the addressed area and for which the Function Label matches criteria set by the infrastructure manager. (O-V3)

10.11.2.8a If the Driver has not yet registered to the Train Functional Identity, the Driver shall be addressed using a Vehicle Functional Identity including Driver Function Label. (M)

10.11.2.8aa The On-Board FRMCS Device shall be able to receive a REC-alert at any time while the Device is powered up. (M-V3)

10.11.2.8ai The REC-alert shall address the Driver for which the front of the Train Geographical Position is located inside the addressed area. (M-Vx)

10.11.2.8i The addressing of the REC-alert should allow to exclude eligible Drivers based on one or a combination of the following conditions: (O-Vx)

a) Train Route Setting;
b) Direction;
c) Speed.

10.11.2.8ii The excluded eligible Drivers of the REC-alert could be for example: (I)

a) Train Route Setting: Train is routed on a diverging Train route from the initiating area;
b) Direction: Train moving away from the initiating area;
c) Speed: low speed or stopped Trains.

10.11.2.8aii The Functional Identity of the Driver initiating a REC-alert shall be presented to the Controller(s) addressed by the REC-alert. (M-V3)

10.11.2.8aiii The Functional Identity of the Driver initiating a REC-alert shall be presented to the other User(s), including Driver(s), addressed by the REC-alert. (M-Vx)

10.11.2.8aiv The Functional Identity of the Controller initiating a REC-alert shall be presented to the Controller(s) addressed by the REC-alert. (M-V3)

10.11.2.8av The Functional Identity of the Controller initiating a REC-alert shall be presented to the other User(s), including Driver(s), addressed by the REC-alert. (M-Vx)

10.11.2.8iii After the initiation phase, the initiator of the REC-alert shall be considered also as an Addressed User. (M)

10.11.2.9 It shall be possible to include at setup of the REC-alert additional information (e.g. text, voice prompts) that are permanently presented to the recipients. (M)

10.11.2.9i It shall be possible during an ongoing REC-alert to change the additional information (e.g. text, voice prompts) that are permanently presented to the recipients. (M-Vx)

10.11.2.9ii It shall be possible during an ongoing REC-alert, if no additional information was inserted at setup, to add the additional information (e.g. text, voice prompts) that are permanently presented to the recipients. (M-Vx)

10.11.2.10 It should be possible for a Controller to change the addressed area(s) during an ongoing REC-alert. (O-Vx)

10.11.2.11 The FRMCS System shall monitor the Geographical Position of the Users in order to determine the Users eligibility to participate in the REC-alert by addressing the Users entering the addressed area and to stop addressing Users leaving the addressed area. (M)

10.11.2.12 Intentionally deleted.

10.11.2.13 Intentionally deleted.

10.11.2.14 The ongoing REC-alert shall be permanently indicated to the recipients. (M)

10.11.2.15 An addressed User no longer eligible for the ongoing REC-alert shall be informed and disconnected from the REC-alert. (M)

10.11.2.16 As long as the REC-alert is ongoing, the Controller shall be informed about the Functional Identity of the recipients currently addressed by a REC-alert. (M)

10.11.2.17 Intentionally deleted.

10.11.2.18 Intentionally deleted.

10.11.2.19 Intentionally deleted.

10.11.2.19i The Controller shall be informed about the Functional Identity of the Usersno longer addressed by the REC-alert. (M-Vx)

10.11.2.20 A Driver already addressed by a REC-alert shall be able to initiate another REC-alert. (M)

10.11.2.21 Intentionally deleted.

10.11.2.22 A Controller already addressed by REC-alert shall be able to initiate another REC-alert. (M)

10.11.2.22i It shall be possible for a Controller to Merge two ongoing REC-alerts. (M-Vx)

10.11.2.22ii After Merging of two REC-alerts, the Addressed Users of the resulting REC-alert shall be the union of Users that would have been addressed by each of the initial REC-alerts. (M-Vx)

10.11.2.22iii A Driver shall not be allowed to leave a REC-alert. (M)

10.11.2.22iv In the case the initiating Driver is moving outside the addressed area of the REC-alert, the ongoing REC-alert shall not be terminated. (M)

10.11.2.22v When the initiating Driver is moving outside the addressed area of the REC-alert, the initiating Driver shall be disconnected and no more be addressed by this REC-alert. (M)

10.11.2.22vi An authorised Controller shall be allowed to leave the REC-alert. (M-Vx)

10.11.2.22vii A Controller shall be able to re-join an ongoing REC-alert that the Controller has previously left. (M-V3)

10.11.2.22viii An authorised Controller shall be able to terminate the REC-alert. (M)

10.11.2.22ix The initiating Driver shall be able to terminate the REC-alert. (M-Vx)

10.11.2.22x Drivers shall not be able to terminate the REC-alert. (M-V3)

10.11.2.23 The FRMCS System shall support the presentation of additional information (e.g. text, voice prompts) to the Addressed Users upon termination of the REC-alert. (M-Vx)

10.11.2.23i The FRMCS System shall be able to predefine whether a REC-alert initiated by a Driver is associated to a REC-voice or REC-data. (M-Vx)

10.11.2.23ii The FRMCS System shall be able to predefine whether a REC-alert initiated by a Controller is associated to a REC-voice or REC-data. (M-Vx)

10.11.2.24 The FRMCS System shall support to predefine if a REC-voice shall be initiated for a given initiating Function Label, the outcome being the following: (M-Vx)

a) REC-voice is set up automatically upon initiation of the REC-alert;
b) No REC-voice set up automatically upon initiation of the REC-alert.

10.11.2.25 The FRMCS System shall support to predefine if a REC-voice shall be initiated for a given initiating area, the outcome being the following:

a) REC-voice is set up automatically upon initiation of the REC-alert; (M-V3)
b) No REC-voice set up automatically upon initiation of the REC-alert. (M-Vx)

10.11.2.26 In the case of using Function Label and initiating area to determine if a REC-voice has to be automatically initiated upon REC-alert initiation, the FRMCS System shall ensure that the configuration leads to a predictable outcome. (M-Vx)

10.11.2.26i A Driver addressed by a REC-alert with no ongoing associated REC-voice shall be able to initiate a REC-voice associated to this REC-alert. (M-Vx)

10.11.2.26ii A Controller addressed by a REC-alert with no ongoing associated REC-voice shall, when authorised, be able to initiate a REC-voice associated to this REC-alert. (M-Vx)

10.11.2.26iii Upon initiation of a REC-voice, the User(s) addressed by the REC-voice shall be those addressed by the associated REC-alert. (M)

10.11.2.26iv As soon as a User is addressed by a REC-alert with an ongoing REC-voice, this User shall also be addressed by the associated REC-voice. (M)

10.11.2.26v As long as a User is addressed by a REC-alert with an ongoing REC-voice, this User shall also be addressed by the associated REC-voice. (M)

10.11.2.26av During an ongoing REC-voice Users shall be presented with the following: (M-Vx)

a) Status of the intended recipient;
b) Functional Identities elements (e.g. Role, area) of the currently connected User(s).

10.11.2.26vi When a User is no longer eligible for receiving the REC-alert, and there is an ongoing associated REC-Voice Communication, the FRMCS System shall support to predefine whether:

a) REC-voice remains connected to this User; (M-Vx)
b) REC-voice is no more addressed to this User. (M)

10.11.2.26vii In the case of Merging two REC-alerts, the associated active REC-Voice Communications shall also be Merged. (M-Vx)

10.11.2.26avii Other Users than Controllers shall not be able to leave a REC-voice. (M-V3)

10.11.2.26viii Users, including Drivers, shall be able to leave a REC-voice. (M-Vx)

10.11.2.26ix An authorised Controller shall be allowed to leave the REC-voice. (M)

10.11.2.26aix A Controller shall be able to re-join an ongoing REC-voice that the Controller has previously left. (M-V3)

10.11.2.26x The initiating Driver of a REC-voice shall be able to terminate this REC-voice. (M-Vx)

10.11.2.26xi No others Users than Controllers in a REC-voice shall be able to terminate this REC-voice. (M-V3)

10.11.2.27 The FRMCS System shall be able to predefine for each Function Label and per initiating area, if a REC-data is set up automatically upon initiation of the REC-alert. (M-Vx)

10.11.2.28 During an ongoing REC-alert with no ongoing REC-data, a Driver shall be able to initiate a REC-data associated to the REC-alert. (M-Vx)

10.11.2.28i During an ongoing REC-alert with no ongoing REC-data, an authorised Controller shall be able to initiate a REC-data associated to the REC-alert. (M-Vx)

10.11.2.29 Intentionally deleted.

10.11.2.29i Upon initiation of the REC-data, the User(s) addressed by the REC-data shall be those addressed by the associated REC-alert. (M-Vx)

10.11.2.29ii As soon as a User is addressed by a REC-alert with an ongoing REC-data, this User shall also be addressed by the associated REC-data. (M-Vx)

10.11.2.29iii As long as a User is addressed by a REC-alert with an ongoing REC-data, this User shall also be addressed by the associated REC-data. (M-Vx)

10.11.2.30 When the User is no longer eligible for receiving the REC-alert, and there is an ongoing associated REC-Data Communication, the FRMCS System shall support to predefine whether. (M-Vx)

a) REC-data remains connected to this User;
b) REC-data is no more addressed to this User.

10.11.2.31 When a REC-voice is active and upon termination of the associated REC-alert, the FRMCS System shall predefine for a given initiating area the outcome being one of the following:

a) REC-Voice Communication remains active; (M-Vx)
b) REC-Voice Communication is terminated. (M-V3)

10.11.2.31i When a REC-alert is active and upon termination of the associated REC-voice, the FRMCS System shall predefine for a given initiating area the outcome being one of the following:

a) REC-alert communication remains active; (M-Vx)
b) REC-alert communication is terminated. (M-V3)

10.11.2.31ii When a REC-voice is active and upon termination of the associated REC-alert, the FRMCS System shall predefine for a given Function Label the outcome being one of the following:

a) REC-voice communication remains active; (M-Vx)
b) REC-voice communication is terminated. (M-V3)

10.11.2.31iii When a REC-alert is active and upon termination of the associated REC-voice, the FRMCS System shall predefine for a given Function Label the outcome being one of the following:

a) REC-alert communication remains active; (M-Vx)
b) REC-alert communication is terminated. (M)

10.11.2.32 When a REC-data is active and upon termination of the associated REC-alert, the FRMCS System shall predefine the outcome being one of the following: (M-Vx)

a) REC-Data Communication remains active;
b) REC-Data Communication is terminated.

10.11.2.33 A REC-alert shall be recorded including its related metadata. (M-V3)

10.11.2.34 When a REC-voice is active, the following shall be recorded.

a) REC-Voice Communication content; (M-V3)
b) REC-Voice Communication related metadata. (M)

10.11.2.35 When a REC-data is active, the REC-Data Communication and its related metadata shall be recorded. (M-Vx)

10.11.2.36 The FRMCS System shall be able to configure georeferenced polygons to define the initiating areas used for REC-alert. (M-V3)

10.11.2.37 The FRMCS System should be able to configure georeferenced polyhedrons to define the initiating areas used for REC-alert. (O-Vx)

10.11.2.38 The use of polyhedrons could allow to discriminate between a track line and another one which overhangs the first one. (I)

10.11.2.38i The FRMCS System shall be able to configure georeferenced polygons to define for each initiating area a corresponding addressed area used for REC-alert. (M-V3)

10.11.2.39 The FRMCS System should be able to configure georeferenced polyhedrons to define for each initiating area a corresponding addressed area used for REC-alert. (O-Vx)

10.11.2.40 For each addressed area used for REC-alert, the FRMCS System shall be able to predefine:

a) Controllers who are able to initiate the REC-alert; (M)
b) Controllers who is to be addressed by the REC-alert; (M)
c) Controllers who are able to leave the REC-alert; (M-Vx)
d) Controllers who are able to terminate the REC-alert. (M)

10.11.2.41 For each addressed area used for REC-alert, the FRMCS System shall support to predefine the Driver(s) authorised to terminate the REC-alert, the outcome being the following:

a) No Driver; (M-V3)
b) Only initiating Driver. (M-Vx)

10.11.2.42 For each addressed area used for REC-alert, the FRMCS System shall be able to predefine:

a) Controllers who are able to initiate a REC-voice for this REC-alert; (M-V3)
b) Controllers who are able to leave the REC-voice for this REC-alert; (M-Vx)
c) Controllers who are able to terminate the REC-voice for this REC-alert. (M-V3)

10.11.2.43 For each addressed area used for REC-alert, the FRMCS System shall be able to predefine: (M-Vx)

a) Controllers who are able to initiate a REC-data for this REC-alert;
b) Controllers who are able to leave the REC-data for this REC-alert;
c) Controllers who are able to terminate the REC-data for this REC-alert;

10.11.2.44 The FRMCS System shall support to predefine if Drivers are able to leave an ongoing REC-voice, the outcome being the following: (M-Vx)

a) Drivers are allowed to leave an ongoing REC-voice;
b) Drivers are not allowed to leave an ongoing REC-voice.

10.11.2.45 The FRMCS System should be able to define the Function Labels (e.g. track side worker, shunter) authorised to use the REC - FRMCS Application in the same manner as a Driver does. (O-V3)

10.11.2.46 The FRMCS System shall be able to define the Function Labels (e.g. like Train traffic Controller, track side work Controller, shunting Controller) authorised to use the REC - FRMCS Application in the same manner as a Controller does. (M-Vx)

10.11.2.47 A Controller shall have the option to address other Driver(s) Controllers(s) and Teams outside the addressed area based on a list of Users eligible for a REC-alert, presented to the Controller by the HMI. The list shall dynamically be generated based on the currently registered Functional Identities of the intended recipients. (M-Vx)

10.11.3 HMI requirements

10.11.3.1 The initiation of the REC-alert by a Driver shall be performed with a single HMI action. (M-V3)

10.11.3.2 The initiation of the REC-alert by a single HMI-action shall be made by using a dedicated button. (M-V3)

10.11.3.3 Details on the activator (e.g. color, placement, size) are out of scope of this document. (I)

10.11.3.4 Additional means of initiating the REC-alert, such as voice activation, are subject to standardization. (I)

10.11.3.5 The risk of accidental initiation of the REC-alert on the HMI shall be mitigated. (M-V3)

10.11.3.6 The mitigation on the HMI does not introduce a significant delay on the initiation of the REC-alert. (I-V3)

10.11.3.7 On the HMI, the User shall be able to unambiguously identify a REC-alert. (M-V3)

10.11.3.7ia On the HMI, the Controller shall be able to distinguish between multiple REC-alerts. (M-V3)

10.11.3.7i On the HMI, the User shall be able to distinguish between multiple REC-alerts. (M-Vx)

10.11.3.8 On every REC-alert associated to a REC-voice, the following information shall be indicated to the Driver: (M-V3)

a) An ongoing REC-Voice Communication that is connected to the speaker of the end User device;
b) Intentionally deleted

10.11.3.8i On every REC-alert associated to a REC-data, the following information shall be indicated: (M-Vx)

a) The existence of unread REC-data messages;
b) The existence of read REC-data messages.

10.11.3.9 The HMI shall support the Controller to select another, or switch between different REC-Voice Communications. (M-V3)

10.11.3.10 The HMI shall support the User to select another, or switch between different REC-Voice Communications. (M-Vx)

10.11.4 Requirements for domain change, Interconnection and Interworking

10.11.4.1 Intentionally deleted.

10.11.4.2 The Railway Emergency Call in the GSM-R system and the REC- alert / REC-voice in the FRMCS System shall be linked together and controlled by the FRMCS System (no changes required in the GSM-R system). (M)

10.11.4.3 Intentionally deleted.

10.11.4.4 Intentionally deleted.

10.11.4.5 Intentionally deleted.

10.11.4.6 Intentionally deleted.

10.11.4.7 Intentionally deleted.

10.11.4.8 Intentionally deleted.

10.11.4.9 Intentionally deleted.

10.11.4.10 Intentionally deleted.

10.11.4.11 Intentionally deleted.

10.11.4.12 Intentionally deleted.

10.11.4.13 Intentionally deleted.

10.11.4.14 Intentionally deleted.

10.11.4.15 Intentionally deleted.

Domain change generic

10.11.4.16 The User shall be able to manually select an FRMCS Domain. (M)

10.11.4.16i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the User shall be able to manually select the GSM-R system. (M)

10.11.4.17 The FRMCS System shall without User action support the selection of an FRMCS Domain by an external trigger (e.g. by a balise, Location Information). (M-V3)

10.11.4.17i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the FRMCS System shall support the selection of the GSM-R system by an external trigger without User action (e.g. by a balise, Location Information). (M-V3)

10.11.4.18 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction of the User. (M-V3)

10.11.4.19 The FRMCS System shall provide information to the User when a change of FRMCS Domain and service has occurred. (M)

Domain change FRMCS to FRMCS

10.11.4.20 When a User with no active REC-alert is moving from an FRMCS Domain to another FRMCS Domain, the User shall be able to initiate a REC-alert excluding the period of domain change. (M)

10.11.4.20i Intentionally deleted.

10.11.4.21 When a User with no active REC-alert is moving from an FRMCS Domain to another FRMCS Domain, the User shall be able to receive a REC-alert excluding the period of domain change. (M)

10.11.4.21i Intentionally deleted.

10.11.4.22 When a User with an active REC-alert is moving from an FRMCS Domain to another FRMCS Domain within the same addressed area, the REC-alert shall not be interrupted. (M-Vx)

10.11.4.23 When a User with an active REC-alert with an associated REC-voice or REC-Data Communication is moving from an FRMCS Domain to another FRMCS Domain within the same addressed area, the REC-voice or REC-Data Communication shall not be interrupted. (M-Vx)

Domain change FRMCS to GSM-R

10.11.4.24 When a User with no active REC-alert is moving from an FRMCS Domain to the the GSM-R system, the User shall be able to initiate a REC excluding the period of domain change. (M)

10.11.4.24i Intentionally deleted.

10.11.4.25 When a User with no active REC-alert is moving from an FRMCS Domain to the GSM-R system, the User shall be able to receive a REC excluding the period of domain change. (M)

10.11.4.25i Intentionally deleted.

10.11.4.26 When a User with an active REC-alert with an associated REC-Voice Communication is moving from an FRMCS Domain to the GSM-R system within the same addressed area, the REC Voice Communication shall not be interrupted. (M-Vx)

Domain change GSM-R to FRMCS

10.11.4.27 When a User with no active REC is moving from the GSM-R system to an FRMCS Domain, the User shall be able to initiate a REC excluding the period of domain change. (M)

10.11.4.27i Intentionally deleted.

10.11.4.28 When a User with no active REC is moving from the GSM-R system to an FRMCS Domain, the User shall be able to receive a REC excluding the period of domain change. (M)

10.11.4.28i Intentionally deleted.

10.11.4.29 When a User with an active REC is moving from the GSM-R system to an FRMCS Domain within the same addressed area, the REC Voice Communication shall not be interrupted. (M)

Interconnection

Between FRMCS Domains

10.11.4.30 Intentionally deleted.

10.11.4.30i The FRMCS System shall support the triggering of a REC in one or multiple neighboring FRMCS Domain(s). (M)

Interworking

From FRMCS to GSM-R

10.11.4.31 Intentionally deleted.

10.11.4.32 For an FRMCS railway emergency area where associated GSM-R areas are predefined, a REC-alert initiated within the FRMCS Domain shall trigger the initiation of an associated REC-voice in the FRMCS System(s) (where the respective systems can be operated by one IM or different IM's) and the establishment in the GSM-R system of a Railway Emergency Call. (M)

10.11.4.33 When the REC-alert in the FRMCS Domain is terminated, the REC in the GSM-R system and the associated REC-voice in the FRMCS System shall be terminated. (M)

10.11.4.33i When an authorised User terminates the REC in the GSM-R system, the REC-alert and the associated REC-voice in the FRMCS System shall be terminated. (M)

From GSM-R to FRMCS

10.11.4.34 Intentionally deleted.

10.11.4.35 For a GSM-R railway emergency area where associated FRMCS areas are predefined, a REC initiated within the GSM-R system shall trigger the initiation of REC-alert and its associated REC-voice in the FRMCS System(s) (where the respective systems can be operated by one IM or different IM's). (M)

10.11.4.36 When the REC in the GSM-R system is terminated, the REC-alert and associated REC-voice in the FRMCS Domain shall be terminated. (M)

10.11.4.36i When an authorised User terminates the REC-alert in the FRMCS System, the REC in the GSM-R system and the associated REC-voice in the FRMCS System shall be terminated. (M)

10.11.4.37 The FRMCS System shall be able to route the GSM-R call confirmation of high priority calls information to the GSM-R system. (M-Vx)

10.11.5 Authorisation of communication for REC

10.11.5.1.1 Intentionally deleted.

10.11.5.1.2 Intentionally deleted.

10.11.5.1.3 Intentionally deleted.

10.11.5.1.4 Intentionally deleted.

10.11.5.1.5 Intentionally deleted.

10.11.5.2 A Controller shall be allowed to invite a User in the REC-voice. (M-V3)

10.11.5.3 A Controller shall be allowed to put a REC-voice on hold. (M-V3)

10.11.5.4 A Driver shall not be allowed to invite a User in the REC-voice. (M-V3)

10.11.5.5 A Controller should be allowed to reject a REC-alert. (O-V3)

10.11.5.6 A Driver shall not be allowed to reject a REC-alert. (M-V3)

10.11.5.7 A Driver shall not be allowed to put a REC-voice on hold. (M-V3)

10.11.5.8 The FRMCS System shall be able to configure the authorisation for a Driver to leave a REC-voice. (M-Vx)

10.11.5.9 The FRMCS System shall be able to configure the authorisation for a Driver to put REC-voice on hold. (M-Vx)

10.11.6 QoS and priority for REC

10.11.6.1 The REC-alert shall use the following QoS and priority parameters: (M)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: IMMEDIATE;
e) Priority: as per Appendix J.

10.11.6.2 The REC-Data Communication shall use the following QoS and priority parameters: (M-Vx)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: MEDIUM;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.11.6.3 The REC-Voice Communication shall use the following QoS and priority parameters: (M)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.11.7 Arbitration for REC

10.11.7.1 The rules defined in the arbitration - Common Function define the handling of the presentation and connection to a REC-alert appropriate to the priority of the REC within the operational rules. (I)

10.11.7.2 The rules defined in the arbitration - Common Function define the handling of the presentation and connection to a REC-voice for each Addressed User. (I)

10.11.7.3 The rules defined in the arbitration - Common Function define the handling of the presentation and connection to a REC-data for each Addressed User. (I)

10.11.7.4 The rules defined in arbitration - Common Function define the allowance of the initiation a REC-alert for each authorised User. (I)

10.11.8 Talker control for REC

10.11.8.1 Intentionally deleted.

10.11.8.2 The Talker control function defines for a REC-voice which connected Users are allowed to talk during the communication. (I)

10.11.8.3 Intentionally deleted.

10.11.8.4 Intentionally deleted.

10.11.8.4i The FRMCS system shall be able to disable for a REC-voice the talk request and granting mechanism for Controller(s). (M-V3)

10.11.8.4ii When in a REC-voice the talk request and granting mechanism is disabled for Controller(s), Controller(s) can talk at any time while Drivers and other Users have to request the permission to talk. (I-V3)

10.11.8.5 If the talker request and granting mechanism is enabled for the Controller(s), the Controller(s) shall have the highest talker priority and other Users shall have the lowest talker priority. (M-V3)

10.11.8.6 The Driver(s) shall have the talker priority higher than other Users but lower than Controller(s). (M-V3)

10.11.9 Requirements for Off-network

10.11.9.1 No specific requirements. (I-Vx)

10.11.10 Intentionally deleted

10.11.10.1 Intentionally deleted

10.12 Intentionally deleted.

10.13 Public Train emergency Voice Communication - FRMCS Application

10.13.1 Introduction

10.13.1.1 To be defined in a later version of the specification. (I-Vx)

10.14 Working alone - FRMCS Application

10.14.1 Introduction

10.14.1.1 To be defined in a later version of the specification. (I-Vx)

10.15 On-Train outgoing Voice Communication from Train Staff towards a Ground User - FRMCS Application

Editor's Note: the requirements in this section are foreseen to be added in the V3 version of the FRS.

10.15.1 Introduction

10.15.1.1 To be defined in a later version of the specification. (I-V3)

10.16 On-Train incoming Voice Communication from a Ground User towards Train Staff - FRMCS Application

10.16.1 Introduction

10.16.1.0 All requirements in this section are applicable to Train Staff equipped with a handheld terminal unless otherwise specified (applicable to intercom). (I-V3)

10.16.1.1 The Ground User is able to initiate a Voice Communication to any Train Staff member, either to a single User or multiple Users, onboard. (I-V3)

10.16.1.2 The Ground User is able to initiate a Voice Communication to a specific Train Staff member using a fixed On-Board intercom system. (I-V3)

10.16.2 Generic requirements

10.16.2.1 The FRMCS System shall support a Ground User to initiate an On-Train incoming Voice Communication from a Ground User towards a member of the Train Staff On-Board. (M-V3)

10.16.2.2 The FRMCS System shall support a Ground User to initiate an On-Train incoming Voice Communication from a Ground User towards a selection of members of the Train Staff On-Board. (M-Vx)

10.16.2.3 A member of the Train Staff shall be able to receive an On-Train incoming Voice Communication from a Ground User towards Train Staff. (M-V3)

10.16.2.3i The Functional Identity of the initiating Ground User shall be presented to the member of the Train Staff addressed by the Voice Communication. (M-V3)

10.16.2.3ii The Functional Identity(ies) of the member(s) of the Train Staff addressed by the Voice Communication shall be presented to the Ground User. (M-V3)

10.16.2.4 The reception of an On-Train incoming Voice Communication from a Ground User towards Train Staff can be realised by Train Staff using a fixed On-Board intercom system. (I-V3)

10.16.2.5 In the case the Train Staff is equipped with an On-Board intercom system connected to FRMCS, the FRMCS System shall support the Train Staff to perform an On-Train incoming Voice Communication from a Ground User towards Train Staff communication on the On-Board intercom system. (M-V3)

10.16.2.6 In some cases receiving an On-Train incoming Voice Communication from a Ground User towards Train Staff communication leads to trigger an audiable indication via the Public Address system, indicating to the Train Staff to call back the Ground User. (I-V3)

10.16.2.6i After triggering the audible indication the On-Board intercom system shall terminate the Voice Communication. (M-V3)

10.16.2.7 In the case the Train is equipped with an On-Board intercom system connected to FRMCS, the FRMCS System shall support a member of the Train Staff to call back the Ground User who is requesting to establish the On-Train incoming Voice Communication from a Ground User towards Train Staff communication. (M-V3)

10.16.2.8 In the case the Train is equipped with an On-Board intercom system connected to FRMCS, the FRMCS System shall support the retention of the call back number to be ended by the following events: (M-V3)

a) A timer expiration;
b) The Train Staff calling back before timer expiration;
c) Deregistration of the Functional Identity of the intercom.

10.16.2.9 The way to interconnect the fixed On-Board intercom system to the FRMCS System is out of scope of this specification. The use of the bus specified within UIC fiches 558 and 568 is an example of implementation. (I-V3)

10.16.2.10 In case of an On-Train incoming Voice Communication from a Ground User towards Train Staff, the FRMCS System should inform the Driver about this ongoing communication. (O-V3)

10.16.2.11 In case the Driver is informed about an ongoing On-Train incoming Voice Communication from a Ground User towards Train Staff, the FRMCS System should allow the Driver to join this ongoing communication. (O-V3)

10.16.2.12 A Ground User who initiates an On-Train incoming Voice Communication from a Ground User towards Train Staff shall be able to terminate this communication. (M-V3)

10.16.2.13 A member of the Train Staff who receives an On-Train incoming Voice Communication from a Ground User towards Train Staff shall be able to terminate this communication. (M-V3)

10.16.2.14 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Setup Time: NORMAL;
e) Priority: as per Appendix J.

10.16.2.15 The Functional Identity assigned to the fixed On-Board intercom system shall be presented to the Ground User initiator of an On-Train incoming Voice Communication. (M-V3)

10.16.2.16 The FRMCS System shall support the recording of a On-Train incoming Voice Communication from a Ground User towards Train Staff communication content and its related metadata. (M-V3)

10.16.2.17 The FRMCS system shall be able to disable for an On-Train incoming Voice Communication from a Ground User towards Train Staff the talk request and granting mechanism for the Controller(s). (M-V3)

10.16.2.18 When in an On-Train incoming Voice Communication from a Ground User towards Train Staff the talk request and granting mechanism is disabled for the Controller(s), Controller(s) can talk at any time while other Users have to request the permission to talk. (I-V3)

10.16.2.19 If the talker request and granting mechanism is enabled for the Controller(s), the Controller(s) shall have the highest talker priority. (M-V3)

10.16.2.20 Other Users shall have a lower talker priority than the Controller(s). (M-V3)

10.16.3 HMI requirements

10.16.3.1 The Ground User is able to choose via a minimum number of interactions the target of a Voice Communication (e.g. chief Conductor, catering staff, etc) via a dedicated button or through a selection in a list. (I-V3)

10.16.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

10.16.4.1 The User shall be able to manually select an FRMCS Domain. (M-V3)

10.16.4.2i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the User shall be able to manually select the GSM-R system. (M-V3)

10.16.4.2 The FRMCS System shall without User action support the selection of an FRMCS Domain by an external trigger (e.g. by a balise, Location Information). (M-V3)

10.16.4.3i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the FRMCS System shall support the selection of the GSM-R system by an external trigger without User action (e.g. by a balise, Location Information). (M-V3)

10.16.4.3 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction of the User. (M-V3)

10.16.4.4 The FRMCS System shall provide information to the User when a change of FRMCS Domain and service has occurred. (M-V3)

Domain change FRMCS to FRMCS

10.16.4.5 When a Train Staff with no active On-Train incoming Voice Communication from a Ground User towards Train Staff is moving from an FRMCS Domain to another FRMCS Domain, the Train Staff shall be able to receive a On-Train incoming Voice Communication from a Ground User towards Train Staff excluding the period of domain change. (M-V3)

10.16.4.6 When a Train Staff with an active On-Train incoming Voice Communication from a Ground User towards Train Staff is moving from an FRMCS Domain to another FRMCS Domain, the Voice Communication should not be dropped. (O-V3)

10.16.4.7 When the On-Train incoming Voice Communication from a Ground User towards Train Staff is dropped during an FRMCS Domain change, the Train Staff shall be able to receive again the communication from the same Ground User with the specified quality of service. (M-V3)

Domain change FRMCS to GSM-R

10.16.4.8 When a Train Staff with no active On-Train incoming Voice Communication from a Ground User towards Train Staff is moving from an FRMCS Domain to the GSM-R system, the Train Staff shall be able to receive a On-Train incoming Voice Communication from a Ground User towards Train Staff excluding the period of domain change. (M-V3)

10.16.4.9 When a Train Staff with an active On-Train incoming Voice Communication from a Ground User towards Train Staff is moving from an FRMCS Domain to the GSM-R system, a drop of the communication is acceptable. (I-V3)

10.16.4.10 When the On-Train incoming Voice Communication from a Ground User towards Train Staff is dropped during an FRMCS to GSM-R domain change, the Train Staff is able to receive again the communication from the same Ground User. (I-V3)

Domain change GSM-R to FRMCS

10.16.4.11 When a Train Staff with no active On-Train incoming Voice Communication from a Ground User towards Train Staff is moving from the GSM-R system to an FRMCS Domain, the Train Staff shall be able to receive a On-Train incoming Voice Communication from a Ground User towards Train Staff excluding the period of domain change. (M-V3)

10.16.4.12 When a Train Staff with an active On-Train incoming Voice Communication from a Ground User towards Train Staff is moving from the GSM-R system to an FRMCS Domain, a drop of the communication is acceptable. (I-V3)

10.16.4.13 When the On-Train incoming Voice Communication from a Ground User towards Train Staff is dropped during GSM-R to an FRMCS Domain change, the Train Staff should be able to receive again the communication from the same Ground User with the specified quality of service. (O-V3)

Interconnection

Between FRMCS Domains

10.16.4.14 A Ground User shall be able to initiate a Voice Communication to Train Staff located in another FRMCS Domain by using the Train Staff Functional Identity. (M-Vx)

Interworking

From FRMCS to GSM-R

10.16.4.15 A Ground User in an FRMCS Domain shall be able to initiate a Voice Communication to Train Staff located in the GSM-R system by using the Train Staff Functional Identity. (M-V3)

From GSM-R to FRMCS

10.16.4.16 A Ground User in the GSM-R system shall be able to initiate a Voice Communication to Train Staff located in an FRMCS Domain by using the Train Staff Functional Identity. (M-V3)

10.16.5 Requirements for Off-network

10.16.5.1 No specific requirements. (I)

10.17 Railway Staff emergency communication - FRMCS Application

10.17.1 Introduction

10.17.1.1 To be defined in a later version of the specification. (I-Vx)

10.18 Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train - FRMCS Application

10.18.1 Generic requirements

10.18.1.0 The Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train - FRMCS Application is optional for the trackside. (O)

10.18.1.0i When the Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train - FRMCS Application is implemented, the requirements of the Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train - FRMCS Application as specified in this chapter apply. (I)

10.18.1.0ii The Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train capability shall be available in the On-Board FRMCS. (M)

10.18.1.0iii The Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train capability should be available at the trackside FRMCS. (O)

10.18.1.1 This FRMCS Application shall provide the same functionality as On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train (section 10.3) but uses its own configuration. (M-V3)

10.18.1.2 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.19 Urgent Multi-Train Voice Communication for Drivers - FRMCS Application

10.19.1 Generic requirements

10.19.1.0 The Urgent Multi-Train Voice Communication for Drivers - FRMCS Application is optional for the trackside. (O)

10.19.1.0i When the Urgent Multi-Train Voice Communication for Drivers - FRMCS Application is implemented, the requirements of the Urgent Multi-Train Voice Communication for Drivers - FRMCS Application as specified in this chapter apply. (I)

10.19.1.0ii The Urgent Multi-Train Voice Communication for Drivers capability shall be available in the On-Board FRMCS. (M)

10.19.1.0iii The Urgent Multi-Train Voice Communication for Drivers capability should be available at the trackside FRMCS. (O)

10.19.1.1 This FRMCS Application shall provide the same functionality as Multi-Train Voice Communication for Drivers (section 10.5) but uses its own configuration. (M-V3)

10.19.1.2 The following QoS and priority parameters shall be used for Multi-Train Voice Communication: (M)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.20 Multi-Train Voice Communication for Drivers excluding Ground User(s) - FRMCS Application

10.20.1 Introduction

10.20.1.1 To be defined in a later version of the specification. (I-Vx)

10.21 On-Train Voice Communication - FRMCS Application

10.21.1 Introduction

10.21.1.1 To be defined in a later version of the specification. (I-V3)

10.21.2 Generic Requirements

10.21.2.1 The On-Train Voice Communication - FRMCS Application is optional. (O-V3)

10.21.2.2 When the On-Train Voice Communication - FRMCS Application is implemented, the requirements of the On-Train Voice Communication - FRMCS Application as specified in this chapter apply. (I-V3)

10.21.2.3 The On-Train Voice Communication capability should be available in the On-Board FRMCS. (O-V3)

10.21.2.4 The On-Train Voice Communication capability should be available at the trackside FRMCS. (O-V3)

10.22 Lineside Telephony - FRMCS Application

10.22.1 Introduction

10.22.1.1 To be defined in a later version of the specification. (I-Vx)

10.23 On-Train Voice Communication towards passengers (Public Address) - FRMCS Application

10.23.1 Introduction

10.23.1.1 The FRMCS Application allows Authorised Users to establish a Voice Communication to the Public Address systems of a Train or multiple Trains in order to provide information to all on-Train passengers. (I-V3)

10.23.1.1i An On-Train Voice Communication towards passengers (Public Address) can be initiated based on Functional Identity or addressed area. (I-V3)

10.23.1.1ii The addressed area is provided by the initiating's User. (I-V3)

10.23.1.2 The broadcasted voice information is either real-time or pre-recorded. (I-V3)

10.23.1.3 The On-Train Voice Communication towards passengers (Public Address) Voice Communication - FRMCS Application is comprehensively captured in this FRMCS Application section. (I)

10.23.1.4 On-Train Voice Communication towards passengers from Train Staff towards passengers (Public Address) could be based on the use of a fixed On-Board intercom system but this is not part of this FRMCS Application. (I-V3)

10.23.2 Generic Requirements

10.23.2.0 The On-Train Voice Communication towards passengers (Public Address) - FRMCS Application is optional. (O-V3)

10.23.2.0i When the On-Train Voice Communication towards passengers (Public Address) - FRMCS Application is implemented, the requirements of the On-Train Voice Communication towards passengers (Public Address) - FRMCS Application as specified in this chapter apply. (I-V3)

10.23.2.0ii The On-Train Voice Communication towards passengers (Public Address) capability should be available in the On-Board FRMCS. (O-V3)

10.23.2.0iii The On-Train Voice Communication towards passengers (Public Address) capability should be available at the trackside FRMCS. (O-V3)

10.23.2.1 When the Public Address system(s) is connected over a mobile interface, a Driver shall be able to initiate an On-Train Voice Communication to the Public Address system(s) of the Driver's own Train by the Functional Identity. (M-V3)

10.23.2.2 A member of the Train Staff shall be able to initiate an On-Train Voice Communication to the Public Address system(s) of the staff's own Train by the Functional Identity. (M-V3)

10.23.2.3 A member of the Train Staff shall be able to initiate an On-Train Voice Communication to the Public Address system(s) and the Driver of the staff's own Train by the Functional Identity. (M-V3)

10.23.2.4 A Controller shall be able to initiate an On-Train Voice Communication to the Public Address system(s) of one Train by the Functional Identity. (M-V3)

10.23.2.5 A Controller shall be able to initiate an On-Train Voice Communication to the Public Address system(s) and the Driver of one Train by their Functional Identities. (M-V3)

10.23.2.6 A Controller shall be able to initiate an On-Train Voice Communication to the Public Address system(s) of multiple Trains by their Functional Identities. (M-V3)

10.23.2.7 A Controller shall be able to initiate an On-Train Voice Communication to the Public Address system(s) and the Drivers of multiple Trains by their Functional Identities. (M-V3)

10.23.2.8 A Controller shall be able to initiate an On-Train Voice Communication to the Public Address system(s) of multiple Trains by selecting one addressed area(s). (M-V3)

10.23.2.8a A Controller shall be able to initiate an On-Train Voice Communication to the Public Address system(s) of multiple Trains by selecting several addressed area(s). (M-Vx)

10.23.2.8i A Controller shall be able to initiate an On-Train Voice Communication to the Public Address system(s) of multiple Trains by selecting one addressed area(s). (M-V3)

10.23.2.8ia A Controller should be able to initiate an On-Train Voice Communication to the Public Address system(s) and the Drivers of multiple Trains by selecting one addressed area(s). (O-V3)

10.23.2.8ib A Controller shall be able to initiate an On-Train Voice Communication to the Public Address system(s) and the Drivers of multiple Trains by selecting several addressed area(s). (M-Vx)

10.23.2.8ii When a Controller initiates an On-Train Voice Communication to the Public Address system(s) by selecting several addressed areas, the resulting addressed area shall be the union of the selected addressed areas. (M-Vx)

10.23.2.8iii A Controller should be able to initiate an On-Train Voice Communication to the Public Address system(s) by manually defining the addressed area (e.g. by drawing an addressed area on a map or by selecting track sections with start and end location). (O-Vx)

10.23.2.9 For each addressed area used for multiple Trains On-Train Voice Communication to the Public Address systems, the FRMCS System shall be able to predefine: (M-V3)

a) Controllers who are able to initiate the multiple Trains Voice Communication to the Public Address systems;
b) Controllers who are able to terminate the multiple Trains Voice Communication to the Public Address systems;

10.23.2.9i The FRMCS System shall be able to configure georeferenced polygons to define each addressed area for On-Train Voice Communication to the Public Address system(s). (M-Vx)

10.23.2.9ii The FRMCS System should be able to configure georeferenced polyhedrons to define each addressed area for On-Train Voice Communication to the Public Address system(s). (O-Vx)

10.23.2.10 The intended Public Address system(s) shall support the reception of the incoming On-Train Voice Communication. (M-Vx)

10.23.2.11 The intended Driver(s) shall support the reception of the incoming On-Train Voice Communication. (M-Vx)

10.23.2.12 Intentionally deleted.

10.23.2.13 The Authorised User who initiates an On-Train Voice Communication towards a the Public Address system(s) shall be able to terminate this communication. (M-V3)

10.23.2.14 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: LOW;
b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

10.23.2.15 The FRMCS System shall support the recording of an On-Train Voice Communication towards passengers (Public Address) Voice Communication content and its related metadata. (M-V3)

10.23.2.16 The FRMCS System shall support the ability to set up communication between the On-Board Public Address system and the FRMCS On-Board system. (M-V3)

10.23.3 HMI requirements

10.23.3.1 The initiation of a Voice Communication to the Public Address system or the action to connect to it is achieved with a minimum of interaction (for example, a single button press or selection from a list). Where selection from a list is determined to be the preferred option, then the list is accessed with the minimum of interaction and is presented in an intuitive manner. (I-V3)

10.23.3.2 The status of the On-Train Voice Communication towards passengers shall be indicated to the Driver of the associated Train. (M-V3)

10.23.3.2ai The status of the On-Train Voice Communication towards passengers shall be indicated to the Driver(s) of the associated Train(s). (M-Vx)

10.23.3.2i The status of the On-Train Voice Communication towards passengers shall be indicated to the Train Staff of the associated Train(s). (M-V3)

10.23.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

10.23.4.1 The User shall be able to manually select an FRMCS Domain. (M-Vx)

10.23.4.1i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the User shall be able to manually select the GSM-R system. (M-Vx)

10.23.4.2 The FRMCS System shall without User action support the selection of an FRMCS Domain by an external trigger (e.g. by a balise, Location Information). (M-Vx)

10.23.4.2i When the FRMCS User Device supports both the FRMCS System and the GSM-R system, the FRMCS System shall support the selection of the GSM-R system by an external trigger without User action (e.g. by a balise, Location Information). (M-Vx)

10.23.4.3 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction of the User. (M-Vx)

10.23.4.4 The FRMCS System shall provide information to the User when a change of FRMCS Domain and service has occurred. (M-Vx)

Domain change FRMCS to FRMCS

10.23.4.5 When a Public Address system(s) with no active On-Train Voice Communication towards passengers is moving from an FRMCS Domain to another FRMCS Domain, the Public Address system(s) shall be able to receive an On-Train Voice Communication towards passengers excluding the period of domain change. (M-Vx)

10.23.4.5i Intentionally deleted.

10.23.4.6 When a Public Address system(s) with an active On-Train Voice Communication towards passengers is moving from an FRMCS Domain to another FRMCS Domain, the Voice Communication should not be dropped. (O-Vx)

10.23.4.7 When the On-Train Voice Communication towards passengers is dropped during an FRMCS Domain change, the Public Address system(s) shall be able to receive again the communication from the same User with the specified quality of service. (M-Vx)

Domain change FRMCS to GSM-R

10.23.4.8 When a Public Address system(s) with no active On-Train Voice Communication towards passengers is moving from an FRMCS Domain to the GSM-R system, the Public Address system(s) shall be able to receive an On-Train Voice Communication towards passengers excluding the period of domain change. (M-Vx)

10.23.4.8i Intentionally deleted.

10.23.4.9 When a Public Address system(s) with an active On-Train Voice Communication towards passengers is moving from an FRMCS Domain to the GSM-R system, a drop of the communication is acceptable. (I-Vx)

10.23.4.10 When the On-Train Voice Communication towards passengers is dropped during an FRMCS to GSM-R domain change, the Public Address system(s) should be able to receive again the communication from the same User with the specified quality of service. (O-Vx)

Domain change GSM-R to FRMCS

10.23.4.11 When a Public Address system(s) with no active On-Train Voice Communication towards passengers is moving from the GSM-R system to an FRMCS Domain, the Public Address system(s) shall be able to receive an On-Train Voice Communication towards passengers excluding the period of domain change. (M-Vx)

10.23.4.11i Intentionally deleted.

10.23.4.12 When a Public Address system(s) with an active On-Train Voice Communication towards passengers is moving from the GSM-R system to an FRMCS Domain, a drop of the communication is acceptable. (I-Vx)

10.23.4.13 When the On-Train Voice Communication towards passengers is dropped during the GSM-R system to an FRMCS Domain change, the Public Address system(s) should be able to receive again the communication from the same User with the specified quality of service. (O-Vx)

Interconnection

Between FRMCS Domains

10.23.4.14 A User shall be able to initiate an On-Train Voice Communication towards passengers to a Public Address system(s) located in another FRMCS Domain by using the Public Address system(s) Functional Identities. (M-Vx)

Interworking

From FRMCS to GSM-R

10.23.4.15 A User in an FRMCS Domain shall be able to initiate an On-Train Voice Communication towards passengers to a Public Address system(s) located in the GSM-R system by using the Public Address system(s) Functional Identities. (M-Vx)

From GSM-R to FRMCS

10.23.4.16 A User in the GSM-R system shall be able to initiate an On-Train Voice Communication towards passengers to a Public Address system(s) located in an FRMCS Domain by using the Public Address system(s) Functional Identities. (M-Vx)

10.23.5 Requirements for Off-network

10.23.5.1 No specific requirements. (I-Vx)

10.23.6 Intentionally deleted

10.23.6.1 Intentionally deleted

10.24 Station Public Address - FRMCS Application

10.24.1 Introduction

10.24.1.1 To be defined in a later version of the specification. (I-Vx)

10.25 Communication at stations and Depots - FRMCS Application

10.25.1 Introduction

10.25.1.1 To be defined in a later version of the specification. (I-Vx)

11 Data FRMCS Applications & Communication Services

11.0 Intentionally deleted

11.0.1 Intentionally deleted.

11.0.2 Intentionally deleted.

11.0.3 Intentionally deleted.

11.0.4 Intentionally deleted.

11.0.5 Intentionally deleted.

11.1 Data Communication functions for FRMCS Applications & Communication Services

11.1.1.1 The aim of this section is to define the requirements related to the Common Functions used by FRMCS Applications & Communication Services as defined in the introduction of this chapter. (I)

11.1.1.2 The Data Communication FRMCS Applications & Communication Services which are specified in this chapter allow all or some of the functions specified in this section. Therefore, in order to avoid the duplication of equivalent requirements all along this chapter, the functional specification of each Data Communication FRMCS Applications & Communication Services refers to the Common Functions defined hereafter. Moreover, some of the Common Functions described in this section are referring to Common Functions already described in paragraph 8. The requirements related to the common data functions are structured in three different phases/contexts of a Data Communication (initiating, addressing and User handling phase). (I)

11.1.1.3 The FRMCS System shall provide a means to establish Data Communications between 2 Users. (M)

11.1.1.3i The FRMCS System shall provide a means to establish Data Communications involving more than 2 Users. (O-Vx)

11.1.1.4 All Data Communication functions shall be applicable for all FRMCS Data Communication FRMCS Applications & Communication Services, unless otherwise specified per FRMCS Application or FRMCS Communication Service. (M)

11.1.1.5 All Data Communication functions shall work by default in On-network mode. (M-Vx)

11.1.1.6 Specific Off-network mode requirements are specified in the corresponding FRMCS Application or FRMCS Communication Service. (I-Vx)

11.1.2 User initiating a Data Communication

11.1.2.1 It is assumed that the User is attached to the FRMCS System, has a valid Subscriber Identity and is optionally logged in. (I-V3)

11.1.2.2 The FRMCS System shall support a User to initiate a Data Communication by providing the identity of the Addressed User. (M-V3)

11.1.2.3 Intentionally deleted.

11.1.2.3i The User eligibility depends on the result of the authorisation of communication - Common Function process and could also depend on the addressing mechanism. (I)

11.1.2.4 Upon a Data Communication initiation by the User, the system shall check the setup applicability for the concerned FRMCS Application or FRMCS Communication Service and determine one of the following outcomes: (M)

a) The Data Communication initiation is aborted (e.g. Addressed User unavailable or initiation rejected);
b) A new Data Communication is set up.

11.1.2.5 If a new Data Communication is setup, the further outcome is depending on the connection status of the Addressed User. (I)

11.1.2.6 At initiation of the Data Communication the User- or Functional Identity of the initiator shall be provided to the Addressed User. (M-V3)

11.1.2.7 At initiation of the Data Communication the User- or Functional Identity of the initiator shall be provided to the Addressed User(s). (M-Vx)

11.1.3 User addressed by a Data Communication

11.1.3.1 It is assumed that the User is attached to the FRMCS System, has a valid Subscriber Identity and is optionally logged in. (I-V3)

11.1.3.2 Receipt of invitation to a communication is considered as a User addressed by the corresponding Data Communication. (I)

11.1.3.3 At the communication setup of the Data Communication, the FRMCS System shall check the User eligibility to be a participant of the point-to-point communication. (M-V3)

11.1.3.3i At the communication setup of the Data Communication, the FRMCS System shall check the Users eligibilities to be a participant of the point-to-multipoint communication. (M-Vx)

11.1.3.4 The User eligibility depends on the result of the authorisation of communication - Common Function process and could also depend on the addressing mechanism (e.g. location dependent as for REC alert). (I)

11.1.3.5 When the User is eligible to be a participant, the User is addressed by the communication. (I)

11.1.3.6 The arbitration - Common Function shall manage the handling of the Data Communication (e.g. rejecting or accepting) according to the predefined arbitration rules taking into account all communications, connected or in the queue, of the concerned User device. (M-Vx)

11.1.3.7 When a User is joining the Data Communication, the identity/ies of the User shall be provided to the other User(s). (M-Vx)

11.1.3.8 When applicable, upon reception of a Data Communication, the User handling process shall support the User to select one of the following actions:
a) To accept the Data Communication; (M-V3)
b) To reject the Data Communication; (M)
c) To ignore the Data Communication (do nothing). (M-V3)

11.1.3.9 Respectively to the User handling actions order, the outcome of the User handling shall be one of the following:
a) The User is connected to the Data Communication; (M)
b) The User is no longer addressed by the Data Communication; (M-V3)
c) The Data Communication is automatically rejected after a predefined delay or the Data Communication initiator stopped the attempt. (M-V3)

11.1.3.10 The delay for automatic rejection when the User ignores a Data Communication shall be configurable. (M-V3)

11.1.4 User handling of an ongoing Data Communication

11.1.4.1 It is assumed that the User is connected to a Data Communication. (I)

11.1.4.2 The User eligibility depends on the result of the authorisation of communication - Common Function process and could also depend on the addressing mechanism (e.g. location dependent as for REC alert). (I)

11.1.4.2i Until the termination of the Data Communication, the FRMCS System shall monitor the User eligibility to be a participant of the point-to-point communication. (M-V3)

11.1.4.2ii Until the termination of the Data Communication, the FRMCS System shall monitor all the Users eligibilities to be a participant of the point-to-multipoint communication. (M-Vx)

11.1.4.3 If the User is no more eligible, the User shall no longer be addressed. (M-V3)

11.1.4.4 The FRMCS System shall check if the Data Communication shall be terminated due to system rules (timer expired, etc.), system operator action or User action. Upon termination, the Data Communication is stopped. (M)

11.1.5 Usability of FRMCS Domain

11.1.5.1 The FRMCS System shall support authorised Users to use available FRMCS Domain(s) to communicate. (M-V3)

11.1i Data Communication functions for FRMCS Communication Services

11.1i.1 The aim of this section is to define the requirements related to the Common Functions used by FRMCS Communication Service as defined in the introduction of this chapter. (I)

11.1i.2 The Data Communication FRMCS Applications & Communication Services which are specified in this chapter to deliver a data connectivity for FRMCS Communication Services through FRMCS System use all or some of the functions specified in this section. Therefore, in order to avoid the duplication of equivalent requirements all along this paragraph, the functional specification of each Data Communication FRMCS Applications & Communication Services refers to the Common Functions defined hereafter. Moreover, some of the Common Functions described in this section are referring to Common Functions already described in paragraph 8. The requirements related to the common data functions are structured in three different phases/contexts of a Data Communication. (I)

11.1i.1.3 The FRMCS System shall provide a means to establish Data Communications between 2 Users. (M)

11.1i.1.4 The FRMCS System shall provide a means to establish Data Communications involving more than 2 Users. (M-Vx)

11.1.i.1.5 All Data Communication functions shall be applicable for all FRMCS Data Communication FRMCS Applications & Communication Services delivering data connectivity to FRMCS Communication Services, unless otherwise specified per FRMCS Application or FRMCS Communication Service. (M)

11.1i.1.6 All Data Communication functions shall work by default in On-network mode. (M-Vx)

11.1i.1.7 Specific Off-network mode requirements are specified in the corresponding FRMCS Application or FRMCS Communication Service. (I-Vx)

11.1i.2 User initiating a Data Communication

11.1i.2.1 It is assumed that the User associated to the FRMCS Communication Service is attached to the FRMCS System, has a valid Subscriber Identity and is optionally logged in. (I-V3)

11.1i.2.2 The FRMCS System shall support a User to initiate a Data Communication providing the identity of the Addressed User or FRMCS Application. (M)

11.1i.2.3 Upon a Data Communication initiation by the User associated to the FRMCS Communication Service, the FRMCS System shall determine if the User is eligible to be the initiator of this Data Communication. (M)

11.1i.2.4 The User eligibility depends on the result of the authorisation of communication - Common Function process and could also depend on the addressing mechanism. (I)

11.1i.2.5 Upon a Data Communication initiation by the User associated to the FRMCS Communication Service, the FRMCS System shall check the communication setup applicability for the concerned FRMCS Application and determines one of the following outcomes: (M)

a) The Data Communication initiation is aborted (e.g. Addressed User unavailable or initiation rejected);
b) A new Data Communication is set up.

11.1i.2.6 If a new Data Communication is setup, the further outcome is depending on the connection status of the Addressed User. (I)

11.1i.2.7 At initiation of the Data Communication the relevant identity of the initiating User associated to the FRMCS Communication Service shall be provided to the Addressed User(s) associated to the FRMCS Communication Service. (M)

11.1i.3 User addressed by a Data Communication

11.1i.3.1 It is assumed that the User associated to the FRMCS Communication Service is attached to the FRMCS System, has a valid Subscriber Identity and is optionally logged in. (I-V3)

11.1i.3.2 Receipt of invitation to a communication is considered as a User addressed to the corresponding Data Communication. (I)

11.1i.3.3 At the communication setup of the Data Communication, the FRMCS System shall check all the Users eligibility to be a participant of the communication. (M)

11.1i.3.4 The User eligibility depends on the result of the authorisation of communication - Common Function process and could also depend on the addressing mechanism. (I)

11.1i.3.5 When the User is eligible to be a participant, the User is addressed by the communication. (I)

11.1i.3.6 Upon reception of a Data Communication, the User handling process shall support the User to select one of the following actions:

a) To accept the Data Communication; (M-V3)
b) To reject the Data Communication; (M-V3)
c) To ignore the Data Communication (do nothing). (O-V3)

11.1i.3.7 Respectively to the User handling actions order, the outcome of the User handling shall be one of the following: (M)

a) The User is connected to the Data Communication;
b) The User is no longer addressed by the Data Communication;
c) The Data Communication is automatically rejected after a predefined delay or the Data Communication initiator stopped the attempt.

11.1i.3.8 The delay for automatic rejection when the User ignores a Data Communication shall be configurable. (M)

11.1i.4 User handling of an ongoing Data Communication

11.1i.4.1 It is assumed that the User associated to the FRMCS Communication Service is connected to a Data Communication. (I)

11.1i.4.2 Intentionally deleted.

11.1i.4.3 Until the termination of the Data Communication, the FRMCS System shall monitor all the User eligibility to be a participant of the communication. (M-V3)

11.1i.4.3i Until the termination of the Data Communication, the FRMCS System shall monitor all the Users eligibilities to be a participant of the communication. (M-Vx)

11.1i.4.4 If the User is no more eligible, the User shall no longer be addressed. (M-V3)

11.1i.4.5 The FRMCS System shall check if the Data Communication shall be terminated due to system rules (timer expired, etc.), system operator action or User action. Upon termination, the Data Communication is stopped. (M)

11.2 Generic Data Communication - FRMCS Communication Service

11.2.1 Introduction

11.2.1.1 The Generic Data Communication is to provide for a User connectivity. This FRMCS Communication Service is for Users to perform Data Communications between two Users or between multiple Users. (I-V3)

11.2.1.2 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I-V3)

11.2.2 Generic requirements

11.2.2.0a The Generic Data Communication - FRMCS Communication Service is optional. (O-V3)

11.2.2.0b When the Generic Data Communication - FRMCS Communication Service is implemented, the requirements of the Generic Data Communication - FRMCS Communication Service as specified in this chapter apply. (I-V3)

11.2.2.0c The Generic Data Communication capability should be available in the On-Board FRMCS. (O-V3)

11.2.2.0d The Generic Data Communication capability should be available at the trackside FRMCS. (O-V3)

11.2.2.0 The ability for a User to perform Generic Data Communications, depends on the permissions given by the FRMCS Operator. (I-V3)

11.2.2.1 The FRMCS System shall support a User to initiate a Generic Data Communication to one User. (M-V3)

11.2.2.2 The FRMCS System shall support a User to initiate a Generic Data Communication to multiple Users. (M-Vx)

11.2.2.3 The FRMCS System shall support a User to initiate a Generic Data Communication to a User outside of the FRMCS System. (M-V3)

11.2.2.4 The FRMCS System shall support a User to receive a Generic Data Communication. (M-V3)

11.2.2.5 The FRMCS System shall support a User to receive a Generic Data Communication from a User outside the FRMCS System. (M-V3)

11.2.2.6 The FRMCS System should support a User to perform the initiation of a Generic Data Communication by defining each recipient by the Subscriber Identity. (O-V3)

11.2.2.7 The FRMCS System shall support a User to perform the initiation of a Generic Data Communication by defining each recipient by the User Identity. (M-Vx)

11.2.2.8 The FRMCS System shall support a User to perform the initiation of a Generic Data Communication by defining the full Functional Identity. (M-Vx)

11.2.2.8i The application using the generic Data Communication – FRMCS Communication Service can have its own IDs and addressing scheme, which is used at application level. (I-V3)

11.2.2.8ii It shall be possible to address the User of the application based on its own application addressing. (M-V3)

11.2.2.9 Intentionally deleted.

11.2.2.10 A human User addressed by an ongoing Generic Data Communication shall be able to invite User(s) to join the communication. (M-Vx)

11.2.2.10i A human User initiator of an ongoing Generic Data Communication shall be able to invite User(s) to join the communication. (M-Vx)

11.2.2.11 A human User shall be able to invite a User(s) to an ongoing Generic Data Communication by defining each recipient by the Subscriber Identity. (M-Vx)

11.2.2.12 A human User shall be able to invite a User(s) to an ongoing Generic Data Communication by defining each recipient by the User Identity. (M-Vx)

11.2.2.13 A human User shall be able to invite a User(s) to an ongoing Generic Data Communication by defining the recipient(s) by the Functional Identity. (M-Vx)

11.2.2.14 A human User shall be able to invite a User(s) to an ongoing Generic Data Communication by using the Group Identity. (M-Vx)

11.2.2.15 The maximum number of simultaneous participants in a Generic Data Communication shall be configurable. (M-Vx)

11.2.2.16 The number of simultaneous participants in a Generic Data Communication is sufficient to fulfil the railway’s operational needs. (I-V3)

11.2.2.17 Intentionally deleted.

11.2.2.17i The Functional Identity of the initiator shall be presented to the User addressed by the Generic Data Communication. (M-Vx)

11.2.2.17ii The Functional Identity of the called User shall be presented to the User initiating the Generic Data Communication. (M-Vx)

11.2.2.18 The User shall be able to choose which Functional Identity to be presented for Generic Data Communication for both initiating and receipt. (M-Vx)

11.2.2.18i The FRMCS System shall support a User involved in a Generic Data Communication to leave this communication. (M-VX)

11.2.2.18ii The FRMCS System shall support the initiating User of a Generic Data Communication to terminate this communication. (M-V3)

11.2.2.18iii If only one User remains in the Generic Data Communication, the FRMCS System shall terminate the communication. (M-Vx)

11.2.2.19 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: MEDIUM;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.2.2.20 The FRMCS System shall support the recording of a Generic Data Communication related metadata. (M-V3)

11.2.3 HMI requirements

11.2.3.1 No requirements. (I-V3)

11.2.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.2.4.1 When a User is in the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Generic Data Communication. (M-Vx)

11.2.4.2 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Communication Service) shall be performed without any interaction of the User of a Generic Data Communication. (M-V3)

Domain change FRMCS to FRMCS

11.2.4.3 When a User with no active Generic Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the User should be able to initiate a Data Communication excluding the period of domain change. (O-V3)

11.2.4.3i Intentionally deleted.

11.2.4.4 When a User with an active Generic Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-Vx)

11.2.4.5 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I-V3)

Domain change FRMCS to GSM-R

11.2.4.6 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

11.2.4.7 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

11.2.4.8 A User shall be able to initiate a Generic Data Communication to a User located in another FRMCS Domain. (M-V3)

11.2.4.8i A User shall be able to initiate a Generic Data Communication to User(s) located in another FRMCS Domain. (M-Vx)

Interworking

From FRMCS to GSM-R

11.2.4.9 No requirements applicable. (I-V3)

From GSM-R to FRMCS

11.2.4.10 No requirements applicable. (I-V3)

11.2.5 Requirements for Off-network

11.2.5.1 Data Communication may be needed Off-network. In those cases, the behavior is the same as when using the function On-network. (I-Vx)

11.2.6 Intentionally deleted

11.2.6.1 Intentionally deleted

11.3 Role management and presence - FRMCS Application

11.3.1 Introduction

11.3.1.1 This FRMCS Application specifies the interface aspects of the Role management and presence - Common Function to the User. (I)

11.3.1.2 The Role management and presence - FRMCS Application is comprehensively captured in this FRMCS Application section . (I)

11.3.2 Generic requirements

11.3.2.1 An FRMCS Application shall support the following User login methods by input of credentials: (M)

a) Without User action. The FRMCS Application provides the credentials;
b) With User action.

11.3.2.1i The FRMCS System should support the Single Sign On/Off procedure to log-in to all FRMCS Applications available to the User on a device. (O-V3)

11.3.2.1ii The information for the Single Sign On/Off procedure can be provided by an External System. (I)

11.3.2.1iii The form of the credentials are dependent on national implementation of General Data Protection Regulation framework.
Examples: jane.doe@railwayundertaking.eu or driver_shift_123@railwayundertaking.eu or controller_station_x@infrastructuremanager.eu . (I)

11.3.2.2 The FRMCS Application shall support the User to provide the credentials that are required for a login to the FRMCS System. (M)

11.3.2.3 The login of a human User can support methods available to the FRMCS User Device used (e.g. keycode, username / password, smart card, finger print, retina scan). (I)

11.3.2.4 The User shall be informed about the outcome of its login procedure. (M)

11.3.2.5 After a successful login, the FRMCS Application shall only list the type of Functional Identities and the corresponding label values allowed by the User's current Role Set. (M-V3)

11.3.2.5i In the case the Train Identity is used by multiple FRMCS Applications and/or FRMCS Communication Services, the FRMCS System shall support the entering of the Train Identity to be carried out only once. (M-V3)

11.3.2.6 Upon invoke of the Role management and presence FRMCS Application dialogue, the FRMCS Application shall only list the type of Functional Identities and the corresponding label values allowed by the User's current Role Set. (M-V3)

11.3.2.7 The User shall be able to enter/compose one or several Functional Identity(ies). (M-V3)

11.3.2.8 For a label which is not specified in the Role Set (e.g. identification of a Train function Identity), the User shall have the ability to provide a specific label value. (M-V3)

11.3.2.9 The User shall be able to enter one or several Functional Identity(ies) without using the selection menu. (M-V3)

11.3.2.10 The User shall be able to initiate its registration into the inputted Functional Identities. (M)

11.3.2.11 The registration into a Functional Identity shall be available for all the FRMCS Applications authorised for this User. (M-V3)

11.3.2.12 The User shall be informed about the outcome of a functional registration attempt. (M-V3)

11.3.2.13 The User shall be able to request the change of (a) label(s) from a registered Functional Identity. (M-V3)

11.3.2.14 The User shall be informed about the outcome of a registration change attempt. (M-V3)

11.3.2.15 The User shall be able to request the deregistration from (a) registered Functional Identity(ies). (M)

11.3.2.16 The User shall be informed about the outcome of the deregistration attempt. (M-V3)

11.3.2.17 The User shall be able to request its log out from the FRMCS System. (M-V3)

11.3.2.17i Intentionally deleted.

11.3.2.17ii Intentionally deleted.

11.3.2.18 The User shall be able to request a list of Users Identities and Functional Identities based on one or a combination of the following:

a) The User’s current Role(s); (M)
b) The User’s Location Information. (M-Vx)

11.3.2.19 The resulting list of Users Identities and Functional Identities shall contain all the following information’s: (M-Vx)

a) Presence status of the User;
b) Location Information.

11.3.2.20 A User shall be able to request information about a specific User / Role. (M)

11.3.2.21 Upon request, an Authorised User shall be able to get one or a combination of the following additional information:

a) List of Functional Identities assigned to a User; (M)
b) List of Users corresponding to a Functional Identity; (M)
c) Timestamp of registration related to a Functional Identity. (M-Vx)

11.3.2.22 A User shall be able to invoke a search to request the list of Users and Roles based on one of the following. (M-Vx)

a) Specific label;

b) Location Information.

11.3.2.23 A User shall be able to retrieve its own current Functional Identities. (M)

11.3.2.24 An Authorised User shall be able to deregister another User. (M)

11.3.2.24i The User deregistered by an Authorised User shall be informed about the outcome of the deregistration attempt. (M-V3).

11.3.2.25 An Authorised User shall be able to select the User to be deregistered from a shared Functional Identity. (M-V3)

11.3.3 Functional Identity transfer

11.3.3.1 An Authorised User shall be able to transfer Functional Identity(ies) from one User to another User. (M-Vx)

11.3.3.2 A User shall be able to offer its current Functional Identity(ies) to another User. (M-Vx)

11.3.3.3 A User being the target of a Functional Identity(ies) transfer shall be able to accept or decline. (M-Vx)

11.3.3.4 A User offering a Functional Identity shall be informed about the outcome of this attempt. (M-Vx)

11.3.3.4i The following QoS and priority parameters shall be used: (M-Vx)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.3.3.5 The FRMCS System shall support the recording of Role management and presence - FRMCS Application Data Communication related metadata. (M-Vx)

11.3.4 HMI requirements

11.3.4.1 No specific requirement. (I)

11.3.5 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.3.5.1 When an FRMCS Domain is selected, the necessary service (re)registering of Identities shall be performed without any interaction of the User of the Role management and presence FRMCS Application. (M)

11.3.5.1i When an FRMCS Domain is selected, the management of credentials shall be performed without any interaction of the User. (M)

Domain change FRMCS to GSM-R

11.3.5.2 The human User shall be informed in the case the (re)registering of Identities failed (e.g. in the case the Train number is already registered in the new domain). (M)

Domain change GSM-R to FRMCS

11.3.5.3 The human User shall be informed in the case the (re)registering of Identities failed (e.g. in the case the Train number is already registered in the new domain). (M)

Interconnection

Between FRMCS Domains

11.3.5.4 No requirements applicable. (I)

Interworking

From FRMCS to GSM-R

11.3.5.5 No requirements applicable. (I)

From GSM-R to FRMCS

11.3.5.6 No requirements applicable. (I)

11.3.6 Requirements for Off-network

11.3.6.1 No specific requirement. (I-Vx)

11.3.7 Intentionally deleted

11.3.7.1 Intentionally deleted

11.4 Automatic Train Protection - FRMCS Communication Service

11.4.1 Introduction

11.4.1.1 An On-Board part of the ATP application is able to initiate a Data Communication to the trackside part of the ATP application responsible for the movement of the Train. (I)

11.4.1.2 Trackside to On-Board, On-Board to On-Board and trackside to trackside Data Communications are out of scope for this section of the specification. (I)

11.4.1.3 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I)

11.4.2 Generic Requirements

11.4.2.1 The FRMCS System shall support an On-Board part of the ATP application to initiate a Data Communication to the trackside part of the ATP application responsible for the movement of the Train. (M)

11.4.2.2 The FRMCS System shall support the trackside part of the ATP application to receive the incoming communication. (M)

11.4.2.3 The FRMCS System should support the On-Board part of the ATP application to register to a Functional Identity. (O-Vx)

11.4.2.4 The Functional Identity of the On-Board part of the ATP application and type of incoming communication should be made available to the trackside part of the ATP application receiver of the Data Communication. (O-Vx)

11.4.2.4i The FRMCS System shall support the registration of one or more Functional Identity(ies) for a trackside part of the ATP application with an implicit method i.e. without any explicit request from the ATP application. (M-V3)

11.4.2.4ii The FRMCS System shall support deregistration of Functional Identity(ies) for a trackside part of the ATP application with an implicit method i.e. without any explicit request from the ATP application. (M-V3)

11.4.2.5 If the Functional Identity of the ATP application is not available, the Functional Identity of the vehicle should be presented to the trackside part of the ATP application receiver of the Data Communication. (O-Vx)

11.4.2.6 The Location Information of the On-Board part of the ATP application should be made available to the trackside part of the ATP application receiver of the Data Communication. (O-Vx)

11.4.2.7 During the Data Communication, the information of the location of the initiator presented to the trackside part of the ATP application receiver should be updated. (O-Vx)

11.4.2.8 The ATP application can have its own location system, which is used at application level, but the FRMCS location can be used in the future. (I)

11.4.2.9 The ATP application can have its own IDs and addressing scheme, which is used at application level. (I)

11.4.2.10 The ATP Data Communications are strictly point-to-point. (I)

11.4.2.10i The Data Communication shall be Bi-directional. (M)

11.4.2.11 Intentionally deleted.

11.4.2.11a It shall be possible to address the responsible trackside part of the ATP application based on one or a combination of the following:

a) Location Information of the initiator; (O-Vx)
a) Functional Identity of the initiator; (O-Vx)
b) Own ATP application addressing. (M)

11.4.2.11ai The FRMCS System shall support the On-Board part of the ATP application to terminate the Data Communication. (M)

11.4.2.11aii The FRMCS System shall support the trackside part of the ATP application to terminate the Data Communication. (M)

11.4.2.12 The following QoS and priority parameters shall be used: (M)

a) Latency: NORMAL;
b) Reliability: HIGH;
c) Throughput: LOW;
d) Session setup Time: IMMEDIATE;
e) Priority: as per Appendix J.

11.4.2.13 For ATP the arbitration - Common Function is not used. (I)

11.4.2.14 The FRMCS System shall support the recording of a Automatic Train Protection Data Communication related metadata. (M-V3)

11.4.3 HMI requirements

11.4.3.1 No requirements applicable. (I)

11.4.4 Requirements for domain change, Interconnection and Interworking

11.4.4.1 Intentionally deleted.

Domain change generic

11.4.4.2 The On-Board part of the ATP application selects whether the FRMCS System or the GSM-R system is used. (I)

11.4.4.3 When the On-Board part of the ATP application is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform the ATP communication. (M)

11.4.4.4 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Communication Service) performed without any interaction of the ATP application. (M-V3)

Domain change FRMCS to FRMCS

11.4.4.5 When an On-Board part of the ATP application with no active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the On-Board part of the ATP application shall be able to initiate a Data Communication excluding the period of domain change. (M)

11.4.4.5i Intentionally deleted.

11.4.4.6 When an On-Board part of the ATP application with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the On-Board part of the ATP application shall be able to initiate another Data Communication excluding the period of domain change. (M)

11.4.4.6i Intentionally deleted.

11.4.4.7 When an On-Board part of the ATP application with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the FRMCS System shall provide Service Continuity. (M)

11.4.4.8 Intentionally deleted.

Domain change FRMCS to GSM-R

11.4.4.9 No requirements applicable: The On-Board part of the ATP application selects whether the FRMCS System or the GSM-R system is used. (I)

Domain change GSM-R to FRMCS

11.4.4.10 No requirements applicable: The On-Board part of the ATP application selects whether the FRMCS System or the GSM-R system is used. (I)

Interconnection

Between FRMCS Domains

11.4.4.11 An On-Board part of the ATP application shall be able to initiate a Data Communication to the responsible trackside part of the ATP application located in another FRMCS Domain. (M)

Interworking

From FRMCS to GSM-R

11.4.4.12 No requirements applicable. (I)

From GSM-R to FRMCS

11.4.4.13 No requirements applicable. (I)

11.4.5 Requirements for Off-network

11.4.5.1 No requirements applicable. (I-Vx)

11.4.5.2 Some modes of ATP operation can require Off-network communications. This requirement does not correspond to the mode of operation where communication is established between the On-Board part of the ATP application of the Train and the one in the control center at the trackside (ground system). It can correspond to other modes of operation where communication is established between the On-Board part of the ATP application of the Trains and/or trackside elements. (I-Vx)

11.4.6 Intentionally deleted

11.4.6.1 Intentionally deleted

11.5 Automatic Train Operation - FRMCS Communication Service

11.5.1 Introduction

11.5.1.1 An On-Board part of the ATO application is able to initiate a Data Communication to the trackside part of the ATO application associated to the movement of the Train. (I)

11.5.1.2 Trackside to On-Board, On-Board to On-Board and trackside to trackside Data Communications are out of scope for this section of the specification (I).

11.5.1.3 When the ATO system requires a Video Communication, the critical real time video – FRMCS Communication Service can be used. (I-V3)

11.5.1.4 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I)

11.5.2 Generic Requirements

11.5.2.1 The FRMCS System shall support an On-Board part of the ATO application to initiate a Data Communication to the trackside part of the ATO application. (M)

11.5.2.1i The FRMCS System should support the ATO application to initiate a critical real time Video Communication coupled with the ATO Data Communication. (O-Vx)

11.5.2.2 The FRMCS System shall support the trackside part of the ATO application to receive the incoming communication. (M)

11.5.2.3 When required by the ATO implementation, the Functional Identity of the On-Board part of the ATO application and when available the Location Information and type of incoming communication shall be made available to the trackside part of the ATO application receiver of the Data Communication. (M-Vx)

11.5.2.4 When required by the ATO implementation, during the Data Communication, the information of the location of the initiator presented to the trackside part of the ATO application receiver shall be updated. (M-Vx)

11.4.2.4i The FRMCS System shall support the registration of one or more Functional Identity(ies) for a trackside part of the ATO application with an implicit method i.e. without any explicit request from the ATO application. (M-V3)

11.4.2.4ii The FRMCS System shall support deregistration of Functional Identity(ies) for a trackside part of the ATO application with an implicit method i.e. without any explicit request from the ATO application. (M-V3)

11.5.2.5 The ATO application has its own location system, which is used at ATO application level, but the FRMCS location can be used in the future (I).

11.5.2.6 When required by the ATO implementation, in the case the Functional Identity of the ATO application is not available, the Functional Identity of the vehicle shall be presented to the trackside part of the ATO application receiver of the Data Communication. (M-Vx)

11.5.2.7 The ATO application has its own IDs and addressing scheme, which is used at application level (I).

11.5.2.8 The ATO Data Communications are strictly point-to-point. (I)

11.5.2.8i The Data Communication shall be Bi-directional. (M)

11.5.2.9 Intentionally deleted.

11.5.2.9a It shall be possible to address the responsible trackside part of the ATO application based on one or a combination of the following:

a) Location Information of the initiator; (O-Vx)
b) Functional Identity of the initiator; (O-Vx)
c) Own ATO application addressing. (M)

11.5.2.9ai The FRMCS System shall support the On-Board part of the ATO application to terminate the Data Communication. (M)

11.5.2.9aii The FRMCS System shall support the trackside part of the ATO application to terminate the Data Communication. (M-V3)

11.5.2.10 The following QoS and priority parameters shall be used for the ATO Data Communication: (M)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: MEDIUM;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.5.2.11 For ATO the arbitration - Common Function is not used. (I)

11.5.2.12 The FRMCS System shall support the recording of a ATO Data Communication related metadata. (M-V3)

11.5.3 HMI requirements

11.5.3.1 No requirements applicable. (I)

11.5.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.5.4.1 The On-Board part of the ATO application selects whether the FRMCS System or the GSM-R system is used. (I)

11.5.4.2 When On-Board part of the ATO application is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform the ATO communication. (M)

11.5.4.3 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Communication Service) shall be performed without any interaction of the ATO application. (M-V3)

Domain change FRMCS to FRMCS

11.5.4.4 When an On-Board part of the ATO application with no active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the On-Board part of the ATO application shall be able to initiate a Data Communication excluding the period of domain change. (M)

11.5.4.4i Intentionally deleted.

11.5.4.5 When an On-Board part of the ATO application with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the On-Board part of the ATO application shall be able to initiate another Data Communication excluding the period of domain change. (M)

11.5.4.5i Intentionally deleted.

11.5.4.6 Intentionally deleted.

11.5.4.7 When an On-Board part of the ATO application with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, an interruption of the transfer of data is acceptable. (I)

Domain change FRMCS to GSM-R

11.5.4.8 No requirements applicable. (I)

Domain change GSM-R to FRMCS

11.5.4.9 No requirements applicable. (I)

Interconnection

Between FRMCS Domains

11.5.4.10 An On-Board part of the ATO application shall be able to initiate a Data Communication to the appropriate trackside part of the ATO application located in another FRMCS Domain. (M)

Interworking

From FRMCS to GSM-R

11.5.4.11 No requirements applicable. (I)

From GSM-R to FRMCS

11.5.4.12 No requirements applicable. (I)

11.5.5 Requirements for Off-network

11.5.5.1 No requirements applicable. (I-Vx)

11.5.5.2 Some modes of ATO operation can require Off-network communications. This requirement does not correspond to the mode of operation where communication is established between the On-Board part of the ATO application of the Train and the one in the control center at the trackside (ground system). It can correspond to other modes of operation where communication is established between the On-Board part of the ATO application of the Trains and/or trackside elements. (I-Vx)

11.5.6 Intentionally deleted

11.5.6.1 Intentionally deleted

11.6 Data Communication for Possession Management - FRMCS Communication Service

11.6.1 Introduction

11.6.1.1 To be defined in a later version of the specification. (I-Vx)

11.7 Trackside Maintenance Warning System communication - FRMCS Communication Service

11.7.1 Introduction

11.7.1.1 To be defined in a later version of the specification. (I-Vx)

11.8 Remote control of engines - FRMCS Communication Service

11.8.1 Introduction

11.8.1.1 To be defined in a later version of the specification. (I-Vx)

11.9 Monitoring and control of critical infrastructure - FRMCS Communication Service

11.9.1 Introduction

11.9.1.1 The ground and/or Train based monitoring and controlling critical infrastructure application allows the system monitoring and controlling critical infrastructure to initiate Data Communication between itself and any critical infrastructure. Users can include Train detection, signals and indicators, movable infrastructure, level crossing elements, including barrier controls vehicle sensors, infrastructure object Controllers, lighting controls and alarms). Critical infrastructures can also initiate Data Communication with the system monitoring and controlling it. (I-V3)

11.9.1.2 Intentionally deleted.

11.9.1.3 Intentionally deleted.

11.9.1.4 The system supervises, monitors and/or controls the status and configuration of the critical infrastructure. (I-V3)

11.9.1.5 The infrastructure provides regular updates on its status (either upon request or triggered by an event) to the system monitoring and controlling it. (I-V3)

11.9.1.6 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I-V3)

11.9.2 Generic Requirements

11.9.2.0 The monitoring and control of critical infrastructure - FRMCS Communication Service is optional. (O-V3)

11.9.2.0i When the monitoring and control of critical infrastructure - FRMCS Communication Service is implemented, the requirements of the monitoring and control of critical infrastructure - FRMCS Communication Service as specified in this chapter apply. (I-V3)

11.9.2.0ii The Monitoring and control of critical infrastructure capability should be available in the On-Board FRMCS. (O-V3)

11.9.2.0iii The Monitoring and control of critical infrastructure capability should be available at the trackside FRMCS. (O-V3)

11.9.2.1 The FRMCS System shall support the system monitoring and controlling critical infrastructure to initiate Data Communication to the critical infrastructure being monitored and/or controlled. (M-V3)

11.9.2.2 The FRMCS System shall support the critical infrastructure being monitored and/or controlled to initiate the Data Communication to the system monitoring and controlling it. (M-V3)

11.9.2.3 The Data Communication shall be Bi-directional. (M-V3)

11.9.2.4 The Data Communication shall be established in a point-to-point or point-to-multipoint basis. (M-V3)

11.9.2.5 Any loss of communications between the system monitoring and controlling critical infrastructure and the critical infrastructure being monitored and/or controlled shall be reported to the User (of that application). (M-V3)

11.9.2.6 Any risk associated with a failure or inability of the FRMCS System to provide Data Communications when required by this FRMCS Communication Service, is mitigated by the application itself. (I-V3)

11.9.2.7 Intentionally deleted.

11.9.2.8 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.9.2.9 The system monitoring and controlling critical infrastructure shall be able to terminate the Data Communication. (M-V3)

11.9.2.10 The critical infrastructure being monitored and/or controlled shall be able to terminate the Data Communication. (M-V3)

11.9.2.11 The FRMCS System shall support the recording of a monitoring and control of critical infrastructure Data Communication related metadata. (M-V3)

11.9.3 HMI requirements

11.9.3.1 Intentionally deleted.

11.9.3.2 Intentionally deleted.

11.9.3.3 Intentionally deleted.

11.9.3.4 No requirements applicable. (I-V3)

11.9.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.9.4.1 When a system monitoring and controlling critical infrastructure is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Data Communication to the critical infrastructure being monitored and/or controlled. (M-Vx)

11.9.4.1i When a system being monitored and/or controlled is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Data Communication to the system monitoring and contsolling the critical infrastructure. (M-Vx)

11.9.4.2 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Communication Service) shall be performed without any interaction with the system monitoring and controlling critical infrastructure and the system being monitored and/or controlled. (M-Vx)

Domain change FRMCS to FRMCS

11.9.4.3 When a system monitoring and controlling critical infrastructure with no active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the system monitoring and controlling critical infrastructure should be able to initiate a Data Communication excluding the period of domain change. (O-Vx)

11.9.4.3ai When a system being monitored and/or controlled with no active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the system should be able to initiate a Data Communication excluding the period of domain change. (O-Vx)

11.9.4.3i Intentionally deleted.

11.9.4.4 When a system monitoring and controlling critical infrastructure with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-Vx)

11.9.4.4i When a system being monitored and/or controlled with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-Vx)

11.9.4.5 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I-Vx)

Domain change FRMCS to GSM-R

11.9.4.6 No requirements applicable. (I-Vx)

Domain change GSM-R to FRMCS

11.9.4.7 No requirements applicable. (I-Vx)

Interconnection

Between FRMCS Domains

11.9.4.8 A system monitoring and controlling critical infrastructure shall be able to initiate a Data Communication to critical infrastructure being monitored and/or controlled located in another FRMCS Domain. (M-Vx)

11.9.4.8i A system being monitored and/or controlled shall be able to initiate a Data Communication to the system monitoring and controlling critical infrastructure located in another FRMCS Domain. (M-Vx)

Interworking

From FRMCS to GSM-R

11.9.4.9 No requirements applicable. (I-Vx)

From GSM-R to FRMCS

11.9.4.10 No requirements applicable. (I-Vx)

11.9.5 Requirements for Off-network

11.9.5.1 The monitoring and control of critical infrastructure Data Communication may be needed Off-network. In this case, the behavior is the same as when using the function On-network. (I-Vx)

11.9.6 Intentionally deleted

11.9.6.1 Intentionally deleted

11.10 Access to recording of communications - FRMCS Communication Service

11.10.1 Introduction

11.10.1.1 It's possible to access the recorded communication content and the communication related data (metadata) in order to support analysis. (I-Vx)

11.10.1.2 This FRMCS Communication Service enables and allows access to recorded Voice, Data or Video Communication for post-incident/accident analysis, Training, operational improvement, staff supervision or any other purpose. (I-Vx)

11.10.1.3 This section does not cover regulatory aspects related to who is authorised to access the communication content and the metadata. (I-Vx)

11.10.1.4 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I-Vx)

11.10.2 Generic requirements

11.10.2.1 Intentionally deleted.

11.10.2.2 Intentionally deleted.

11.10.2.3 Intentionally deleted.

11.10.2.4 Intentionally deleted.

11.10.2.5 When further investigation of the communication is required, the FRMCS System loggings provide additional details. (I-Vx)

11.10.2.6 The FRMCS System shall enable an IM system administrator to define authorised Users who are able to access communication content and metadata. (M-Vx)

11.10.2.7 For access to communication content and metadata, the FRMCS System shall be able to assign access rights to an authorised User. (M-Vx)

11.10.2.8 Access rights to communication content and metadata shall be based on following criteria: (M-Vx)

a) Type of FRMCS Application or FRMCS Communication Service;
b) Type of data (communication content, metadata).

11.10.2.9 For FRMCS Applications or FRMCS Communication Services configured to be recorded, the communications content and metadata shall be made available on the track side. (M-Vx)

11.10.2.10 For FRMCS Applications or FRMCS Communication Services configured to be recorded and involving an On-Board User, the communications content and metadata should be made available on the On-Board based solution. (O-Vx)

11.10.2.11 Intentionally deleted.

11.10.3 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.10.3.1 No requirements applicable. (I-Vx)

Domain change FRMCS to FRMCS

11.10.3.2 No requirements applicable. (I-Vx)

Domain change FRMCS to GSM-R

11.10.3.3 No requirements applicable. (I-Vx)

Domain change GSM-R to FRMCS

11.10.3.4 No requirements applicable. (I-Vx)

Interconnection

Between FRMCS Domains

11.10.3.5 No requirements applicable. (I-Vx)

Interworking

From FRMCS to GSM-R

11.10.3.6 No requirements applicable. (I-Vx)

From GSM-R to FRMCS

11.10.3.7 No requirements applicable. (I-Vx)

11.11 Intentionally deleted.

11.12 Shunting Data Communication - FRMCS Application

11.12.1 Introduction

11.12.1.1 The Shunting Data Communication is used for operational Data Communications within one or more Shunting Team(s). (I-Vx)

11.12.1.2 Shunting Teams are a composition of shunting Drivers, shunting leaders, shunting workers. Authorised Controllers and other Authorised Ground Users can be associated to Shunting Teams. (I-Vx)

11.12.1.3 The Shunting Data Communication - FRMCS Application is comprehensively captured in this FRMCS Application section. (I-Vx)

11.12.2 Generic Requirements

11.12.2.1 The Shunting Team composition shall be created based on Shunting Team identification, as part of Functional Identities. (M-Vx)

11.12.2.2 It shall be possible to predefine Shunting Teams and their associated User(s) (e.g. Controller(s) and/or Ground User(s)) by the IM system administrator. (M-Vx)

11.12.2.3 The IM system administrator shall be able to configure the Shunting Team members who are allowed to use the ADC - Common Function. (M-Vx)

11.12.2.4 The IM system administrator shall be able to configure the Shunting Team members who are allowed to use the inviting-a-user - Common Function. (M-Vx)

11.12.2.5 A Shunting Team member shall be able to initiate a Shunting Data Communication with the Shunting Team the User is registered to (Team Identity). (M-Vx)

11.12.2.6 An Authorised Shunting Team member shall be able to invite additional User(s) to the an existing Shunting Data Communication. (M-Vx)

11.12.2.7 After registration of a new Shunting Team member the User shall automatically join the ongoing Shunting Data Communication. (M-Vx)

11.12.2.8 An Authorised Shunting Team member shall be able to initiate an ADC. (M-Vx)

11.12.2.9 An Authorised Controller shall be able to initiate a Shunting Data Communication to a Shunting Team. (M-Vx)

11.12.2.10 An Authorised Controller shall be able to join an ongoing Shunting Data Communication. (M-Vx)

11.12.2.11 During an ongoing Shunting Data Communication Users shall be presented with the following: (M-Vx)

a) Status of the intended recipient;
b) Functional Identities elements (e.g. Role, area) of the currently connected User(s).

11.12.2.12 The following QoS and priority parameters shall be used: (M-Vx)

a) Latency: NORMAL;
b) Reliability: NORMAL;

c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.12.2.13 A Shunting Team member shall be able to leave an ongoing Shunting Data Communication. (M-Vx)

11.12.2.14 Only the Shunting Team leader shall be able to terminate the Shunting Data Communication. (M-Vx)

11.12.2.15 If only one Shunting Team member is remaining in the Shunting Data Communication, the FRMCS System shall automatically terminate the Shunting Data Communication. (M-Vx)

11.12.2.16 The FRMCS System shall support the recording of a Shunting Data Communication related metadata. (M-Vx)

11.12.3 HMI requirements

11.12.3.1 The activation of ADC - Common Function during an ongoing Shunting Data Communication shall be achieved with a single HMI action. (M-Vx)

11.12.3.2 A successful activation of the ADC - Common Function shall be indicated with audible and/or a visible information to the involved Shunting Team members. (M-Vx)

11.12.3.3 An interrupted ADC - Common Function during an ongoing Shunting Data Communication shall be indicated on the User Device by an acoustic alarm and a dedicated icon without any User interaction. (M-Vx)

11.12.3.4 A confirmation shall be returned to the sender, upon successful reception of the message for all data messages sent. (M-Vx)

11.12.3.5 The Functional Identity/ies of the User(s) with interrupted ADC - Common Function should be indicated to the remaining Shunting Team members using ADC - Common Function. (O-Vx)

11.12.3.6 The User interface needs to be adaptable to the work environment of trackside Users (for example helmet with microphone, work gloves, voice interaction, noise canceling). (I-Vx)

11.12.4 Requirements for domain change, Interconnection and Interworking

11.12.4.1 Intentionally deleted.

Domain change generic

11.12.4.2 No requirements applicable. (I-Vx)

Domain change FRMCS to FRMCS

11.12.4.3 No requirements applicable. (I-Vx)

Domain change FRMCS to GSM-R

11.12.4.4 No requirements applicable. (I-Vx)

Domain change GSM-R to FRMCS

11.12.4.5 No requirements applicable. (I-Vx)

Interconnection

Between FRMCS Domains

11.12.4.6 No requirements applicable. (I-Vx)

Interworking

From FRMCS to GSM-R

11.12.4.7 No requirements applicable. (I-Vx)

From GSM-R to FRMCS

11.12.4.8 No requirements applicable. (I-Vx)

11.13 Train integrity monitoring Data - FRMCS Communication Service

11.13.1 Introduction

11.13.1.1 To be defined in a later version of the specification. (I-Vx)

11.14 Public Emergency Warning - FRMCS Communication Service

11.14.1 Introduction

11.14.1.1 To be defined in a later version of the specification. (I-Vx)

11.15 Critical Advisory Messaging services- safety related Data - FRMCS Communication Service

11.15.1 Introduction

11.15.1.1 A critical advisory system is able to send and/or receive critical messages, safety related, like (pre-defined or any) text or pre-recorded voice messages to instruct Railway Staff about the usage of the infrastructure (for example speed restrictions, overriding of a stopping point). Messages can be exchanged on user-to-user or on multi-user level. (I-V3)

11.15.1.2 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I-V3)

11.15.2 Generic Requirements

11.15.2.1 The FRMCS System shall support a critical advisory system to initiate Data Communication to the critical advisory messaging receiver intended to receive the critical advisory message. (M-V3)

11.15.2.2 The FRMCS System shall support a critical advisory messaging receiver to receive the incoming communication. (M-V3)

11.15.2.3 The Data Communication shall be Bi-directional. (M-V3)

11.15.2.4 The Data Communication shall be established in a point-to-point when only two Users are involved. (M-V3)

11.15.2.4i The Data Communication shall be established in point-to-multipoint basis when multiple Users are involved. (M-Vx)

11.15.2.5 Any loss of communications between the critical advisory system and receiver(s) of the critical advisory messaging shall be reported. (M-V3)

11.15.2.6 Any risk associated with a failure or inability of the FRMCS System to provide Data Communications when required by this FRMCS Communication Service, is mitigated by the application itself. (I-V3)

11.15.2.7 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: NORMAL;
b) Reliability: HIGH;
c) Throughput: LOW;
d) Session setup Time: IMMEDIATE;
e) Priority: as per Appendix J.

11.15.2.8 The critical advisory system shall be able to terminate the Data Communication. (M-V3)

11.15.2.9 A critical advisory messaging initiator shall be able to terminate the Data Communication with the critical advisory system. (M-V3)

11.15.2.10 The FRMCS System shall support the recording of a critical Advisory Messaging services- safety related Data Communication related metadata. (M-V3)

11.15.3 HMI requirements

11.15.3.1 No requirements applicable. (I-V3)

11.15.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.15.4.1 When a critical advisory system is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Data Communication to the critical advisory messaging receiver(s). (M-V3)

11.15.4.2 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Communication Service) shall be performed without any interaction of the critical advisory system. (M-V3)

Domain change FRMCS to FRMCS

11.15.4.3 When a critical advisory system with no active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the critical advisory system shall be able to initiate a Data Communication excluding the period of domain change. (M-V3)

11.15.4.3i Intentionally deleted.

11.15.4.4 When a critical advisory system with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-Vx)

11.15.4.5 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I-V3)

Domain change FRMCS to GSM-R

11.15.4.6 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

11.15.4.7 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

11.15.4.8 A critical advisory system should be able to initiate a Data Communication to a critical advisory messaging receiver located in another FRMCS Domain. (O-Vx)

Interworking

From FRMCS to GSM-R

11.15.4.9 No requirements applicable. (I-V3)

From GSM-R to FRMCS

11.15.4.10 No requirements applicable. (I-V3)

11.15.5 Requirements for Off-network

11.15.5.1 No requirements applicable. (I-Vx)

11.15.6 Intentionally deleted

11.15.6.1 Intentionally deleted

11.16 Virtual coupling Data - FRMCS Communication Service

11.16.1 Introduction

11.16.1.1 To be defined in a later version of the specification. (I-Vx)

11.17 Train Parking Protection - FRMCS Communication Service

11.17.1 Introduction

11.17.1.1 To be defined in a later version of the specification. (I-Vx)

11.18 Key Management System Data - FRMCS Communication Service

11.18.1 Introduction

11.18.1.1 An On-Board part of the KMS application is able to initiate a Data Communication to the trackside part of the KMS application responsible for the information related to the Train. (I)

11.18.1.2 KMS to On-Board and KMS to trackside Data Communications are out of scope for this section of the specification (I).

11.18.1.3 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I)

11.18.2 Generic Requirements

11.18.2.1 The FRMCS System shall support an On-Board part of the KMS application to initiate a Data Communication to the network through which the trackside part of the KMS application responsible for the information of the Train is reachable by. (M)

11.18.2.2 The FRMCS System shall support the trackside part of the KMS application to receive the incoming communication. (M)

11.18.2.3 When required by the KMS implementation, the Functional Identity of the On-Board part of the KMS application and when available the Location Information and type of incoming communication shall be made available to the trackside part of the KMS application receiver of the Data Communication. (M-Vx)

11.18.2.4 When required by the KMS implementation, during the Data Communication, the information of the location of the initiator presented to the trackside part of the KMS application receiver shall be updated. (M-Vx)

11.18.2.5 When required by the KMS implementation, in the case the Functional Identity of the KMS application is not available, the Functional Identity of the vehicle shall be presented to the trackside part of the KMS application receiver of the Data Communication. (M-Vx)

11.18.2.6 The KMS application has its own IDs and addressing scheme, which is used at application level (I).

11.18.2.7 The KMS Data Communications are strictly point-to-point. (I)

11.18.2.8 Intentionally deleted.

11.18.2.8i It shall be possible to address the responsible trackside part of the KMS application based on one or a combination of the following:

a) Location Information of the initiator; (O-Vx)
b) Functional Identity of the initiator; (O-Vx)
c) Own KMS application addressing. (M)

11.18.2.9 The following QoS and priority parameters shall be used: (M)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: LOW;
d) Session setup Time: NORMAL;

e) Priority: as per Appendix J.

11.18.2.10 For KMS the arbitration - Common Function is not used. (I)

11.18.2.11 The On-Board part of the KMS application shall be able to terminate the Key Management System Data Communication. (M)

11.18.2.12 The trackside part of the KMS application shall be able to terminate the Key Management System Data Communication. (M-V3)

11.18.2.13 The FRMCS System shall support the recording of a safety key management Data Communication related metadata. (M-V3)

11.18.3 HMI requirements

11.18.3.1 No requirements applicable. (I)

11.18.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.18.4.1 The KMS application On-Board selects whether the FRMCS System or the GSM-R system is used. (I)

11.18.4.2 When a KMS application On-Board is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform the KMS communication. (M)

11.18.4.3 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Communication Service) shall be performed without any interaction of the KMS application. (M-V3)

Domain change FRMCS to FRMCS

11.18.4.4 When an On-Board part of the KMS application with no active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the On-Board part of the KMS application shall be able to initiate a Data Communication excluding the period of domain change. (M)

11.18.4.4i Intentionally deleted.

11.18.4.5 Intentionally deleted.

11.18.4.6 When an On-Board part of the KMS application with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-V3)

11.18.4.7 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I)

Domain change FRMCS to GSM-R

11.18.4.8 No requirements applicable. (I)

Domain change GSM-R to FRMCS

11.18.4.9 No requirements applicable. (I)

Interconnection

Between FRMCS Domains

11.18.4.10 The FRMCS System shall support an On-Board part of the KMS application to initiate a Data Communication to the responsible KMS. (M-V3)

Interworking

From FRMCS to GSM-R

11.18.4.11 No requirements applicable. (I)

From GSM-R to FRMCS

11.18.4.12 No requirements applicable. (I)

11.18.5 Requirements for Off-network

11.18.5.1 No requirements applicable. (I-Vx)

11.18.5.2 Some modes of KMS operation can require Off-network communications. This requirement does not correspond to the mode of operation where communication is established between the On-Board part of the KMS application of the Train and the one in the key management center at the trackside (ground system). It can correspond to other modes of operation where communication is established between the On-Board part of the KMS application of the Trains and/or trackside elements. (I-Vx)

11.18.6 Intentionally deleted

11.18.6.1 Intentionally deleted

11.19 On-Train Telemetry - FRMCS Communication Services

11.19.1 Introduction

11.19.1.1 It is possible to set up Data Communication between on-Train systems (on the same Train) or between on-Train systems and a ground based system. (I)

11.19.1.2 Telemetry data from On-Board Train systems are used by various systems employed by Railway Undertakings or Infrastructure Managers to increase performance or support the management of day-to-day operations. (I)

11.19.1.3 Examples of the usage of telemetry data include: (I)

a) Data on passenger counting, Train loading etc. to support demand forecasting and response.
b) Provision of service related information (live Train running and connecting service updates etc.) to passenger facing On-Board staff or On-Board passenger information systems.
c) Provision of, suitably accurate Train position information to support more accurate initiator context dependent addressing or more efficient incident response.
d) The transfer of health (from sensors to the Train management system), status, vital parameter condition, and onset of fault condition data from intelligent on-Train systems to Train maintenance organisations.
e) Transfer of infrastructure condition data from On-Board sensors or cameras that monitor the condition of trackside infrastructure as the Train moves along the track to infrastructure maintenance Depots or operations control centers.
f) Information on composition of the Train.
g) Information on the load of the Train (e.g. container), like position and load status.
h) Information on the railway asset (e.g. wagon), like position and status.
i) The transfer of configuration data to the On-Board Train systems.

11.19.1.4 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I)

11.19.2 Generic Requirements

11.19.2.0 The On-Train Telemetry - FRMCS Communication Service is optional. (O)

11.19.2.0i When the On-Train Telemetry - FRMCS Communication Service is implemented, the requirements of the On-Train Telemetry - FRMCS Communication Service as specified in this chapter apply. (I)

11.19.2.0ii The On-Train Telemetry - FRMCS Communication Service capability should be available in the On-Board FRMCS. (O)

11.19.2.0iii The On-Train Telemetry - FRMCS Communication Service capability should be available at the trackside FRMCS. (O)

11.19.2.1 The FRMCS System shall support an On-Train telemetry application to initiate an On-Train telemetry communication to another telemetry application on the same Train. (M-Vx)

11.19.2.2 The FRMCS System shall support an On-Train telemetry application to initiate an On-Train telemetry communication to a ground based telemetry application. (M)

11.19.2.3 The FRMCS System shall support an On-Train telemetry application to receive an incoming On-Train telemetry communication. (M-V3)

11.19.2.4 The FRMCS System shall support a ground based telemetry application to receive an incoming On-Train telemetry communication. (M)

11.19.2.5 The FRMCS System should support the telemetry application to register to a Functional Identity. (O-Vx)

11.19.2.6 The Functional Identity of the On-Train telemetry application and type of incoming communication should be made available to the receiving application. (O-Vx)

11.19.2.7 If the Functional Identity of the On-Train telemetry application is not available, the Functional Identity of the vehicle -when registered- should be presented to the receiving application. (O-Vx)

11.19.2.8 The Location Information of the On-Train telemetry application should be made available to the receiving application. (O-Vx)

11.19.2.9 During the On-Train Telemetry communication, the information of the location of the initiator should be presented to the receiving application. (O-Vx)

11.19.2.10 The On-Train telemetry application may use its own location system, or it can use the FRMCS location. (I)

11.19.2.11 The On-Train telemetry application can have its own IDs and addressing scheme, which is used at application level. (I)

11.19.2.12 The On-Train telemetry Data Communication shall be Bi-directional. (M)

11.19.2.13 The On-Train telemetry Data Communication shall be established in a point-to-point basis. (M)

11.19.2.14 The on-Train telemetry application shall be able to terminate the Data Communication. (M)

11.19.2.15 The ground based telemetry application shall be able to terminate the Data Communication. (M-V3)

11.19.2.16 The following QoS and priority parameters shall be used: (M)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: MEDIUM;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.19.2.17 For On-Train telemetry application, the arbitration - Common Function is not used. (I)

11.19.2.18 The FRMCS System shall support the recording of an On-Train telemetry Data Communication related metadata. (M-V3)

11.19.3 HMI requirements

11.19.3.1 No requirements applicable. (I)

11.19.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.19.4.1 When an On-Train telemetry application is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Data Communication to another telemetry application. (M)

11.19.4.2 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS application) shall be performed without any interaction of the On-Train telemetry application. (M)

Domain change FRMCS to FRMCS

11.19.4.3 When an On-Train telemetry application with no active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the On-Train telemetry application should be able to initiate a Data Communication excluding the period of domain change. (O-V3)

11.19.4.3i Intentionally deleted.

11.19.4.4 When an On-Train telemetry application with an active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-Vx)

11.19.4.5 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I)

Domain change FRMCS to GSM-R

11.19.4.6 No requirements applicable. (I)

Domain change GSM-R to FRMCS

11.19.4.7 No requirements applicable. (I)

Interconnection

Between FRMCS Domains

11.19.4.8 An On-Train telemetry application shall be able to initiate a Data Communication to another telemetry application located in another FRMCS Domain. (M-Vx)

Interworking

From FRMCS to GSM-R

11.19.4.9 No requirements applicable. (I)

From GSM-R to FRMCS

11.19.4.10 No requirements applicable. (I)

11.19.5 Requirements for Off-network

11.19.5.1 To be defined in a later version of the specification. (I-Vx)

11.19.6 Intentionally deleted

11.19.6.1 Intentionally deleted

11.20 Infrastructure Telemetry - FRMCS Communication Service

11.20.1 Introduction

11.20.1.1 To be defined in a later version of the specification. (I-Vx)

11.21 On-Train remote equipment control - FRMCS Communication Service

11.21.1 Introduction

11.21.1.1 To be defined in a later version of the specification. (I-Vx)

11.22 Monitoring and Control of Non-Critical Infrastructure - FRMCS Communication Service

11.22.1 Introduction

11.22.1.1 To be defined in a later version of the specification. (I-Vx)

11.23 Wireless on-Train Data Communication for Train Staff - FRMCS Communication Service

11.23.1 Introduction

11.23.1.1 To be defined in a later version of the specification. (I-Vx)

11.24 Wireless Data Communication for Railway Staff on platforms - FRMCS Communication Service

11.24.1 Introduction

11.24.1.1 To be defined in a later version of the specification. (I-Vx)

11.25 Train Driver advisory -Train performance Data - FRMCS Communication Service

11.25.1 Introduction

11.25.1.1 To be defined in a later version of the specification. (I-Vx)

11.26 Train Departure Data - FRMCS Communication Service

11.26.1 Introduction

11.26.1.1 To be defined in a later version of the specification. (I-Vx)

11.27 Messaging services - FRMCS Application

11.27.1 Introduction

11.27.1.1 In operational conditions, there is a need to exchange information among different railway Users. The exchanged information can be for example:

a) Pictures or video from a track side maintenance employee to a Controller; (I-Vx)
b) An instruction for an On-Board maintenance employee; (I-Vx)
c) Exchange information among Train Staff about weather, traffic disturbances/limitations, logistics, etc; (I-Vx)
d) Leaving a voice mail if a User is not available; (I-Vx)
e) Information from a Controller to a Driver via a pre-recorded voice message; (I-Vx)
f) Customer information; (I-Vx)
g) Text messages. (I-V3)

11.27.1.2 A messaging service can be defined as a service allowing the delivery of information from a User, to a User or a group of Users in a way which doesn't imply a Voice Communication between involved Users. (I-V3)

11.27.1.3 Intentionally deleted.

11.27.1.4 The messaging service - FRMCS Application is comprehensively captured in this FRMCS Application section. (I-V3)

11.27.2 Generic Requirements

11.27.2.0 The messaging services - FRMCS Application is optional for the trackside. (O-V3)

11.27.2.0i When the messaging services - FRMCS Application is implemented, the requirements of the messaging services - FRMCS Application as specified in this chapter apply. (I-V3)

11.27.2.0ii The messaging services capability shall be available in the on-On-Board FRMCS. (M-V3)

11.27.2.0iii The messaging services capability should be available at the trackside FRMCS. (O-V3)

11.27.2.1 Intentionally deleted.

11.27.2.1i The FRMCS System shall support sending non-critical messages in the form of text messages. (M-V3)

11.27.2.1ii The FRMCS System shall support sending non-critical messages in other forms such as: (M-Vx)

a) Pictures or video from a track side maintenance employee to a Controller;
b) An instruction for an On-Board maintenance employee;
c) Exchange information among Train Staff about weather, traffic disturbances/limitations, logistics, etc;
d) Leaving a voice mail if a User is not available;
e) Information from a Controller to a Driver via a pre-recorded voice message;

f) Customer information.

11.27.2.2 The FRMCS System should support an authorised External System to send non-critical messages to authorised Users. (O-V3)

11.27.2.3 The FRMCS System shall support the User to send a message previously received (forwarding). (M-V3)

11.27.2.4 The User shall be able to select the Addressed User(s) of a message based on one or a combination of the following:
a) Identity; (M-V3)
b) Location; (M-Vx)
c) Status. (M-Vx)

11.27.2.5 The User shall be able to select the Addressed User(s) of the message from a predefined list. (M-V3)

11.27.2.6 A Ground User shall be able to select the Addressed User(s) of the message by selecting a predefined geographical area on a map. (M-Vx)

11.27.2.7 A Ground User shall be able to select the Addressed User(s) of the message by drawing an addressed area on a map. (M-Vx)

11.27.2.8 The FRMCS System shall determine the set of Addressed Users based on one or a combination of the following:
a) The list of Users who have subscribed to the service; (M-Vx)
b) A list of User/Functional Identities provided by the sender; (M-V3)
c) The type of Functional Identities of Users (e.g. broadcasting only to certain functions); (M-Vx)
d) The position of the Users; (M-Vx)
e) The status of the Users; (M-Vx)
f) The time frame the message is to be delivered; (M-Vx)
g) Intentionally deleted.

11.27.2.9 The FRMCS System shall route the message automatically to the intended User(s). (M-V3)

11.27.2.10 An authorised User(s) shall be able to receive non-critical messages. (M-V3)

11.27.2.11 The User shall be able to display the information from the received message. (M-V3)

11.27.2.12 The FRMCS System shall inform the sender about the status of the messages (for example, notification of message delivered, message read, etc.). (M-V3)

11.27.2.13 An authorised User shall be able to subscribe to a specific messaging channel within the messaging service in order to be addressed by the messages delivered by this service. (M-Vx)

11.27.2.14 A messaging channel is for example a Train Staff from a specific RU or Train Staff of an RU on a specific station. (I-V3)

11.27.2.15 The FRMCS System shall inform the User about the outcome of its subscription request (accepted or rejected). (M-Vx)

11.27.2.16 The User shall be able to unsubscribe from a specific messaging channel within the messaging service. (M-Vx)

11.27.2.17 The FRMCS System shall inform the User about the outcome of its un-subscription request (accepted or rejected). (M-Vx)

11.27.2.18 Users receiving a message shall be presented with the following information's when available:

a) Functional Identity of the originator; (M-V3)
b) Information related to the location of the originator; (M-Vx)
c) At least the first part of the incoming message, depending on HMI capabilities; (M-V3)
d) The time of delivery.. (M-V3)

11.27.2.19 For each Addressed User and upon acknowledgment by the receiver, the FRMCS System shall provide to the sender a delivery report including the following information:

a) The time of delivery; (M-V3)
b) The position of delivery; (M-Vx)
c) The User Identity of the User; (M-Vx)
d) The Functional Identity/ies of the User (based on the criteria of the receiver); (M-Vx)
e) The unique reference of the initially sent message. (M-Vx)

11.27.2.20 The arbitration is managed by the arbitration - Common Function. Depending on the arbitration - Common Function, the incoming message is notified immediately or later to the User. (I-V3)

11.27.2.21 The messaging service shall be Bi-directional. (M-Vx)

11.27.2.21i The messaging service shall be Uni-directional. (M-V3)

11.27.2.22 Messages can be addressed on user-to-user or a user-to-multi User level. (I-V3)

11.27.2.23 Intentionally deleted.

11.27.2.24 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: LOW;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.27.2.25 The FRMCS System shall support the recording of a messaging services Data Communication related metadata. (M-V3)

11.27.3 HMI requirements

11.27.3.1 When applicable, the input of textual content is eased by the HMI (e.g. predictive typing, speech-to-text,..). (I-V3)

11.27.3.2 The selection of Addressed User(s) of a message shall be achieved with the minimum of interaction (a single button press or selection from list). Where selection from a list is determined to be the preferred option, its possible to access the list with the minimum of interaction and it is presented in an intuitive manner. (M-V3)

11.27.3.3 For predefined message, the selection of the message is achieved with the minimum of interaction (for example, a single button press or selection from list). Where selection from a list is determined to be the preferred option, its possible to access the list with the minimum of interaction and it is presented in an intuitive manner. (I-V3)

11.27.3.4 Where a Functional Identity is provided, it is consistent with the harmonised operational rules (where necessary). (I-V3)

11.27.3.5 The selection of a messaging channel shall be achieved with the minimum of interaction (for example, a single button press or selection from list). Where selection from a list is determined to be the preferred option, its possible to access the list with the minimum of interaction and it is presented in an intuitive manner. (M-Vx)

11.27.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.27.4.1 When a messaging service - FRMCS Application is in the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to send non-critical messages. (M-V3)

11.27.4.2 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction for the Userof the messaging service. (M-V3)

Domain change FRMCS to FRMCS

11.27.4.3 When a messaging service - FRMCS Application is moving from an FRMCS Domain to another FRMCS Domain, the messaging service - FRMCS Application should be able to send a message excluding the period of domain change. (O-V3)

11.27.4.3i Intentionally deleted.

11.27.4.4 When a messaging service - FRMCS Application with no active data transfer communication is moving from an FRMCS Domain to another FRMCS Domain, the messaging service - FRMCS Application should be able to receive a data transfer communication excluding the period of domain change. (O-V3)

11.27.4.4i Intentionally deleted.

11.27.4.5 When a messaging service - FRMCS Application with an active data transfer communication is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-Vx)

11.27.4.6 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I-V3)

Domain change FRMCS to GSM-R

11.27.4.7 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

11.27.4.8 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

11.27.4.9 A messaging service - FRMCS Application shall be able to send non-critical messages to User(s) located in another FRMCS Domain. (M-V3)

Interworking

From FRMCS to GSM-R

11.27.4.10 Intentionally deleted.

11.27.4.10i A messaging service - FRMCS Application should be able to send non-critical messages to User(s) located in the GSM-R system. (O-V3)

From GSM-R to FRMCS

11.27.4.11 Intentionally deleted.

11.27.4.11i A User in the GSM-R system should be able to send non-critical messages to a User located in the FRMCS System. (O-V3)

11.27.5 Requirements for Off-network

11.27.5.1 No requirements applicable. (I-Vx)

11.27.6 Intentionally deleted

11.27.6.1 Intentionally deleted

11.28 Transfer of data - FRMCS Communication Service

11.28.1 Introduction

11.28.1.1 It is possible to initiate a transfer of Data Communication to facilitate data that requires to be transferred between Users, such as data from Train Staff, time table data, mission data, recorded data for post-accident/incident analysis (for example, CCTV, JRU, energy metering data files). (I-V3)

11.28.1.2 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I-V3)

11.28.2 Generic Requirements

11.28.2.0 The transfer of data - FRMCS Communication Service is optional. (O-V3)

11.28.2.0i When the transfer of data - FRMCS Communication Service is implemented, the requirements of the transfer of data - FRMCS Communication Service as specified in this chapter apply. (I-V3)

11.28.2.0ii The Transfer of data capability should be available in the On-Board FRMCS. (O-V3)

11.28.2.0iii The Transfer of data capability should be available at the trackside FRMCS. (O-V3)

11.28.2.1 The FRMCS System shall support an On-Board User to initiate a Transfer of Data Communication to a ground User. (M-V3)

11.28.2.2 The FRMCS System shall support a ground User to initiate a Transfer of Data Communication to an On-Board User. (M-V3)

11.28.2.3 The FRMCS System shall support an On-Board User to receive the Transfer of Data Communication. (M-V3)

11.28.2.4 The FRMCS System shall support a ground User to receive the Transfer of Data Communication. (M-V3)

11.28.2.5 The FRMCS System should support the Transfer of data to register to a Functional Identity. (O-Vx)

11.28.2.6 The Functional Identity of the Transfer of data and type of incoming communication should be made available to the receiving application. (O-Vx)

11.28.2.7 If the Functional Identity of the Transfer of data is not available, the Functional Identity of the vehicle -when registered- should be presented to the receiving application. (O-Vx)

11.28.2.8 The Transfer of data can have its own IDs and addressing scheme, which is used at application level. (I-V3)

11.28.2.9 The Transfer of Data Communication shall be Uni-directional. (M-V3)

11.28.2.10 The Transfer of Data Communication shall be established in a point-to-point basis. (M-V3)

11.28.2.11 The on-Train Transfer of data shall be able to terminate the Data Communication. (M-V3)

11.28.2.12 The ground based Transfer of data shall be able to terminate the Data Communication. (M-V3)

11.28.2.13 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: MEDIUM;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.28.2.14 The FRMCS System shall support the recording of a transfer of data data communication related metadata. (M-V3)

11.28.3 HMI requirements

11.28.3.1 No requirements applicable. (I-V3)

11.28.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.28.4.1 When a Transfer of data is in the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Data Communication used for TransferData Communication. (M-V3)

11.28.4.2 Upon changing FRMCS Domains, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be transparent for the User of a data transfer communication (no action required from the application). (M-V3)

Domain change FRMCS to FRMCS

11.28.4.3 When a Transfer of data with no active data transfer communication is moving from an FRMCS Domain to another FRMCS Domain, the Transfer of data should be able to initiate a data communication used for Transfer of data excluding the period of domain change by the FRMCS System. (O-V3)

11.28.4.3i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (M-V3)

11.28.4.4 When a Transfer of data with no active data transfer communication is moving from an FRMCS Domain to another FRMCS Domain, the Transfer of data should be able to receive a data communication used for Transfer of data excluding the period of domain change by the FRMCS System. (O-V3)

11.28.4.4i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (M-V3)

11.28.4.5 When a Transfer of data with an active data communication used for Transfer of data is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-Vx)

11.28.4.6 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I-V3)

Domain change FRMCS to GSM-R

11.28.4.7 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

11.28.4.8 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

11.28.4.9 A User shall be able to initiate a data communication used for Transfer of data to User(s) located in another FRMCS Domain. (M-V3)

Interworking

From FRMCS to GSM-R

11.28.4.10 No requirements applicable. (I-V3)

From GSM-R to FRMCS

11.28.4.11 No requirements applicable. (I-V3)

11.28.5 Requirements for Off-network

11.28.5.1 No requirements applicable. (I-Vx)

11.28.6 Intentionally deleted

11.28.6.1 Intentionally deleted

11.29 Record and broadcast of information - FRMCS Application

11.29.1 Introduction

11.29.1.1 To be defined in a later version of the specification. (I-Vx)

11.30 Transfer of CCTV archives - FRMCS Communication Service

11.30.1 Introduction

11.30.1.1 To be defined in a later version of the specification. (I-Vx)

11.31 Augmented reality Data - FRMCS Communication Service

11.31.1 Introduction

11.31.1.1 To be defined in a later version of the specification. (I-Vx)

11.32 Real time translation of speech Data - FRMCS Communication Service

11.32.1 Introduction

11.32.1.1 To be defined in a later version of the specification. (I-Vx)

11.33 Passenger Information System Data - FRMCS Communication Service

11.33.1 Introduction

11.33.1.1 A passenger information data application on-Train or ground based (e.g. at stations) is able to have Data Communication to a Passenger Information System (PIS), which is responsible for the presentation of visual and audio information, either real-time or pre-recorded, to all on-Train passengers or to passengers at specific locations such as station concourses and platforms. (I-V3)

11.33.1.2 A Passenger Information System (PIS) consist of a central server and various decentralised components on-train or on stations (e.g. display, speaker). (I-V3)

11.33.1.3 This FRMCS Communication Service is used by the corresponding application not specified in this FRS, requiring communication. (I-V3)

11.33.2 Generic Requirements

11.33.2.0 The Passenger Information System Data Communication - FRMCS Communication Service is optional. (O-V3)

11.33.2.0i When the Passenger Information System Data Communication - FRMCS Communication Service is implemented, the requirements of the Passenger Information System Data Communication - FRMCS Communication Service as specified in this chapter apply. (I-V3)

11.33.2.0ii The Passenger Information System Data Communication capability should be available in the On-Board FRMCS. (O-V3)

11.33.2.0iii The Passenger Information System Data Communication capability should be available at the trackside FRMCS. (O-V3)

11.33.2.1 The FRMCS System shall support a decentralised component of the PIS to initiate a Data Communication to the PIS central server. (M-V3)

11.33.2.2 The FRMCS System shall support the PIS central server to initiate a Data Communication to a decentralised PIS component(s). (M-V3)

11.33.2.3 The FRMCS System shall support the decentralised component of the PIS to receive incoming communication. (M-V3)

11.33.2.4 The FRMCS System shall support the PIS central server to receive incoming communication. (M-V3)

11.33.2.5 The FRMCS System should support the decentralised component of the PIS to register to a Functional Identity. (O-Vx)

11.33.2.6 The FRMCS System should support the PIS central server to register to a Functional Identity. (O-Vx)

11.33.2.7 The Functional Identity of the decentralised component of the PIS and type of incoming communication should be made available to the PIS central server receiving the Data Communication. (O-Vx)

11.33.2.8 The Functional Identity of the PIS central server and type of incoming communication should be made available to the decentralised component of the PIS receiving the Data Communication. (O-Vx)

11.33.2.9 For an on-train decentralised component of the PIS, if the Functional Identity is not available, the Functional Identity of the vehicle should be presented to the PIS central server receiving the Data Communication. (O-Vx)

11.33.2.10 For an on-train decentralised component of the PIS, the Location Information should be made available to the PIS central server receiving the Data Communication. (O-Vx)

11.33.2.11 During the Data Communication, the information of the location of the On-train decentralised component of the PIS should be updated. (O-Vx)

11.33.2.12 The PIS can have its own location system, which is used at FRMCS Communication Service level, but the FRMCS location can be used in the future. (I-V3)

11.33.2.13 The PIS can have its own IDs and addressing scheme, which is used at FRMCS Communication Service level. (I-V3)

11.33.2.14 It should be possible to address the responsible PIS component based on one or a combination of the following: (O-V3)

a) Location Information of the initiator;
b) Functional Identity of the initiator;
c) System configuration on which passenger information data application trackside is responsible for which part of the track/station/etc;
d) Own PIS application IDs and addressing scheme.

11.33.2.15 The PIS Data Communication shall be Bi-directional. (M-V3)

11.33.2.16 The PIS Data Communications shall be established in a point-to-point basis. (M-V3)

11.33.2.17 The decentralised component of the PIS shall be able to terminate the Data Communication. (M-V3)

11.33.2.18 The PIS central server shall be able to terminate the Data Communication. (M-V3)

11.33.2.19 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: NORMAL;
b) Reliability: NORMAL;
c) Throughput: MEDIUM;
d) Session setup Time: NORMAL;
e) Priority: as per Appendix J.

11.33.2.20 The FRMCS System shall support the recording of a Passenger Information System Data Communication related metadata. (M-V3)

11.33.3 HMI requirements

11.33.3.1 No requirements applicable. (I-V3)

11.33.4 Requirements for domain change, Interconnection and Interworking

Domain change generic

11.33.4.1 When a decentralised component of the PIS is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Data Communication to the PIS central server. (M-V3)

11.33.4.2 Upon changing FRMCS Domains, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be transparent for the decentralised component of the PIS (no action required from the application). (M-V3)

Domain change FRMCS to FRMCS

11.33.4.3 When a decentralised component of the PIS with no active Data Communication is moving from an FRMCS Domain to another FRMCS Domain, the decentralised component of the PIS should be able to initiate a Data Communication to the PIS central server excluding the period of domain change by the FRMCS System. (O-V3)

11.33.4.3i The maximum period of domain change as defined in FRMCS SRS is xx seconds. (M-V3)

11.33.4.4 When decentralised component of the PIS with an active Data Communication to the PIS central server is moving from an FRMCS Domain to another FRMCS Domain, the communication should not be dropped. (O-V3)

11.33.4.5 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I-V3)

Domain change FRMCS to GSM-R

11.33.4.6 No requirements applicable. (I-V3)

Domain change GSM-R to FRMCS

11.33.4.7 No requirements applicable. (I-V3)

Interconnection

Between FRMCS Domains

11.33.4.8 A decentralised component of the PIS shall be able to initiate a Data Communication to a PIS central server located in another FRMCS Domain. (M-V3)

Interworking

From FRMCS to GSM-R

11.33.4.9 No requirements applicable. (I-V3)

From GSM-R to FRMCS

11.33.4.10 No requirements applicable. (I-V3)

11.33.5 Requirements for Off-network

11.33.5.1 No requirements applicable. (I-Vx)

11.33.6 Intentionally deleted

11.33.6.1 Intentionally deleted

11.34 On-Train safety device to ground communication - FRMCS Application

11.34.1 Introduction

11.34.1.1 Based on a critical situation in the Train (for example, triggered by a Driver Safety Device (DSD)), a Data Communication is automatically set up towards a Ground User (Controller or ground system). (I-V3)

11.34.1.2 As a result of this trigger, the Ground User can setup a Voice Communication to the Driver. This is handled by the On-Train incoming Voice Communication from Controller to Driver - FRMCS Application. (I-V3)

11.34.1.3 The On-Train safety device to ground Data Communication - FRMCS Application is comprehensively captured in this FRMCS Application section. (I-V3)

11.34.2 Generic requirements

11.34.2.1 The FRMCS System shall support the automatic initiation of a Data Communication triggered by the On-Train safety device towards a ground system. (M-Vx)

11.34.2.2 The FRMCS System shall support the automatic initiation of a Data Communication triggered by the On-Train safety device towards a Controller. (M-V3)

11.34.2.3 The Data Communication triggered by the On-Train safety device shall be addressed to the Controller(s) responsible for the movement of the Train. (M-V3)

11.34.2.4 The responsible Controller(s) shall be addressed based on the Geographical Position of the initiator. (M-V3)

11.34.2.4i The responsible Controller(s) should be addressed based on one or a combination of the following: (O-Vx)

a) Railway infrastructure element(s) where the initiator is located (e.g. track section ID, station ID, signal box ID, track kilometer marking);
b) Other infrastructure element(s) where the initiator is located.

11.34.2.4ii The responsible Controller(s) should be addressed based on system configuration on which Controller (function) is responsible for which part of the track/station/etc. (O-Vx)

11.34.2.5 The Data Communication shall be Uni-directional. (M-V3)

11.34.2.6 The FRMCS System shall provide the following information to the User addressed by a communication initiated by an On-Train safety device:

a) Vehicle Functional Identity of the concerned railway engine; (M-V3)
b) Train Functional Identity registered by Train Driver; (M-V3)
c) Location Information. (O-V3)

11.34.2.7 Intentionally deleted.

11.34.2.8 The following QoS and priority parameters shall be used: (M-V3)

a) Latency: NORMAL;

b) Reliability: MEDIUM;
c) Throughput: LOW;
d) Session setup Time: IMMEDIATE;
e) Priority Level: as per Appendix J.

11.34.2.9 When receiving the On-Train safety device information the receiver shall terminate the Data Communication. (M-V3)

11.34.2.10 The FRMCS System shall support the recording of the On-Train safety device Data Communication related metadata. (M-V3)

11.34.3 Requirements for domain change, Interconnection and Interworking

11.34.3.1 Intentionally deleted.

11.34.3.2 Intentionally deleted.

Domain change generic

11.34.3.3 When an On-Train safety device is using the FRMCS System, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Data Communication to a ground system. (M-Vx)

11.34.3.4 When an On-Train safety device is using FRMCS, the FRMCS System shall determine the appropriate FRMCS Domain to perform a Data Communication to a Controller. (M-V3)

11.34.3.5 When an FRMCS Domain is selected, the necessary service (re)configuration actions (e.g. (de)registering of Identities, (re)setting authorisation of communication and FRMCS Application) shall be performed without any interaction of the On-Train safety device. (M-V3)

Domain change FRMCS to FRMCS

11.34.3.6 When no active Data Communication related to an On-Train safety device is ongoing and the Train is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication to the ground system shall be able to be triggered excluding the period of domain change . (M-Vx)

11.34.3.6i Intentionally deleted.

11.34.3.7 When no active Data Communication related to an On-Train safety device is ongoing and the Train is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication to the Controller shall be able to be triggered excluding the period of domain change. (M-V3)

11.34.3.7i Intentionally deleted.

11.34.3.8 When a Train with an active Data Communication related to an On-Train safety device is ongoing and the Train is moving from an FRMCS Domain to another FRMCS Domain, the Data Communication should not be dropped. (O-Vx)

11.34.3.9 A short interruption of the transfer of data within the ongoing Data Communication during the change of FRMCS Domain is acceptable. (I-V3)

11.34.3.10 Intentionally deleted.

Domain change FRMCS to GSM-R

11.34.3.11 When no active Data Communication related to an On-Train safety device is ongoing and the Train is moving from an FRMCS Domain to the GSM-R system, the On-Train safety device shall be able to initiate a Data Communication excluding the period of domain change. (M-V3)

11.34.3.11i Intentionally deleted.

11.34.3.12 When an active Data Communication related to an On-Train safety device is ongoing and the Train is moving from an FRMCS Domain to the GSM-R system, a drop of the Data Communication is acceptable. (I-V3)

11.34.3.13 Intentionally deleted.

Domain change GSM-R to FRMCS

11.34.3.14 When no active Data Communication related to an On-Train safety device is ongoing and the Train is moving from the GSM-R system to an FRMCS Domain, the On-Train safety device shall be able to initiate a Data Communication triggered excluding the period of domain change. (M-V3)

11.34.3.14i Intentionally deleted.

11.34.3.15 When an active Data Communication related to an On-Train safety device is ongoing and the Train is moving from the GSM-R system to an FRMCS Domain, a drop of the Data Communication is acceptable. (I-V3)

11.34.3.16 Intentionally deleted.

Interconnection

Between FRMCS Domains

11.34.3.17 An On-Train safety device shall be able to trigger the initiation of a Data Communication to a ground system located in another FRMCS Domain. (M-Vx)

11.34.3.18 An On-Train safety device shall be able to trigger the initiation of a Data Communication to a Controller located in another FRMCS Domain. (M-Vx)

Interworking

From FRMCS to GSM-R

11.34.3.19 The FRMCS System shall support an On-Train safety device in an FRMCS Domain to trigger the initiation of a Data Communication to Controller(s) located in the GSM-R system. (M-V3)

From GSM-R to FRMCS

11.34.3.20 The FRMCS System shall support an On-Train safety device related communication triggered in the GSM-R system to Controller(s) located in an FRMCS Domain. (M-V3)

11.34.4 HMI requirements

11.34.4.1 The Controller shall be able to unambiguously identify the incoming On-Train safety device Data Communication (e.g. by a specific alerting tone, use of specific icon(s) and/or specific color(s)). (M-V3)

11.34.4.2 The Controller acknowledges the incoming On-Train safety device Data Communication in order to stop the incoming notification. (I-V3)

12 Video FRMCS Applications & Communication Services

12.0 Intentionally deleted

12.0.1 Intentionally deleted.

12.0.2 Intentionally deleted.

12.1 Video Communication functions for FRMCS Applications & Communication Services

12.1.1.1 The aim of this section is to define the requirements related to the Common Functions which are implemented to support the FRMCS Applications & Communication Services requiring a Video Communication. The Video Communication FRMCS Applications & Communication Services which are specified in this chapter allow all or some of the functions specified in this section. Therefore, in order to avoid the duplication of equivalent requirements all along this paragraph, the functional specification of each Video Communication FRMCS Applications & Communication Services refers to the Common Functions defined hereafter. Moreover, some of the Common Functions described in this section are referring to Common Functions already described in paragraph 8. The requirements related to the common video functions are structured in three different phases/contexts of a Video Communication (initiating, addressing and User handling phase). The diagrams aim to help the reader to understand the different functional steps required but certainly not to define the technical implementation of the FRMCS System. For each context, the diagram describes the possible use cases and outcomes from one specific involved User point of view. (I-Vx)

12.1.1.2 All Video Communication functions shall be applicable for all Video Communication FRMCS Applications & Communication Services , unless otherwise specified per FRMCS Applications or FRMCS Communication Services. (M-Vx)

12.1.1.3 All Video Communication functions shall work by default in On-network mode. (M-Vx)

12.1.1.4 Specific Off-network mode requirements are specified in the corresponding FRMCS Applications or FRMCS Communication Services. (I-Vx)

12.1.1.5 This section is for further study. (I-Vx)

12.2 Generic Video Communication - FRMCS Communication Services

12.2.1 Introduction

12.2.1.1 To be defined in a later version of the specification. (I-Vx)

12.3 Critical real time video - FRMCS Communication Services

12.3.1 Introduction

12.3.1.1 To be defined in a later version of the specification. (I-Vx)

12.4 Non-critical real time video - FRMCS Communication Services

12.4.1 Introduction

12.4.1.1 To be defined in a later version of the specification. (I-Vx)

12.5 Non-critical real time Video Communication - FRMCS Communication Services

12.5.1 Introduction

12.5.1.1 To be defined in a later version of the specification. (I-Vx)

13 Handheld terminal requirement

Editor's Note: the requirements for handheld terminals are foreseen to be included in V3 in this section of the FRS.

13.1 Use case: Deported control of applications

13.1.1 Description

13.1.1.1 In order to offer flexibility to the users in the way they are interacting with the FRMCS Applications to perform the railway operations, the FRMCS system is allowing the deported control of these applications. (I-Vx)

13.1.2 Pre-conditions

13.1.2.1 An open interface (not proprietary) is available on the COTS user device. (I-Vx)

13.1.2.2 A deported equipment is available and connected to the COTS user device. (I-Vx)

13.1.3 Service flows

13.1.3.1 A user should be able to control some or any (depending on the operational needs) of the FRMCS Applications from a deported control equipment through the open machine-to-machine interface (e.g. open interface designed over Bluetooth, serial…). (O-Vx)

13.1.3.2 The deported control of FRMCS Applications should comply with the environmental conditions of railway operations. (O-Vx)

13.1.4 Post-conditions

13.1.4.1 The required interactions with FRMCS Applications are performed from a deported control equipment. (I-Vx)

13.1.5 HMI related criteria

13.1.5.1 The set up of the interface between the COTS user device and the deported control equipment doesn't require any intervention from the user (e.g. the user has only to plug the COTS user device into a docking station to enable the deported control). (I-Vx)

13.1.5.2 The HMI that allows the interaction with the FRMCS Applications follows the same design principles as those used for the User Device on-board. (I-Vx)

13.1.6 Other requirements

13.1.6.1 Single sign on principle should be implemented to allow users to access different FRMCS Applications by a single registration. (O-Vx)

13.1.6.1i The login of a human user can support methods available to the equipment used (e.g. keycode, username / password, smart card, finger print, retina scan). (I-Vx)

13.1.6.2 The FRMCS User Device should fit to the railway environment it is used in. (O-Vx)

13.1.6.3 Intentionally deleted.

14 System management and configuration aspects

14.1 Introduction

14.1.1 The FRMCS System needs to integrate a comprehensive set of tools dedicated to the operation and maintenance (O&M) of the entire system, namely the core network, the radio network and the FRMCS User Device. (I)

14.1.2 The FRMCS System needs to provide an unified solution to provide administration, monitoring, fault analysis and handling, performance data analysis, accounting, and security, with a high level of automated functions contributing for efficient operation with reduced OPEX costs. Besides this system has the capability to combine and correlate the network and FRMCS User Device data to achieve an integrated operation and maintenance of the FRMCS System, namely the fault and performance management functions. (I)

14.2 Network management and configuration

14.2.1 The FRMCS System offers network and configuration management tools . (I-V3)

14.2.1i The FRMCS System offers network and configuration management tools to the Authorised User. (I-V3)

14.2.2 The configuration and management tools can be COTS or MOTS. (I)

14.2.3 Network management is based on a structured model (e.g. on the principles of the ITU Network Management Model FCAPS (Fault, Configuration, Accounting, Performance and Security)). (I-V3)

14.2.4 The FRMCS System supports alarm interfaces. (I-V3)

14.2.5 The network management model covers the following aspects: (I-V3)

a) Corrective maintenance, (fault diagnosis and recovery);
b) Change and configuration management, including network and service configuration, subscriber management, software life cycle management, FRMCS Application authorisation, rollout management and configuration tools;
c) Performance Management, including measurement of network and service performance (KPI and SLA compliance), of end to end service quality (KQI - Key Quality Indicators);
d) Post-incident/accident analysis;
e) Interconnection and roaming with other FRMCS- and public networks, including Service Continuity, network access and routing, breakout control and traffic steering;
f) Service Management, including end-to-end service monitoring, analysis of service performance degradations and generation of service reports;
g) Security management;
h) Identity and access management.

14.2.5i The network management model covers the following aspects: (I-V3)

a) Preventive and Predictive maintenance, (risk prediction and prevention capabilities);
b) Testing functions for fault diagnosis and fault recovery;

c) Accounting (billing) management and service utilization;
d) Prediction and analysing of network and service performance degradations;
e) Post-incident/accident tools and information sharing;
f) Required operational rules and processes, monitoring tools and information sharing between railways IM and/or RU's.

14.2.6 Accounting management and service utilization is possible on the level of individual Users and individual communications, departments and organisations (e.g. IM, RU, ...), so that Users can be appropriately billed or charged for accounting purposes. (I-Vx)

14.2.7 An Authorised User is able to obtain information for any type of On-network communication from the FRMCS System in order to support the generation of billing information and statistics on communications. (I-V3)

14.2.8 As the FRMCS System may consist of multiple bearers (public and non-public), aspects are important. (I)

14.3 User Device management and configuration

Editor's Note: the requirements in this section are not applicable for handhelds since handhelds are foreseen in V3 of the FRS.

14.3.1 The FRMCS System provides tools to generate activity logs of the FRMCS User Device with the purpose of tracking errors and related data in a centralized way. (I)

14.3.2 The FRMCS User Device generate and record O&M log data. (I)

14.3.3 The O&M log data information is accessible by a ground based system. (I-V3)

14.3.3i The O&M log data is accessible locally via the FRMCS User Device. (I)

14.3.4 Each log data generated by the FRMCS User Device include at least the following type of information:

a) Functional Identity (e.g. number of the engine); (I)
b) Location data; (I-V3)
c) Time stamp; (I-V3)
d) Type of bearer and conditions (e.g. RF parameters); (I-V3)
e) FRMCS Applications registered to the FRMCS System at a given time; (I-V3)
f) Type of bearer used by each app; (I-V3)
g) Intentionally deleted;
h) Faults detected on the radio interface; (I-V3)
i) Faults detected internally in the FRMCS User Device; (I-V3)
j) Authentication mechanism used by the apps. (I-V3)

14.3.4i It is possible to retrieve the amount of data uploaded and downloaded by each app over each period of time. (I-Vx)

14.3.5 The log files received from the FRMCS User Device, typically contain timestamps, time source, device identification, interface identification, events, history, geographical information, protocol versions, results, fault information, performance information, change in configuration data, etc. (I)

14.3.5i The gathered information from the FRMCS User Device can be combined and correlated with network data for fault diagnosis as well as end-to-end performance analysis. (I)

14.3.6 The FRMCS System provides tools for the configuration management of the FRMCS User Device with the purpose of service configuration, software lifecycle management, etc. (I-V3)

14.3.6i The FRMCS System supports the remote update of configuration parameters, software and firmware releases of the User Device. (I-V3)

14.3.6ii The FRMCS-system supports the local update of configuration parameters, software and firmware of the User Device. (I-V3)

14.3.7 Intentionally deleted.

14.3.8 Intentionally deleted.

14.4 Intentionally deleted.

14.4.1 Intentionally deleted.

14.4.2 Intentionally deleted.

14.4.3 Intentionally deleted.

14.4.4 Intentionally deleted.

14.4.5 Intentionally deleted.

14.4.6 Intentionally deleted.

14.4.7 Intentionally deleted.

14.4.8 Intentionally deleted.

14.4.9 Intentionally deleted.

14.4.10 Intentionally deleted.

14.4.11 Intentionally deleted.

14.4.12 Intentionally deleted.

14.4.13 Intentionally deleted.

14.4.14 Intentionally deleted.

14.4.15 Intentionally deleted.

14.4.16 Intentionally deleted.

14.4.17 Intentionally deleted.

15 Digital resilience

Editor's Note: the requirements for digital resilience are foreseen to be further developed and to be aligned with SRS requirements within V3 in this section of the FRS.

15.1 Generic requirements

15.1.1 The FRMCS System supports an implementer to achieve its Cyber Security objectives through the use of resilient means against Cyber Security threats. (I-V3)

15.1.2 Cyber Security covers the usage of the FRMCS System by FRMCS Applications & Communication Services, it consists of both technical means and procedures. (I-V3)

15.1.3 The FRMCS System shall support the means to authenticate a authorised User. (M-V3)

15.1.3i The FRMCS System shall support the means to authenticate a authorised User Device. (M-V3)

15.1.3ii The FRMCS System shall support the means to authenticate FRMCS Applications & Communication Services. (M-V3)

15.1.4 The FRMCS System shall support encryption and key management methods for those FRMCS Applications & Communication Services that require it. (M-V3)

15.1.5 The FRMCS System shall implement the principles defined in Cyber Security standards applicable to railways. (M-V3)

15.2 For further study

15.2.1 The FRMCS System is designed with adequate levels and degrees of: (I-V3)

a) Resilience, Reliability and Availability;
b) Disaster Tolerance;
c) Sustainability;
d) Adaptability.

16 FRMCS Domain change, Interconnection and Interworking

16.1 Introduction

16.1.1 Intentionally deleted.

16.1.2 Intentionally deleted.

16.1.3 Intentionally deleted.

16.1.4 Intentionally deleted.

16.1.5 Intentionally deleted.

16.1.6 Intentionally deleted.

16.1.7 Intentionally deleted.

16.1.8 Intentionally deleted.

16.1.9 The FRMCS System shall support the use of multiple bearers and networks, either public or private, to achieve the communication needs required by the railways for train operation, in terms of reliability, capacity, performance, reduction of costs of infrastructure and to accelerate migration. (M-V3)

16.1.10 Intentionally deleted.

16.2 Inter FRMCS Domain Change generic

16.2.1 Intentionally deleted.

16.2.2 Intentionally deleted.

16.2.3 Intentionally deleted.

16.2.4 Intentionally deleted.

16.2.5 Intentionally deleted.

16.2.6 Domain use comprises the use of an FRMCS Domain regardless of it being the Users Home FRMCS Domain or not, thereby being able to communicate (incoming and outgoing) as if they were in their home domain. This maybe subject to limitations because of e.g. authorisation, transfer of priorities, QoS. Users using different domains (being their home domain or not) are able to communicate. (I)

16.2.7 Intentionally deleted.

16.2.8 Intentionally deleted.

16.2.9 For FRMCS Applications & Communication Services, the FRMCS System shall support the following methods of changing a domain:

a) Based on a User action; (M)
b) Based on a trigger (either internally from the FRMCS System or external to the FRMCS System). (M-V3)

16.2.10 Intentionally deleted.

16.2.11 Intentionally deleted.

16.2.12 Intentionally deleted.

16.2.13 The FRMCS System shall support independent domain changes for different FRMCS Applications & Communication Services in the following methods:
a) Domain change which occurs at different positions and times; (M-Vx)
b) Domain change which occurs at the same positions and times; (M-V3)

16.3.13i Intentionally deleted.

16.2.14 The FRMCS System shall support an IM system administrator to configure the method of domain change per track line where a domain change is applicable. (M-Vx)

16.3 Interconnection

16.3.0i It shall be possible to connect FRMCS Domains to support communication between these domains. (M)

16.3.1 The FRMCS System shall support changing of FRMCS Domains (e.g. when a User crosses a country border, awakens in another domain or changes FRMCS Domain within a country). (M)

16.3.2 Intentionally deleted.

16.3.3 Intentionally deleted.

16.3.4 Intentionally deleted.

16.3.5 Intentionally deleted.

16.3.6 Intentionally deleted.

16.3.7 Intentionally deleted.

16.4 Intentionally deleted.

16.4.1 Intentionally deleted.

16.4.2 Intentionally deleted.

16.4.3 Intentionally deleted.

16.5 Interworking

16.5.1 Intentionally deleted.

User attached to GSM-R

16.5.2 The FRMCS System shall route a communication initiated within the GSM-R system to the appropriate User(s). (M)

16.5.3 The capabilities of addressing Users from the GSM-R system are listed in Appendix D. (I)

16.5.4 Intentionally deleted.

16.5.5 Intentionally deleted.

16.5.6 The FRMCS System shall invoke the appropriate FRMCS Application and/or Common Function matching the GSM-R communication in order to realise Interworking. (M)

User attached to FRMCS

16.5.7 The FRMCS System shall route a communication initiated within the FRMCS System to the appropriate GSM-R user(s). (M)

16.5.8 The capabilities of addressing GSM-R users from the FRMCS System are listed in Appendix D. (I)

16.5.9 Intentionally deleted.

16.5.10 Intentionally deleted.

16.5.11 Intentionally deleted.

16.6 Intra FRMCS Domain Changes and Service Continuity

16.6.1 Intra FRMCS Domain Changes within the FRMCS Domain shall be transparent (no interaction required with the User) for the User. (M-V3)

16.6.2 The Intra FRMCS Domain Change within the FRMCS Domain shall not lead to a drop of the ongoing communication. (M-V3)

16.6.3 A short interruption within the ongoing communication during the Intra FRMCS Domain Change of FRMCS Domain is acceptable (e.g. short interruption of speech or data transfer without a Drop of Communication). (I)

17 References

17.1 Normative references

EIN Structure and content of the European identification number (COMMISSION IMPLEMENTING DECISION (EU) 2018/1614 of 25 October 2018 laying down specifications for the vehicle registers referred to in Article 47 of Directive (EU) 2016/797 of the European Parliament and of the Council and amending and repealing Commission Decision 2007/756/EC).

17.2 Informative references

URS FRMCS User Requirements Specification FU-7100 (latest version applies)

UC FRMCS Use cases MG-7900 (latest version applies)

Appendix A URS Pr's and GN's covered in FRS

In this appendix an overview is given which Pr's (Principles) and GNs (Guidance) from the URS are covered where in the FRS, or elsewhere.

Editor's Note: this table is not updated after v1.0.0 of this document. An update of this table will be performed during the V3 work.

Pr/GN	FU-7100 (URS)	FU-7120 (FRS)	Target (proposal)	Destination in FRS
Pr1.	The FRMCS is able to satisfy the communication needs of the railway operation.	Not included	-	-
GN1.	Railway operation includes normal, degraded and emergency operating conditions. Some characteristics can be affected by the operational conditions, such as capacity, availability, quality of communication, etc.	To be determined	FRS	-
GN2.	Evolution of the characteristics of the Train route or introduction of new Train routes can affect the operational needs. The system is scalable to cope with these changes.	Included	FRS ch 5	ch 5 - Application concept
GN3.	Operational conditions can vary depending on the characteristics of the Train route, for example maximum permissible line speed, headway between Trains, complexity of Train route (single, double, multiple track layout), low/medium/high density Train routes, climatic environment, volume of Train journey commencing, frequency and likelihood of accidents and/or operational incidents (conflict points, level crossings etc.). These can require different classes of service.	Included	FRS ch QoS and priority	§8.2.7 - QoS and priority
GN4.	Capacity, reliability, availability, maintainability, quality of service are characteristics to be used to meet the operational needs of the railways. The “End to End” performance and functionalities can be relaxed or strengthened compared to the legacy radio system (for example GSM-R), depending on specific operational needs.	Included	FRS ch8-12 SRS	§8.2.7 - QoS and priority
GN5.	Other characteristics such as integrity, clarity, accuracy etc. have to be taken into account and can also vary depending on the operational conditions.	?	?	-
GN6.	Deleted.	Not included	-	-
GN7.	It’s possible to maintain systemfunctionalities in the environment or climatic conditions required for the operation.	To be included	FU-7100 ch13 and/or FU-7100 ch14.	§14.1 - Terminal equipment
GN8.	The system is able to co-exist (spectrum wise) and operate in parallel with other mobile communication systems keeping the required functionality and performance.	Not included	SRS	-
GN9.	Information inside the FRMCS System can be made available to other External Systems, such as traffic management systems, tracking systems, planning systems, etc. The relevant interfaces have to be defined.	To be included	FU-7100 ch13 or ch16	§8.2.4 - Location services (as current example)
GN10.	It’s possible to HharmonisationseHarmonisation different types of data for FRMCS internal and external railway use (like location data, caller Identity, etc.).	Not included	SRS	-
GN11.	Deleted.	Not included	-	-
GN12.	The FRMCS is able to facilitate connectivity to and from public operators, both mobile and fixed networks.	To be included	FRS ch8-13 and ch16 §10.3?	§10.3 - Generic Voice Communication

Pr/GN	FU-7100 (URS)	FU-7120 (FRS)	Target (proposal)	Destination in FRS
GN12i.	Additionally the FRMCS Users are able to use resources and services provided by other mobile networks according to corresponding agreements.	Not included	SRS?	-
GN13.	It's possible to communicate in the event of loss/lack of infrastructure. In this case it is acceptable for a limited number of applications only to be made available. Reduction of the performance is also acceptable.	Included	FRS ch8-13	§8.2 - Common functions §10.3 - Generic voice function §10.4 - Train Driver to Controller voice comm. §10.5 - Controller to Train Driver voice comm. §10.6 - Multi-Train voice comm. for Drivers §10.8 - REC §11.2 - ATP §11.3 - ATO §11.4 - Safety key management §13.1 - Role management and presence application
GN13i.	The FRMCS is able to avoid/limit the interdependency between different interconnected FRMCS (such as cross border situations).	Not included	SRS?	-
GN14.	The system is flexible and supports new created apps or new functionality in the future.	Included	FRS ch 5	§5.1 - Goal
Pr2.	FRMCS supports the applications independently of the used FRMCS networks and radio access technologies by any of the users. Transition of a user to or from other FRMCS networks or radio access technologies does not lead to interruption of the usage of the applications.	Not included	-	-
GN14i.	The system is able to provide voice and Data Communication. It's possible to utilise multiple communication bearers to achieve this.	Included Not included	FRS ch8-13 -	ch 10 - Voice applications ch 11 - Data applications
GN14ii.	The system is able to provide all generic telephony features and supplementary services as commonly used (for example Call forwarding, call transfer, etc.).	Included	FRS §8.2, §8.3, §10.3	§10.1 - Generic Voice Communication functions §10.3 - Generic Voice Communication
GN15.	FRMCS networks are able to interconnect/interwork with GSM-R or and/other networks (mobile or fixed).	Included	FRS ch8-13 and ch16	§10.3 - Generic Voice Communication (as example)
GN16.	The transition between networks is automatic, without any interaction required from the user unless otherwise required.	To be included	FRS ch8-13	§9.4.3
GN17.	The user doesn't experience any interruption in the usage of the application due to a transition between networks (seamless user experience). In the case of transition to/from GSM-R, a degradation of the user experience including interruption is acceptable. The application and/or the end user device are able to automatically re-establish the communication session of the application (like a voice call).	Included To be included	FRS ch8-13	§9.4.3, §9.4.4 and §9.4.8. §10.3 - Generic Voice Communication (as example) §8.2.7 - QoS and priority (is this the right location to put this?)
GN17i.	A seamless user experience in the case of transition means that the ongoing communication session is not terminated. A short interruption, not impacting the application session or the user communication, is acceptable.	see GN17	-	§9.4.5 and §9.4.7

Pr/GN	FU-7100 (URS)	FU-7120 (FRS)	Target (proposal)	Destination in FRS
GN18.	The user does not experience any difference in the behavior of the application regardless of which network the user is active or other users are active on.	Included To be included	FRS ch8-13	§9.4.3, §9.4.8, §9.4.9. §10.3 - Generic Voice Communication (as example) §8.2.7 - QoS and priority (is this the right location to put this?)
GN18i.	When one of the users is active in a GSM-R system, a degradation of the user experience is acceptable.	See GN18	-	-
Pr3.	The FRMCS is able to place the human being at the centre of the design.	Not included	-	-
GN19.	Human-Machine Interfaces are intuitive.	Not included	-	-
GN20.	Human-Machine Interfaces are standardised where possible.	Included	FRS ch8-13	ch 15 - HMI aspects
GN21.	Functionality/application remain consistent across all devices used.	Included	FRS	ch 15 - HMI aspects
GN22.	Messaging is operationally meaningful.	Included	FRS ch8-13	§10.8 - REC (as example)
GN23.	Data input is mostly automated to facilitate the operation of voice and data applications.	Included	FRS ch8-13	ch 11 - Data applications
GN24.	initiation or accepting Voice Communication is possible by minimal interactionshall.	Included	FRS ch8-13	ch 15 - HMI aspects
GN25.	Tones and alerts do not conflict with others within the operating environment.	To be included	FRS ch15	ch 15 - HMI aspects
GN26.	For Voice Communication, the system allows the user to switch between different modes of using the microphone and loudspeaker (e.g. handset, headset, hands-free, etc.) based on the operational needs.	To be included	FRS ch15	ch 15 - HMI aspects
Pr4.	The FRMCS is able to support the application of the harmonised operational rules and principles where available. For EU countries, these are defined in Technical Specification for Interoperability relating to Operation and Traffic Management.	Included	FRS	ch 7 - Introduction to Common Functions and applications
GN27.	It's possible to issue and revoke movement authorities according to the harmonised operational rules and principles where available.	Not included	-	-
GN28.	Voice Communication during operation respects the harmonised operational rules and principles where available.	Not included	-	-
GN29.	The structure of operational messages or information follows the harmonised operational rules and principles where available.	Not included	-	-
Pr5.	The FRMCS is able to support the exchange of information and performance of actions without the manual assistance of humans (machine to machine communication) both for operational and maintenance purposes.	Not included	-	-
GN30.	Activities relating to the maintenance of On-Board and infrastructure assets is automated. Over-the-air software updates, configuration changes, fault diagnosis and rectification shall be allowed by the system architecture and applications.	To be included	FRS ch 16	§16.3 – FRMCS User Device management and configuration
GN31.	Automatic and remote monitoring of the characteristics of the railway assets is supported.	To be included	FRS ch 11	ch 11 - Data applications

Pr/GN	FU-7100 (URS)	FU-7120 (FRS)	Target (proposal)	Destination in FRS
GN32.	Direct exchange of information between devices, for example, between infrastructure elements (such as a point and a barrier for a level crossing) or between trackside elements and other elements (such as a sensor and a device on board of a Train or between different Trains), is supported.	Included	FRS several paragraphs	§8.2 - Common functions §10.3 - Generic voice function §10.4 - Train Driver to Controller voice comm. §10.5 - Controller to Train Driver voice comm. §10.6 - Multi-Train voice comm. for Drivers §10.8 - REC §11.2 - ATP §11.3 - ATO §11.4 - Safety key management §13.1 - Role management and presence application
Pr6.	The FRMCS is able to mitigate the risk of miscommunication.	Not included	-	Pr6
GN33.	Caller identification is available.	Included	FRS ch8-13	§10.1 Generic Voice Communication functions
GN34.	Train Location Information is available.	Included	FRS ch8-13	§10.1 Generic Voice Communication functions
GN35.	There shall be a mechanism that prevents background noise being overheard by participants.	Included	FRS or SRS	ch 15 - HMI aspects
GN36.	It's possible to pass confirmation data messages that can be used as a reference point by the user during a related activity.	To be included	FRS	tbd
GN37.	The system is able to provide technical solutions to mitigate the risk of miscommunication in multi-user Voice Communication, like Push-to-Talk, voice detection, etc. Optionally it's possible to usethis solution in a user-to-user communication, based on operational rules.	Included	FRS ch8-13	§8.2.2 Talker control - Common Function
Pr7.	The FRMCS is cost effective.	Not included	-	-
GN38.	The re-use of installed base, for example GSM-R, is considered by enabling the re-use of existing equipment that has not reached the end of its lifecycle such as the base station installations, On-Board installations, track side installations, Controller installations, etc.	Included	FRS SRS	-
GN39.	Reduction in capital expenditure, whilst providing access to the benefits associated with the future radio mobile communication system during the migration phase.	Not included	-	-
GN39i.	Ability to capitalise on true COTS (for both hardware and software) products, and make use of open and standardised interfaces (non-propriety).	Not included	-	-
Pr8.	The FRMCS is able to provide precautionary measures to prevent unauthorised access.	Included	FRS ch 16 or §8.2.7? SRS?	§14.4 - Digital resilience
GN40.	To prevent unauthorised and potential malicious acts affecting the use of the communication system and any associated data.	Included	FRS ch 16 SRS	§14.4 - Digital resilience
GN41.	Certain applications require strong authentication, encryption and key management methods and the communication system is able to support these when required.	Included	FRS ch 16 or §8.2.7? SRS?	§14.4 - Digital resilience
GN42.	Access to applications is configured within the system and based upon the permissions associated with each Authorised user.	Included	FRS §8.2.6	§8.2.6 - Authorisation of FRMCS Applications & Communication Services

Pr/GN	FU-7100 (URS)	FU-7120 (FRS)	Target (proposal)	Destination in FRS
GN43.	The system is able to mitigate (cyber) security threats.	Included	SRS	§14.4 - Digital resilience

Table A-1: URS Pr's and GN's covered in FRS

Appendix B Intentionally deleted.

Appendix C Regional requirements

In this appendix the classification of the FRS requirements applicable for a specific region of individual country is specified.

The section 1 of this annex is the placeholder for identifying the requirements relevant for interoperability in the European Union, i.e. the requirements, with respect to the authorisation in the EU according to the TSI, that are considered in the European Directives to be relevant for interoperability as fulfilling the essential requirements for the Control-Command and Signalling (CCS) subsystem related to safety and technical compatibility which must be met by the rail system, the subsystems, and the interoperability constituents, including interfaces, according to the corresponding conditions set out in Directive (EU) 2016/797. It is mandatory that each railway subsystem in the EU meets these requirements on lines under the scope of the Directive and the CCS TSI to ensure technical compatibility between Member States and safe integration between Train and track.

At this stage, the version of this specification is not considered complete for the purpose of tendering On-Board FRMCS Device, and the identification of all requirements relevant for interoperability is for further study.

This annex part is therefore only informative.

1 European Union

1.1 Scope and Purpose

1.1.1 This document lists a classification into categories of all the clauses in the FRMCS Functional Requirements Specifications (FRMCS FRS).

1.1.2 The purpose of this document is to ease the assessment of the compliance of an FRMCS On-Board and trackside equipment with the FRS.

1.1.3 To that effect, this document comprehensively identifies which clauses contain requirements allocated to the FRMCS On-Board and/or trackside equipment and conversely which ones do not.

1.2 Definitions

1.2.1 The following categories are used to classify each FRS clause:

1.2.1.1 Intentionally deleted

1.2.1.2 Intentionally deleted

1.2.1.3 Intentionally deleted

1.2.1.4 Intentionally deleted

1.2.1.5 Candidate MI requirement: a requirement that, as expressed in this FRMCS V2 specification, is considered to be related to interoperability (MI=mandatory for interoperability in Europe). This pre-assessment can be used to focus on the requirements that shall be completed in FRMCS V3 and also, to drive attention to the fact that a latter inclusion of the identified functionality will have to be done with careful attention to the compatibility between new and previous installations.

1.2.1.6 Note that the identification of “candidate MI” requirements is just an indication to the reader, and, since this FRMCS V2 version is not to be part of a CCS TSI and the specifications are not yet ready for product production, it has no impact on the certification tasks of the Notified Bodies.

1.2.1.7 The following subcategories can be found in the table:

- **Candidate MI requirement for FRMCS On-Board**: a clause containing requirement(s) that are thought to be related to interoperability; if confirmed in FRMCS V3, the requirement must be fulfilled by any CCS TSI compliant FRMCS On-Board.
- **Candidate MI requirement for FRMCS trackside**: a clause containing requirement(s) that are thought to be related to interoperability; if confirmed in FRMCS V2, the requirement must be fulfilled by any CCS TSI compliant FRMCS trackside.
- **Candidate Optional MI requirement for FRMCS On-Board**: a clause containing requirement(s) that are thought to be related to interoperability; if confirmed in FRMCS V2, the requirement must be fulfilled by any CCS TSI compliant FRMCS On-Board only in case the corresponding function is implemented.
- **Candidate Optional MI requirement for FRMCS trackside**: a clause containing requirement(s) that are thought to be related to interoperability; if

confirmed in FRMCS V2, the requirement must be fulfilled by any CCS TSI compliant FRMCS trackside only in case the corresponding function is implemented.

1.2.2. In case a requirement equally applies to both FRMCS On-Board equipment and FRMCS trackside or in case it is not possible to distinguish between On-Board and trackside functionality, requirements are kept together in the concerned clause.

1.3 List of MI Candidate clauses

The table below covers sections and individual requirements of the FRS.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
5. FRMCS Application concept	Those proposed as M and M-V3: 5.5.12	MI	MI	New functionality in FRMCS
6. Functional addressing and registration	Those proposed as M and M-V3: 6.1.1 6.1.4 6.1.4i 6.1.5 6.1.10i 6.1.11 6.2.1.1.1 6.2.1.1.2 6.2.1.1.3 6.2.1.1.4 6.2.1.2.1 6.2.1.2.2 6.2.1.2.3 6.2.1.2.4 6.2.1.3.1 6.2.1.3.2 6.2.1.3.3 6.2.1.3.4 6.2.1.3.5 6.2.1.3.6 6.2.1.3.7 6.2.2.1.1 6.2.2.1.2 6.2.2.1.3 6.2.2.1.4 6.2.2.1.5 6.2.2.1.5i 6.2.2.1.6 6.2.2.2.1 6.2.2.2.2 6.2.2.2.3 6.2.2.2.4 6.2.2.2.5 6.2.2.2.6 6.2.2.3.1 6.2.2.3.2 6.2.2.3.3 6.2.2.3.4 6.2.2.3.5 6.2.2.3.7 6.2.2.4.2	MI	MI	Functionality existing in GSM-R
8.2.2 Assured voice communication	Those proposed as M and M-V3: 8.2.2.2.1 8.2.2.2.2 8.2.2.2.3	O	MI	Functionality existing in GSM-R

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
8.2.3 Talker control	Those proposed as M and M-V3: 8.2.3.2.1 8.2.3.2.1ai 8.2.3.2.2 8.2.3.2.3i 8.2.3.2.3ii 8.2.3.2.5 a), b), c), d) 8.2.3.2.8 8.2.3.2.8i 8.2.3.2.9 8.2.3.3.3 8.2.3.3.5i 8.2.3.3.6 8.2.3.3.7 8.2.3.3.9 8.2.3.3.9i 8.2.3.3.12 8.2.3.3.16 8.2.3.3.16i 8.2.3.3.17 8.2.3.3.18 8.2.3.4.4 8.2.3.4.8 8.2.3.4.9	MI	MI	Functionality existing in GSM-R DIFFERENCES in FRMCS: a) controllers in FRMCS shall also use PTT b) to be confirmed if it can be achieved via configuration the same behaviour as in GSM-R (e.g. only one user has the right to speak or that all participants have this right; if the right to speak can be granted first to the initiator)

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
8.2.4 Role management and presence	Those proposed as M and M-V3: 8.2.4.2.4 8.2.4.2.6 8.2.4.2.7 8.2.4.2.7i 8.2.4.2.8 8.2.4.3.1 8.2.4.3.3 8.2.4.3.3i 8.2.4.3.5 8.2.4.3.7 8.2.4.3.10 8.2.4.3.11 8.2.4.3.13 8.2.4.3.14 8.2.4.3.15 8.2.4.3.16 8.2.4.3.17 8.2.4.3.21 8.2.4.3.22 8.2.4.4.1 8.2.4.4.2 8.2.4.5.1 8.2.4.5.2 8.2.4.5.3 8.2.4.5.5 8.2.4.5.6 8.2.4.5.7 8.2.4.5.8 8.2.4.5.9 8.2.4.5.10 8.2.4.5.11 8.2.4.5.12 8.2.4.5.13 8.2.4.5.15 8.2.4.5.16i 8.2.4.5.16ii 8.2.4.5.16iv 8.2.4.5.19 8.2.4.5.20 8.2.4.8.4 8.2.4.8.5 8.2.4.8.6 8.2.4.8.7 8.2.4.8.9 8.2.4.8.10 8.2.4.8.11 8.2.4.8.12 8.2.4.8.15 8.2.4.8.16 8.2.4.8.19 8.2.4.8.20	MI	MI	Role management: Functionality existing in GSM-R DIFFERENCES: Not all GSM-R details are covered, but functional principles are set Presence: new functionality in FRMCS.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
8.2.5 Location services	Those proposed as M and M-V3: 8.2.5.2.1 8.2.5.2.2.a 8.2.5.2.3 8.2.5.2.6 8.2.5.2.6i 8.2.5.2.7 8.2.5.2.9.a 8.2.5.2.11.b 8.2.5.2.11.c 8.2.5.2.11i 8.2.5.2.12 8.2.5.2.14 8.2.5.3.3 8.2.5.3.6	MI	MI	Functionality existing in GSM-R
8.2.6 Authorisation of communication	Those proposed as M and M-V3: 8.2.6.2.0i 8.2.6.2.0iia 8.2.6.2.0iiia 8.2.6.2.1 8.2.6.2.1i 8.2.6.2.3 8.2.6.2.3i 8.2.6.2.4 8.2.6.2.5 8.2.6.2.6 8.2.6.2.6i 8.2.6.2.12.a 8.2.6.2.12.b 8.2.6.2.12.d 8.2.6.2.12.e 8.2.6.2.14 8.2.6.2.15 8.2.6.2.21 8.2.6.2.22 8.2.6.3.3 8.2.6.3.4	MI	MI	Functionality existing in GSM-R
8.2.7 Authorisation FRMCS Applications & Communication Services	Those proposed as M and M-V3: 8.2.7.2.1 8.2.7.2.2 8.2.7.2.3 8.2.7.2.4.a 8.2.7.2.4.b 8.2.7.2.4.c 8.2.7.2.4.e 8.2.7.2.4.f 8.2.7.2.5 8.2.7.2.7 8.2.7.3.3	MI	MI	New functionality in FRMCS, but, if feature is implemented, it is related to interoperability. [It is not expected to be fully ready in V3]

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
8.2.8 QoS and priority	Those proposed as M and M-V3: 8.2.8.1.3 8.2.8.2.1 8.2.8.2.2 8.2.8.2.3 8.2.8.2.3i 8.2.8.2.4 8.2.8.2.6 8.2.8.2.6i 8.2.8.3.4 8.2.8.3.8 8.2.8.3.9 8.2.8.3.10 8.2.8.3.11	MI (*)	MI (*)	Functionality existing in GSM-R (*) The functional requirements shall be met (capability to handle the different QoS and priorities defined); the specific values for each application shall be specified in SRS. Only those related to applications with impact on interoperability shall be considered as MI. Note that some applications may be optional for OB and mandatory for TS.
8.2.9 Assured data communication	Those proposed as M and M-V3: no requirements in this version of the FRS	O	MI	New functionality in FRMCS, but, if feature is implemented, it is related to interoperability. [It is not expected to be fully ready in V3]
8.2.10 Inviting-a-user	Those proposed as M and M-V3: 8.2.10.2.1 8.2.10.2.1i 8.2.10.2.2	MI	MI	Functionality existing in GSM-R
8.2.11 Arbitration	Those proposed as M and M-V3: 8.2.11.2.1 8.2.11.2.2i 8.2.11.2.3i 8.2.11.2.7 8.2.11.2.7i 8.2.11.2.7ii 8.2.11.2.10 8.2.11.2.11 8.2.11.3.1 8.2.11.3.2.a 8.2.11.3.2.c 8.2.11.3.2.d 8.2.11.3.2.e 8.2.11.3.3.a 8.2.11.3.3.c 8.2.11.3.3.d 8.2.11.3.4 8.2.11.3.7 8.2.11.5.1 8.2.11.5.2 8.2.11.6.4 8.2.11.6.8 8.2.11.6.9 8.2.11.8.3 8.2.11.8.4	MI (*)	MI (**)	Functionality existing in GSM-R (*) Not clear in V2 if there is a need of TS support for the arbitration functionality (if this is limited to arbitration of communications in OB only) (**) For OB, chapters 4 and 5 are pending further definition and may not be related to interoperability.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
8.2.12 Distribution of synchronised time	Those proposed as M and M-V3: 8.2.12.2.1 8.2.12.2.2 8.2.12.2.2i 8.2.12.2.3 8.2.12.2.4 8.2.12.2.5 8.2.12.2.6 8.2.12.2.7 8.2.12.2.9 8.2.12.2.11 8.2.12.3.3 8.2.12.3.6 8.2.12.5.1	MI	MI (*)	New functionality in FRMCS. (*) = Not clear in V2 if this is only a TS functionality (understanding that the OB shall be ready to use the time source distributed by the network in case the GNSS source OB is not available). To be clarified in V3.
8.2.13 Billing information	Those proposed as M and M-V3: no requirements in this version of the FRS	O	O	Functionality existing in GSM-R but not considered as mandatory. When functionality is implemented, to be done as per the requirements defined.
8.2.14 Recording (**)	Those proposed as M and M-V3: 8.2.14.2.1 8.2.14.2.2 8.2.14.2.3 8.2.14.2.4 8.2.14.2.5 8.2.14.2.7 8.2.14.3.3	MI (*)/O	MI (*)/O	Functionality existing in GSM-R related to REC participation data. (*) = Only to be considered as MI the recording of data corresponding to the participation in REC. Recording of other information, to be considered O (not mandatory, but when implemented, to be done as per the requirements defined) (**) the mechanism is not yet fully defined in V2; further considerations need to be taken once it is specified in V3.
9.3 Generic HMI aspects Selection of the active HMI component(s) or resource in a voice communication	9.3.6	Not applicable (*)	Not applicable (*)	(*) HMI characteristics are not fully specified in V2 and assessment will need to be carried out in V3.
9.3 Generic HMI aspects Ability to divert the ongoing communication to an alternative HMI component or resource of the same device (e.g. loudspeaker).	9.3.7	Not applicable (*)	Not applicable (*)	(*) HMI characteristics are not fully specified in V2, and assessment will need to be carried out in V3.

10.2 Generic voice communication (*)	Those proposed as M and M-V3: 10.1.1.2 10.1.1.3 10.1.2.3 10.1.2.6 10.1.2.7 10.1.2.8.a 10.1.2.8.c 10.1.2.10 10.1.3.3 10.1.3.4.a 10.1.3.4.b 10.1.3.7 10.1.3.8 10.1.3.10 10.1.3.11 10.1.3.13 10.1.3.14 10.1.3.16 10.1.3.17 10.1.3.21 10.1.3.22 10.1.3.23 10.1.3.24 10.1.3.24i 10.1.3.25 10.1.4.2 10.1.4.3 10.1.4.4 10.1.4.6 10.1.4.7 10.1.4.8 10.1.4.9 10.1.4.10 10.1.4.11 10.1.4.12 10.1.4.14 10.1.4.16.a 10.1.4.16.c 10.1.4.16.e 10.1.4.16.f 10.1.4.16.g 10.1.4.19 10.1.4.20 10.1.4.21 10.1.4.22 10.1.4.22i 10.1.4.23 10.1.4.23ai 10.1.4.26 10.1.4.28 10.1.4.29 10.1.4.34 10.1.5.1.a 10.1.5.2.a 10.1.6.1 10.2.2.0a 10.2.2.1 10.2.2.2 10.2.2.4 10.2.2.7	MI (**)	MI (**)	(*) the applications refer to common functions defined in 10.1, therefore the applicable requirements in 10.1 are also to be considered as MI. (**) MI only when referring to voice communications / applications / users related to interoperability.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
	10.2.2.8 10.2.2.9 10.2.2.10 10.2.2.10i 10.2.2.10ii 10.2.2.10iii 10.2.2.10iv 10.2.2.10v 10.2.2.10vi 10.2.2.10vii 10.2.2.13 10.2.2.14 10.2.2.15 10.2.2.15i 10.2.2.17 10.2.2.18 10.2.2.19 10.2.2.20 10.2.2.21 10.2.2.23i 10.2.2.23ii 10.2.2.24 10.2.2.24i 10.2.2.24ii 10.2.2.24iv 10.2.2.25 10.2.2.27 10.2.4.13 10.2.4.13i 10.2.4.14 10.2.4.14i 10.2.4.15 10.2.4.16 10.2.4.17 10.2.4.17i 10.2.4.19 10.2.4.20 10.2.4.21 10.2.4.22i 10.2.4.24 10.2.4.25 10.2.4.25i 10.2.4.28 10.2.4.29 10.2.4.31 10.2.4.32.b 10.2.4.33 10.2.4.34.a 10.2.4.35 10.2.4.37 10.2.4.38 10.2.4.39 10.2.4.40			

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
10.3 On-train outgoing voice communication from the train driver towards the controller(s) of the train	Those proposed as M and M-V3: 10.3.2.1 10.3.2.2 10.3.2.4 10.3.2.6 10.3.2.8 10.3.2.9i 10.3.2.9ii 10.3.2.9iii 10.3.2.9iv 10.3.2.9v 10.3.2.9vi 10.3.2.10 10.3.2.11 10.3.3.1 10.3.3.2 10.3.3.5 10.3.4.3 10.3.4.3i 10.3.4.4 10.3.4.4i 10.3.4.5 10.3.4.6 10.3.4.7 10.3.4.7i 10.3.4.8 10.3.4.10 10.3.4.10i 10.3.4.13 10.3.4.13i 10.3.4.16 10.3.4.19 10.3.4.22	MI	MI	Functionality existing in GSM-R

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
10.4 On-train incoming voice communication from the controller towards a train driver	Those proposed as M and M-V3: 10.4.2.1 10.4.2.2 10.4.2.3 10.4.2.3i 10.4.2.3ii 10.4.2.3iii 10.4.2.3iv 10.4.2.4 10.4.2.5 10.4.4.2 10.4.4.2i 10.4.4.3 10.4.4.3i 10.4.4.4 10.4.4.5 10.4.4.6 10.4.4.6i 10.4.4.8 10.4.4.9 10.4.4.9i 10.4.4.12 10.4.4.12i 10.4.4.15 10.4.4.16 10.4.4.17	MI	MI	Functionality existing in GSM-R

10.5 Multi-Train voice communication for drivers	Those proposed as M and M-V3: 10.5.3.1 10.5.3.2 10.5.3.24 10.5.3.31 10.5.3.32 10.5.3.34 10.5.3.36i 10.5.3.37 10.5.3.39 10.5.3.40 10.5.3.41 10.5.3.42 10.5.3.46 10.5.3.47 10.5.3.48 10.5.3.49 10.5.3.50 10.5.3.51 10.5.3.52 10.5.3.53 10.5.3.53i 10.5.3.54i.b 10.5.3.55 10.5.3.58 10.5.3.59 10.5.3.60 10.5.3.61.c 10.5.3.64 10.5.3.65.a 10.5.3.65i 10.5.3.66 10.5.3.67 10.5.5.5 10.5.5.5i 10.5.5.6 10.5.5.6i 10.5.5.7 10.5.5.8 10.5.5.9 10.5.5.9i 10.5.5.10 10.5.5.10i 10.5.5.12 10.5.5.13 10.5.5.13i 10.5.5.14 10.5.5.14i 10.5.5.17 10.5.5.17i 10.5.5.18 10.5.5.18i 10.5.5.20 10.5.5.22 10.5.5.23 10.5.5.24 10.5.5.24i 10.5.5.25 10.5.5.26 10.5.5.27 10.5.5.28 10.5.5.28i	MI	MI	Functionality existing in GSM-R

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
	10.5.5.29			
10.6 Banking voice communication	Those proposed as M and M-V3: 10.6.2.2 10.6.2.3 10.6.2.3ai 10.6.2.3iii 10.6.2.4 10.6.2.5 10.6.2.6 10.6.2.6i 10.6.2.7 10.6.2.7i 10.6.2.8 10.6.2.9 10.6.2.10 10.6.3.2 10.6.3.3 10.6.3.4 10.6.3.5 10.6.3.6 10.6.3.7 10.6.4.5 10.6.4.5i 10.6.4.8 10.6.4.9i 10.6.4.13i 10.6.4.17i	O	MI	Functionality existing in GSM-R but executed without a specific application defined.
10.8 Shunting Voice Communication	Those proposed as M and M-V3: 10.8.2.1 10.8.2.2 10.8.2.3 10.8.2.4 10.8.2.5 10.8.2.6 10.8.2.6i 10.8.2.7 10.8.2.8 10.8.2.9 10.8.2.10 10.8.2.11.b 10.8.2.13 10.8.2.14 10.8.2.15 10.8.2.16 10.8.2.17 10.8.3.1 10.8.3.2 10.8.3.3	O	MI	Functionality existing in GSM-R. NOTE: In FRMCS there is no "Shunting mode" defined, similar functionality to GSM-R to be fulfilled thanks to arbitration of communications
10.9 Public emergency call	Those proposed as M and M-V3: no requirements in this version of the FRS	O	MI (*)	Optional in GSM-R. There is European regulation on configuration of public networks to allow any user to raise an emergency call, but it is not applicable to private networks. (*) = to be further investigated (in V3) if needed to be considered MI for OB

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
10.10 Ground to ground voice communication	Those proposed as M and M-V3: 10.10.2.2 10.10.2.3 10.10.2.5 10.10.2.6 10.10.2.7 10.10.2.8.a 10.10.2.9 10.10.2.11 10.10.2.12.a 10.10.2.12.b 10.10.2.13 10.10.2.14	MI	O	Functionality existing in GSM-R

10.11 Railway Emergency Communication	Those proposed as M and M-V3: 10.11.2.1 10.11.2.2 10.11.2.4 10.11.2.5ii 10.11.2.6 10.11.2.6ii 10.11.2.7 10.11.2.8 10.11.2.8a 10.11.2.8iii 10.11.2.9 10.11.2.11 10.11.2.14 10.11.2.15 10.11.2.16 10.11.2.20 10.11.2.22 10.11.2.22iii 10.11.2.22iv 10.11.2.22v 10.11.2.22vi 10.11.2.22vii 10.11.2.22viii 10.11.2.22ix 10.11.2.24.a 10.11.2.25.a 10.11.2.26iii 10.11.2.26iv 10.11.2.26v 10.11.2.26vi.b 10.11.2.26viii 10.11.2.26ix 10.11.2.26x 10.11.2.31.b 10.11.2.31i.b 10.11.2.31ii.b 10.11.2.31iii.b 10.11.2.33 10.11.2.34 10.11.2.36 10.11.2.38i 10.11.2.40 10.11.2.41.b 10.11.3.1 10.11.3.2 10.11.3.5 10.11.3.6 10.11.3.7 10.11.3.8 10.11.3.9 10.11.4.2 10.11.4.16 10.11.4.16i 10.11.4.17 10.11.4.17i 10.11.4.18 10.11.4.19 10.11.4.20 10.11.4.20i 10.11.4.21 10.11.4.21i	MI	MI	Functionality existing in GSM-R, with enhancements defined in FRMCS. Only REC-Alert & REC-Voice are defined in V2.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
	10.11.4.22 10.11.4.23 10.11.4.24 10.11.4.24i 10.11.4.25 10.11.4.25i 10.11.4.26 10.11.4.27 10.11.4.27i 10.11.4.28 10.11.4.28i 10.11.4.29 10.11.4.30i 10.11.4.32 10.11.4.33 10.11.4.33i 10.11.4.35 10.11.4.36 10.11.4.36i 10.11.4.37 10.11.6.1.1 10.11.6.1.3			
10.13 Public train emergency communication	Those to be proposed as M in V3: no requirements in this version of the FRS	MI (*)	MI (*)	New functionality in FRMCS. (*) functionality not yet defined in V2, to be reassessed in V3.
10.15 On-train outgoing voice communication from train staff towards a ground user	Those to be proposed as M in V3: no requirements in this version of the FRS	MI (*)	MI (*)	Functionality existing in GSM-R, with enhancements defined in FRMCS. (*) to be reassessed when defined
10.16 On-train incoming voice communication from a ground user towards train staff	Those to be proposed as M in V3: no requirements in this version of the FRS	MI (*)	MI (*)	Functionality existing in GSM-R, with enhancements defined in FRMCS. (*) to be reassessed when defined
10.18 Urgent On-train outgoing voice communication from the train driver towards the controller(s) of the train	Those proposed as M and M-V3: 10.18.1.0ii 10.18.1.2	O	MI	Functionality existing in GSM-R. High priority call to controller is not classified as MI in GSM-R, but this leads to national rules.
10.19 Urgent Multi-Train voice communication for drivers	Those proposed as M and M-V3: 10.19.1.0ii 10.19.1.2	O	MI	Functionality existing in GSM-R. High priority call to drivers is not classified as MI in GSM-R.
10.20 Multi-Train voice communication for drivers excluding ground user(s)	Those to be proposed as M in V3: no requirements in this version of the FRS	MI	MI	Functionality existing in GSM-R.
10.21 On-train voice communication	Those to be proposed as M in V3: no requirements in this version of the FRS	MI / O (*)	MI / O (*)	Functionality existing in GSM-R. (*) the full assessment of this functionality cannot be done based on V2 specification, and it is not possible to determine if it requires TS features or not. To be reassessed in V3.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
10.23 On-train voice communication towards passengers (Public Address)	Those proposed as M and M-V3: 10.23.2.1 10.23.2.2 10.23.2.3 10.23.2.4 10.23.2.5 10.23.2.6 10.23.2.7 10.23.2.8 10.23.2.8i 10.23.2.9 10.23.2.13 10.23.2.14 10.23.2.15 10.23.2.16 10.23.3.2 10.23.3.2i	O	MI (*)	Functionality existing in GSM-R. (*) To be reassessed in V3

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
11.2 Generic data communication (*)	Those proposed as M and M-V3: 11.1.1.3 11.1.1.4 11.1.2.2 11.1.2.4 11.1.2.6 11.1.3.3 11.1.3.6 11.1.3.7 11.1.3.8 11.1.3.9 11.1.3.10 11.1.4.2i 11.1.4.3 11.1.4.4 11.1.5.1 11.1i.1.3 11.1i.1.5 11.1i.2.2 11.1i.2.3 11.1i.2.5 11.1i.2.7 11.1i.3.3 11.1i.3.6 11.1i.3.7 11.1i.3.8 11.1i.4.3 11.1i.4.4 11.1i.4.5 11.2.2.1 11.2.2.3 11.2.2.4 11.2.2.5 11.2.2.7 11.2.2.8 11.2.2.9 11.2.2.17i 11.2.2.17ii 11.2.2.18 11.2.2.18ii 11.2.2.19 11.2.2.20 11.2.4.1 11.2.4.2 11.2.4.3i 11.2.4.8	MI (**)	MI (**)	(*)= the applications refer to common functions defined in 11.1, therefore the applicable requirements in 11.1 are also to be considered as MI. (**) MI only when referring to voice communications / applications / users related to interoperability.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
11.3 Role management and presence	Those proposed as M and M-V3: 11.3.2.1 11.3.2.2 11.3.2.4 11.3.2.5 11.3.2.6 11.3.2.7 11.3.2.8 11.3.2.9 11.3.2.10 11.3.2.11 11.3.2.12 11.3.2.13 11.3.2.14 11.3.2.15 11.3.2.16 11.3.2.17 11.3.2.18.a 11.3.2.20 11.3.2.21.a 11.3.2.21.b 11.3.2.23 11.3.2.24 11.3.5.1 11.3.5.1i 11.3.5.2 11.3.5.3	MI	MI	Role management: Functionality existing in GSM-R Presence: new feature in FRMCS
11.4 Automatic Train Protection communication	Those proposed as M and M-V3: 11.4.2.1 11.4.2.2 11.4.2.4i 11.4.2.4ii 11.4.2.10i 11.4.2.11a.c 11.4.2.11ai 11.4.2.11aii 11.4.2.12 11.4.2.14 11.4.4.3 11.4.4.4 11.4.4.5 11.4.4.5i 11.4.4.6 11.4.4.6i 11.4.4.7 11.4.4.11	O (*)	MI	Functionality existing in GSM-R. (*) MI when implementing ETCS L2.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
11.5 Automatic Train Operation communication	Those proposed as M and M-V3: 11.5.2.1 11.5.2.2 11.5.2.8i 11.5.2.9a.c 11.5.2.9ai 11.5.2.9aii 11.5.2.10 11.5.2.12 11.5.4.2 11.5.4.3 11.5.4.4 11.5.4.4i 11.5.4.5 11.5.4.5i 11.5.4.10	O (*)	MI	Functionality existing in GSM-R. (*) MI when implementing ATO as defined in CCS TSI.
11.6 Data communication for Possession Management	Those to be proposed as M in V3: no requirements in this version of the FRS	O	MI (*)	New feature in FRMCS. (*) if this is intended for OB to controller indication, then interoperability related. NOT DEFINED in FRS V2.
11.8 Remote control of engines communication	Those to be proposed as M in V3: no requirements in this version of the FRS	O	MI (*)	New feature in FRMCS. (*) not clear if this is limited to a specific fleet (in which case, not strictly related to interoperability) or as a generic functionality to be available OB.
11.10 Access to recording of communications (Voice)	Those proposed as M and M-V3: no requirements in this version of the FRS	O	O	Details on the mechanism and format not available in V2.
11.10 Access to recording of communications (Data) (**)	Those proposed as M and M-V3: no requirements in this version of the FRS	MI / O (*)	MI / O (*)	Functionality existing in GSM-R, for REC participation data. (*) = Only to be considered as MI the recording of data corresponding to the participation in REC. Recording of other information, to be considered O (not mandatory, but when implemented, to be done as per the requirements defined) (**) the mechanism is not yet fully defined in V2; further considerations need to be taken once it is specified in V3.
11.12 Shunting data communication	Those proposed as M and M-V3: no requirements in this version of the FRS	O	MI	New functionality in FRMCS, but, if feature is implemented, it is related to interoperability. [It is not expected to be fully ready in V3]
11.13 Train integrity monitoring data communication	Those to be proposed as M in V3: no requirements in this version of the FRS	Not applicable (*)	MI (*)	New feature in FRMCS. (*) reassessment is needed once the functionality will be defined (to be analysed if it should be considered as O for TS, or O for OB)

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
11.15 Critical Advisory Messaging services- safety related data communication	Those proposed as M and M-V3: 11.15.2.1 11.15.2.2 11.15.2.3 11.15.2.4 11.15.2.5 11.15.2.7 11.15.2.8 11.15.2.9 11.15.2.10 11.15.4.1 11.15.4.2 11.15.4.3 11.15.4.3i	MI	MI	New feature in FRMCS to transmit European instructions (i.e."Written orders"). Related to interoperability when it will be defined.
11.16 Virtual coupling data communication	Those to be proposed as M in V3: no requirements in this version of the FRS	MI	MI	New functionality in FRMCS. Related to interoperability, to be reassessed when it will be defined.
11.17 Train Parking Protection	Those to be proposed as M in V3: no requirements in this version of the FRS	O	MI	New functionality in FRMCS. Related to interoperability, to be reassessed when it will be defined.
11.18 Key Management System data communication	Those proposed as M and M-V3: 11.18.2.1 11.18.2.2 11.18.2.8i.c 11.18.2.9 11.18.2.11 11.18.2.12 11.18.2.13 11.18.4.2 11.18.4.3 11.18.4.4 11.18.4.4i 11.18.4.10	MI	MI	Functionality existing in GSM-R but described together with ETCS L2.
11.19 On-Train Telemetry communications	Those proposed as M and M-V3: 11.19.2.2 11.19.2.3 11.19.2.4 11.19.2.12 11.19.2.13 11.19.2.14 11.19.2.15 11.19.2.16 11.19.2.18 11.19.4.1 11.19.4.2 11.19.4.3i 11.19.4.8	O (*)	O (*)	New functionality in FRMCS. (*) considered as related to maintenance
11.26 Train Departure data communications	Those to be proposed as M in V3: no requirements in this version of the FRS	O	MI	New functionality in FRMCS

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
11.27 Messaging Services	Those proposed as M and M-V3: 11.27.2.0ii 11.27.2.1 11.27.2.3 11.27.2.4.a 11.27.2.5 11.27.2.8.b 11.27.2.9 11.27.2.10 11.27.2.11 11.27.2.12 11.27.2.18.a 11.27.2.18.c 11.27.2.18.d 11.27.2.19.a 11.27.2.19.d 11.27.2.19.e 11.27.2.21 11.27.2.24 11.27.2.25 11.27.3.2 11.27.3.3 11.27.4.1 11.27.4.2 11.27.4.3i 11.27.4.4i 11.27.4.9 11.27.4.10i 11.27.4.11i	O	MI	Functionality existing in GSM-R Note that this refers to the capabilities of the FRMCS OB/TS service, not to the specific applications that may make use of the service.
11.28 Transfer of data	Those proposed as M and M-V3: 11.28.2.1 11.28.2.2 11.28.2.3 11.28.2.4 11.28.2.9 11.28.2.10 11.28.2.11 11.28.2.12 11.28.2.13 11.28.2.14 11.28.4.1 11.28.4.2 11.28.4.3i 11.28.4.4i 11.28.4.9	O (*)	O (*)	(*) This is pre-classified as optional in relation to interoperability because there is no application at the moment requiring it. To be considered MI if related to interoperable applications.
11.29 Record and broadcast of information	Those to be proposed as M in V3: no requirements in this version of the FRS	O (*)	O (*)	(*) This is pre-classified as optional in relation to interoperability because there is no application at the moment requiring it. To be considered MI if related to interoperable applications.

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
11.34 On-train safety device to ground communication	Those proposed as M and M-V3: 11.34.2.2 11.34.2.3 11.34.2.4 11.34.2.5 11.34.2.6 11.34.2.8 11.34.2.9 11.34.2.10 11.34.3.1 11.34.3.2 11.34.3.4 11.34.3.5 11.34.3.7 11.34.3.7i 11.34.3.10 11.34.3.11 11.34.3.11i 11.34.3.14 11.34.3.14i 11.34.3.19 11.34.3.20 11.34.4.1 11.34.4.2	O	MI	Optional in GSM-R, but national rules exist that force a specific implementation in each country. To be considered MI in FRMCS for OB.
12.2 Generic video communication	Those proposed as M and M-V3: no requirements in this version of the FRS	O (*)	O (*)	New feature in FRMCS. (*) This is pre-classified as optional in relation to interoperability because there is no application at the moment requiring it. To be considered MI if related to interoperable applications.
12.3 Critical real time video	Those to be proposed as M in V3: no requirements in this version of the FRS	O (*)	O (*)	New feature in FRMCS. (*) This is pre-classified as optional in relation to interoperability because there is no application at the moment requiring it. To be considered MI if related to interoperable applications.
12.4 Non-critical real time video communication	Those proposed as M and M-V3: no requirements in this version of the FRS	O (*)	O (*)	New feature in FRMCS. (*) This is pre-classified as optional in relation to interoperability because there is no application at the moment requiring it. To be considered MI if related to interoperable applications.
13 Terminal requirements	Those to be proposed as M in V3: no requirements in this version of the FRS	Not applicable (*)	MI/ O (*)	New feature in FRMCS (*) Deported control of apps: needed for the definition of the IC and to support the OB Subsystem functionality for arbitration

Section	Requirements	Candidate MI for TS (MI/O)	Candidate MI for OB (MI/O)	Notes
14 Network management	Those to be proposed as M in V3: 14.2.1 14.2.1i 14.2.3 14.2.4 14.2.5 14.2.7 14.3.1 14.3.2 14.3.3 14.3.3i 14.3.4 14.3.6 14.3.6i 14.3.6ii	O (*)	Not applicable (*)	Functionality existing in GSM-R but not formalised in MI requirements. (*) To be considered MI if related to interoperable applications. To be reassessed in V3
15 Digital resilience	Those to be proposed as M in V3: 15.1.3 15.1.3i 15.1.3ii 15.1.4 15.1.5	MI/ O (*)	MI/ O (*)	New functionality in FRMCS (*) Proposed as MI only in case there may be technical features that need to be supported both by Trackside and Onboard. To be reassessed in V3.
16 Domain change, interconnection, interworking	16.1.9	MI (*)	MI (*)	New functionality in FRMCS (*) functionality to be reassessed when fully specified in V3, also to consider the possible scenarios for interconnection and interworking during migration
16.2 Inter domain change	16.2.9 16.2.13.b	MI (*) (**)	MI (*) (**)	Similar functionality existing in GSM-R (*) functionality to be reassessed when fully specified in V3, also to consider the possible scenarios for interconnection and interworking during migration (**) NOTE that for ETCS L2 using FRMCS, network selection is NOT commanded by the application
16.3 Interconnection	16.3.0i 16.3.1	MI (*)	MI (*)	Similar functionality existing in GSM-R (*) functionality to be reassessed when fully specified in V3, also to consider the possible scenarios for interconnection and interworking during migration
16.5 Interworking	16.5.2 16.5.6 16.5.7	MI (*)	MI (*)	New functionality in FRMCS (*) functionality to be reassessed when fully specified in V3, also to consider the possible scenarios for interconnection and interworking during migration
16.6 Intra domain changes and service continuation	16.6.1 16.6.2	MI (*)	MI (*)	New functionality in FRMCS (*) functionality to be reassessed when fully specified in V3, also to consider the possible scenarios for interconnection and interworking during migration

Table C-1: Categorisation for EU

2 Asia

To be added in a later version of this specification.

3 US

To be added in a later version of this specification.

Appendix D Mapping of functional addressing with GSM-R

This appendix gives a non-exhaustive mapping between the numbering plan of GSM-R and the addressing schema of FRMCS. This can act as a starting point to establish a full configuration of the mapping by the IM system administrator to be used during migration.

Legend:
➔ = mapping is possible
➔ = mapping might be possible but action to be taken by implementers due to conceptual differences
➔ = mapping is not possible (since it is not supported in GSM-R)

FRMCS			GSM-R
Organisation Code (OC)			**RAC**
AAAA	→	←	NNN
++			
Short Dialling Codes			**Call Type 1**
1xxx	→	←	1xxx
++			
Train Function Identity			**Call Type 2**
TrainIdentity (IL)			***Train Function Number***
A...A	→	←	NNNNNNNN
Function (FL)			***Function Code***
Leading Driver	→	←	01 - Leading Driver
Driver 2	→	←	02 - Driver 2
Driver 3	→	←	03 - Driver 3
Driver 4	→	←	04 - Driver 4
Driver 5 – reserved for Banking	→	←	05 - Driver 5 – reserved for Banking
Intercom	→	←	07 - Intercom
Public Address	→	←	08 - Public Address
Chief Conductor	→	←	10 - Chief Conductor
Second Conductor	→	←	11 - Second Conductor
Third Conductor	→	←	12 - Third Conductor
Fourth Conductor	→	←	13 - Fourth Conductor
Train crew 5-10	→	←	14-19 - Train crew 5-10
Catering staff chief	→	←	20 - Catering staff chief
Catering 2-10	→	←	21-29 - Catering 2-10
Railway security services chief	→	←	30 - Railway security services chief
Railway security 2-10	→	←	31-39 - Railway security 2-10
		←	40-49 - ERTMS/ETCS
		←	50 - Train-borne recorder

FRMCS		GSM-R	
		←	51 - Diagnostics
		←	52 - Train data bus
		←	53 - Train location system
		←	60 - Pre-recorded passenger info
		←	61 - Displayed passenger information unit
++			
Vehicle Functional Identity			**Call Type 3/4**
VI (IL)			***CT3 - Engine Function Number*** ***CT4 - Coach Function Number***
A...A	→	←	CT3 - NNNNNNNN CT4 - NNNNNNNNN
On-Board Equipment Identity (EL)			---
A…A	→		---
Function (FL)			***Function Code***
Driver	→	←	NN
Vehicle Equipment Function 2-25	→	←	NN
++			
Group Identity and Addressed Area Identity			**Call Type 5**(0)
Location (LL)			***Group Call Area***
Area ID	→	←	NNNNN
Group Identity (FL)			***Group ID***
All			---
Train Driver	→	←	(VGCS) 200, 555
Train Staff			---
Shunting Team members	→	←	(VGCS) 500-529
Maintenance team members	→	←	(VGCS) 560-569
Railway security team members	→	←	(VGCS) 530-539
Public Address	→	←	(VBS) 203, 221-229, 540-550
++			
Team Functional Identity			**Call Type 6**

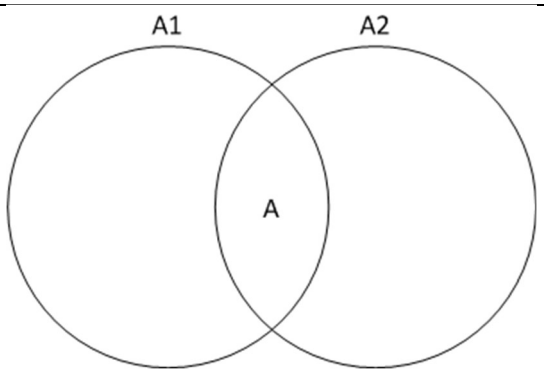
FRMCS			GSM-R
Area ID (LL)			***Location Number***
A...A	→	←	NNNNN
Team Identity (IL)			***Function Code***
A…A (eg. Shunting 1)	→	←	6LLLLLYY**XX**
Function (FL)			***Function Code – only for shunting***
Driver	→	←	6LLLLL**54**XX
Team leader	→	←	6LLLLL**50**XX
Team member 1	→	←	6LLLLL**51**XX
Team member 2	→	←	6LLLLL**52**XX
Team member 3	→	←	6LLLLL**53**XX
Team member 4			---
Team member 5			---
++			
Controller Functional Identity			**Call Type 7**
Area ID (LL)			***Location Number***
A...A	→	←	NNNNN
Function (FL)			***Function Code***
Primary Controller	→	←	01 - Primary Controller
Secondary Controller	→	←	02 - Secondary Controller
Power supply Controller	→	←	03 - Power supply Controller
Switchman	→	←	04 - Switchman
Platform inspector	→	←	05 - Platform inspector
Railway undertaking dispatcher	→	←	06 - Railway undertaking dispatcher
Technical inspector	→	←	07 - Technical inspector
Train preparation	→	←	08 - Train preparation
Emergency manager	→	←	09 - Emergency manager

Table D-1: Mapping of functional addressing with GSM-R

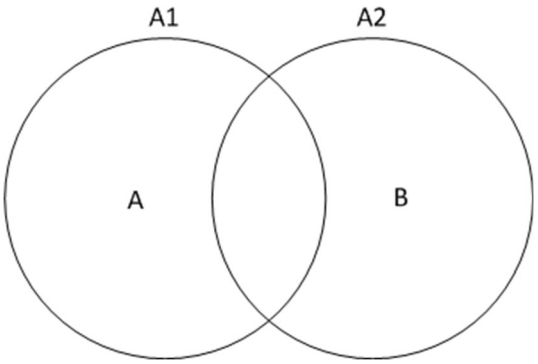
Appendix E Examples of “first to accept” call handling

In this appendix some examples of scenario related to the requirement specified in § 0 a) are given .

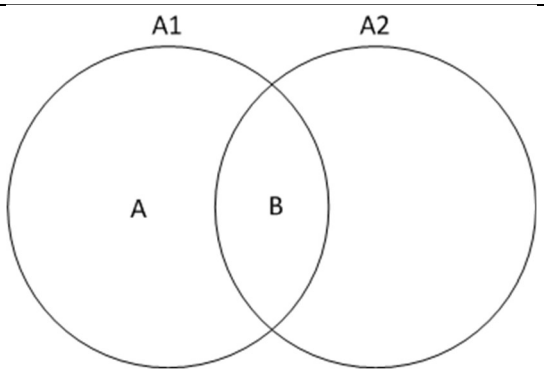
I. Example 1

• User A1 is registered to Functional Identity A • User A2 is registered to Functional Identity A An incoming communication addressed to Functional Identity A is presented to User A1 and A2. If the incoming communication is accepted by User A1, the User A2 sharing the same Functional Identity is released from the incoming communication. The User A2 shall be informed, that the incoming communication was alternatively accepted. The context of identity A is fulfilled.	

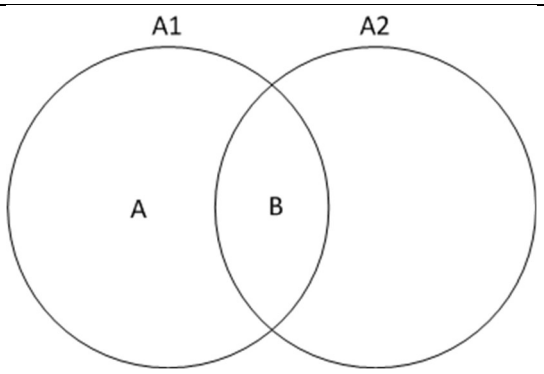
II. Example 2

• User A1 is registered to Functional Identity A • User A2 is registered to Functional Identity B An incoming communication addressed to Functional Identities A and B is presented to User A1 and A2. If the incoming communication is accepted by User A1, the incoming communication is still presented to User A2. Only the context of identity A is currently fulfilled.	

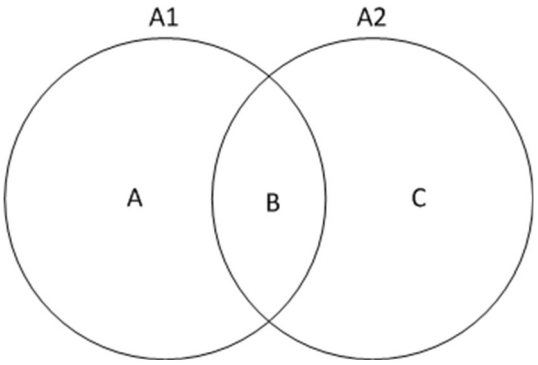
III. Example 3.1

• User A1 is registered to Functional Identities A+B • User A2 is registered to Functional Identity B An incoming communication addressed to Functional Identities A and B shall be presented to User A1 and A2. If the incoming communication is accepted by User A1, User A2 shall be released from the incoming communication. The context of identity A+B is fulfilled. User A2 shall be informed, that the incoming communication was alternatively accepted.	

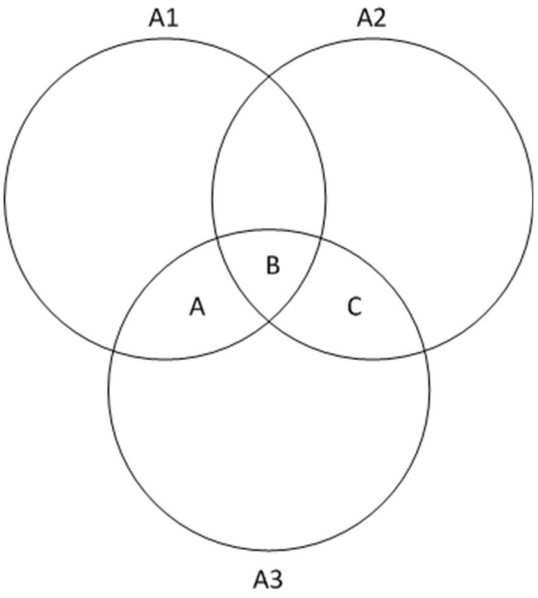
IV. Example 3.2.

• User A1 is registered to Functional Identities A+B • User A2 is registered to Functional Identity B An incoming communication addressed to Functional Identities A and B shall be presented to User A1 and A2. If the incoming communication is accepted by User A2, the incoming communication is still be presented to User A1. Only the context of identity B is currently fulfilled.	

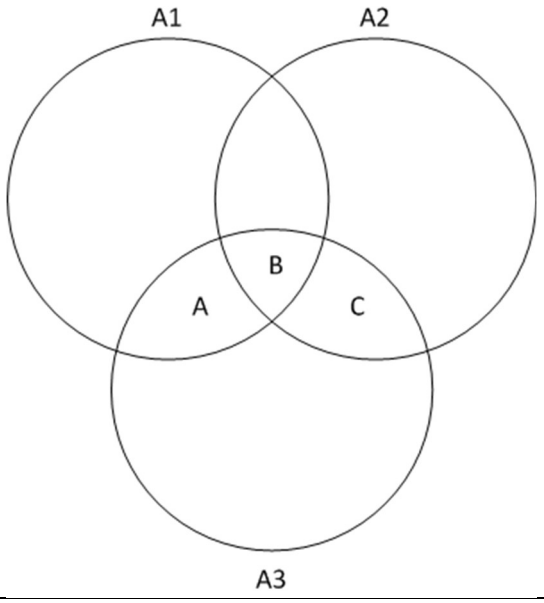
V. Example 4

• User A1 is registered to Functional Identities A+B • User A2 is registered to Functional Identities B+C An incoming communication addressed to Functional Identities A, B and C is presented to User A1 and A2. If the incoming communication is accepted by User A1, the incoming communication is still presented to User A2. Only the context of identity A+B is currently fulfilled.	

VI. Example 5.1

• User A1 is registered to Functional Identities A+B • User A2 is registered to Functional Identities B+C • User A3 is registered to Functional Identities A+B+C An incoming communication addressed to Functional Identities A, B and C is presented to User A1, A2 and A3. Step 1: The incoming communication is accepted by User A1, the incoming communication is still presented to User A2 and A3. Only the context of Identity A+B is currently fulfilled. Step 2: The incoming communication is accepted by User A2, User A3 is released from the incoming communication. The context of identity A+B+C is now fulfilled. User A3 shall be informed, that the incoming communication was alternatively accepted.	

VII. Example 5.2

• User A1 is registered to Functional Identities A+B • User A2 is registered to Functional Identities B+C • User A3 is registered to Functional Identities A+B+C An incoming communication addressed to Functional Identities A, B and C is presented to User A1, A2 and A3. The incoming communication is accepted by User A3, User A1 and A2 are released from the incoming communication. The context of identity A+B+C is fulfilled.	

Appendix F Guidance to construct Functional Identities

In this appendix an overview is given how to construct Functional Identities and the different labels within that.

Identity	*LocationLabel*	*IdentificationLabel*	*FunctionLabel*	*OrganisationCode*
Train Functional Identity		Train Identity	• Leading Driver • Driver 2 • Driver 3 • Driver 4 • Driver 5 – reserved for Banking • Intercom • Public Address • Chief Conductor • Second Conductor • Third Conductor • Fourth Conductor • Train crew 5 – 10 • Catering staff chief • Catering 2 – 10 • Railway security services chief • Railway security 2 – 10	OC
Identity	*LocationLabel*	*IdentificationLabel*	*FunctionLabel*	*OrganisationCode*
Controller Functional Identity	Area ID		• Primary Controller • Secondary Controller • Power supply Controller • Switchman • Platform inspector • Railway undertaking dispatcher • Technical inspector • Train preparation • Emergency manager	OC
Identity	*LocationLabel*	*IdentificationLabel*	*FunctionLabel*	*OrganisationCode*
Team Functional Identity	Area ID	Team Identity	• Driver • Team leader • Team member 2-10	OC
Identity	*IdentificationLabel*	*EquipmentLabel*	*FunctionLabel*	*OrganisationCode*
Vehicle Functional Identity	Vehicle Identifier	On-Board Equipment Identity	• Driver • Vehicle Equipment Function 2-25	OC
Identity	*LocationLabel*	*IdentificationLabel*	*FunctionLabel*	*OrganisationCode*
Trackside Equipment Functional Identity	Area ID	Trackside Equipment Identity	Trackside Equipment Function 1-25	OC

Table F-1: Guidance to construct Functional Identities

Appendix G Common functions used per FRMCS Application

In this appendix an overview is given which Common Function is used by which FRMCS Application.

Where a cell is empty the Common Function is not used for the FRMCS Application.
Where a cell is marked with “x” the Common Function is used for the FRMCS Application.
Where a cell is marked with “O” the Common Function is optional for the FRMCS Application.
Where a cell is marked with “ffs” it is not yet determined if the Common Function is used for the FRMCS Application

URS	*FRMCS Application*	*FRS ref*	Assured voice communi-cation	Multi user talker control	Role Manage-ment and presence	Location services	Authori-sation of communi-cation	Authori-sation FRMCS Application & Communicat ion Service	QoS and priority	Assured data communi-cation	Inviting -a-user messaging	Arbitration	Distribu-tion of synchroni-sed time	Billing Informa-tion	Recording
-	**Generic Voice Communication**	10.2		x	x	x	x	x	x	ffs	x	x	x	ffs	
-	**Generic Data Communication**	11.2			x		x	x	x	ffs	x	x	x	ffs	
-	**Generic Video Communication**	12.2	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	
-	**Role management and presence**	11.3			x	x	x	x	x	ffs			x	ffs	
5.1	**On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train**	10.3		x	x	x	x	x	x	ffs	x	x	x	ffs	x
5.2	**On-Train incoming Voice Communication from the Controller towards a Train Driver**	10.4		x	x	x	x	x	x	ffs	x	x	x	ffs	x

URS	*FRMCS Application*	*FRS ref*	Assured voice communi-cation	Multi user talker control	Role Manage-ment and presence	Location services	Authori-sation of communi-cation	Authori-sation FRMCS Application & Communicat ion Service	QoS and priority	Assured data communi-cation	Inviting -a-user messaging	Arbitration	Distribu-tion of synchroni-sed time	Billing Informa-tion	Recording
5.3	**Multi-Train Voice Communication for Drivers**	10.5		x	x	x	x	x	x	ffs	x	x	x	ffs	x
5.4	**Banking Voice Communication**	0	x	x	x	x	x	x	x	ffs	x	x	x	ffs	x
5.5	**Trackside Maintenance Voice Communication**	10.7	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.6	**Shunting Voice Communication**	10.8	x	x	x	x	x	x	x		x	x	x	ffs	x
5.7	**Public Emergency Call**	10.9	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.8	**Ground to ground Voice Communication**	10.10		x	x	x	x	x	x	ffs	x	x	x	ffs	x
5.9	**Automatic Train Protection communication**	11.4			x	O	x	x	x	ffs	x			ffs	x
5.10	**Automatic Train Operation communication**	0			x	O	x	x	x	ffs	x			ffs	x
5.11	**Data Communication for Possession Management**	11.6	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.12	**Trackside Maintenance Warning System communication**	11.7	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.13	**Remote control of engines communication**	11.8	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.14	**Monitoring and control of critical infrastructure**	11.9			x		x	x	x	ffs	x		x	ffs	x
5.15	**Railway Emergency Communication**	10.11		x	x	x	x	x	x	ffs	x	x	x	ffs	x

URS	*FRMCS Application*	*FRS ref*	Assured voice communi-cation	Multi user talker control	Role Manage-ment and presence	Location services	Authori-sation of communi-cation	Authori-sation FRMCS Application & Communicat ion Service	QoS and priority	Assured data communi-cation	Inviting -a-user messaging	Arbitration	Distribu-tion of synchroni-sed time	Billing Informa-tion	Recording
5.16	**On-Train safety device to ground communication**	11.34		x	x	x	x	x	x	ffs	x	x	x	ffs	x
5.17	**Public Train emergency communication**	10.13	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.18	**Working alone**	10.14	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.19	**Access to recording of communication**	11.10	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.20	See 5.19	11.10													
5.21	**Shunting Data Communication**	11.12	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.22	**Train integrity monitoring Data Communication**	11.13	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.23	**Public Emergency Warning**	11.14	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.24	**On-Train outgoing Voice Communication from Train Staff towards a Ground User**	10.15		x	x	x	x	x	x		x	x	x	ffs	x
5.25	**On-Train incoming Voice Communication from a Ground User towards Train Staff**	10.16		x	x	x	x	x	x		x	x	x	ffs	x
5.26	**Railway Staff emergency communication**	10.17	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.27	**Critical real time video**	12.3	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.28	**Critical Advisory Messaging services-safety related Data Communication**	11.15			x		x	x	x	ffs	x	x	x	ffs	x

URS	*FRMCS Application*	*FRS ref*	Assured voice communi-cation	Multi user talker control	Role Manage-ment and presence	Location services	Authori-sation of communi-cation	Authori-sation FRMCS Application & Communicat ion Service	QoS and priority	Assured data communi-cation	Inviting -a-user messaging	Arbitration	Distribu-tion of synchroni-sed time	Billing Informa-tion	Recording
5.29	**Virtual coupling Data Communication**	11.16	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.30	**Train Parking Protection**	11.17	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
5.31	**Key Management System Data Communication**	11.18			x	x	x	x	x	ffs	x			ffs	x
5.32	**Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train**	10.18		x	x	x	x	x	x	ffs	x	x	x	ffs	x
5.33	**Urgent Multi-Train Voice Communication for Drivers**	10.19		x	x	x	x	x	x	ffs	x	x	x	ffs	x
6.1	**Deleted**	n.a.													
6.2	**Deleted**	n.a.													
6.3	**Multi-Train Voice Communication for Drivers excluding Ground User(s)**	10.20	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.4	**On-Train Voice Communication**	10.21		x	x	x	x	x	x		x	x	x	ffs	x
6.5	**Lineside Telephony**	10.22	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.6	**On-Train Voice Communication towards passengers (Public Address)**	10.23	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.7	**Station Public Address**	10.24	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.8	**Communication at stations and Depots**	10.25	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs

URS	*FRMCS Application*	*FRS ref*	Assured voice communi-cation	Multi user talker control	Role Manage-ment and presence	Location services	Authori-sation of communi-cation	Authori-sation FRMCS Application & Communicat ion Service	QoS and priority	Assured data communi-cation	Inviting -a-user messaging	Arbitration	Distribu-tion of synchroni-sed time	Billing Informa-tion	Recording
6.9	**On-Train Telemetry communications**	11.19			x	x	x	x	x	ffs	x		x	ffs	x
6.10	**Infrastructure Telemetry communications**	11.20	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.11	**On-Train remote equipment control**	11.21	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.12	**Monitoring and Control of Non-Critical Infrastructure**	11.22	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.13	**Non-critical real time video**	12.4	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.14	**Wireless on-Train Data Communication for Train Staff**	11.23	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.15	**Wireless Data Communication for Railway Staff on platforms**	11.24	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.16	**Deleted**		ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.17	**Train Driver advisory -Train performance Data Communication**	11.25	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.18	**Train Departure Data Communications**	11.26	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.19	**Messaging Services**	11.27			x	x	x	x	x	ffs	x	x	x	ffs	x
6.20	**Transfer of data**	11.28			x		x	x	x	ffs	x		x	ffs	x
6.21	**Record and broadcast of information**	11.29	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.22	**Transfer of CCTV archives**	11.30	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs

URS	*FRMCS Application*	*FRS ref*	Assured voice communi-cation	Multi user talker control	Role Manage-ment and presence	Location services	Authori-sation of communi-cation	Authori-sation FRMCS Application & Communicat ion Service	QoS and priority	Assured data communi-cation	Inviting -a-user messaging	Arbitration	Distribu-tion of synchroni-sed time	Billing Informa-tion	Recording
6.23	**Non-critical real time Video Communication**	12.4	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.24	**Augmented reality Data Communication**	11.31	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.25	**Real time translation of speech Data Communication**	11.32	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
6.26	**Passenger Information System Data Communication**	11.33			x	x	x	x	x	ffs			x	ffs	x
7.1	**Information Help Point for Public**	tbd	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
7.2	**Emergency Help Point for Public**	tbd	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
7.3	**Wireless internet on-Train for passengers**	tbd	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs
7.4	**Wireless internet for passengers on platforms**	tbd	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs	ffs

Table G-1: Common functions used per FRMCS Application

Appendix H Intentionally deleted.

Appendix I Arbitration rules for Drivers

In this appendix the arbitration rules for Drivers are specified for both incoming and outgoing calls.

Call arbitration incoming

The following definitions apply:

a) Incoming communication is indicated audibly and visibly, automatically connected, any previously connected communication is queued; (M-V3)

b) Incoming communication is indicated audibly and visibly and automatically Merged with the connected communication; (M-Vx)

c) Incoming communication is indicated audibly and visibly and automatically connected, previously connected communication is kept connected (both communications are connected); (M)

d) Incoming communication is not presented, not connected but User is kept addressed; (M)

e) Incoming communication is presented with visible and audible indication, connected communication is kept connected; (M)

f) Incoming communication is rejected. (M-V3)

* Default behavior; (M)
NA = Not applicable

Incoming communication	Generic Voice Communication	Train Driver towards the Controller	Urgent Train Driver towards the Controller	Controller towards the Train Driver	Multi-Train	Train Staff towards a Ground User (joined by the Driver)	Ground User towards Train Staff (joined by Driver)	Urgent Multi-Train	Banking Voice Communication	Shunting Voice Communication	REC-Alert(stand-alone is (M-Vx))	REC-Voice	On-Train Voice Communication	Critical Advisory Messaging services-safety related Data Communication	Messaging service
Connected communication															
Generic Voice Communication	d) or e)* or f)	NA	NA	a)* or e)	a)* or e)	e)	e)	a)* or e)	a)* or e)	a)* or e)	c)	a)	a) or e)*	c)	d)* or e)
Train Driver towards the Controller	d) or e)* or f)	NA	NA	b) or e)*	a) or b) or d) or e)*	e)	e)	a)* or b)	b) or e)*	e)	c)	a)	e)	c)	d) or e)*
Urgent Train Driver towards the Controller	d) or e)* or f)	NA	NA	d) or e)* or f)	d) or e)* or f)	e)	e)	b) or e)*	b) or e)* or f)	d) or e)* or f)	c)	a)* or b)	d) or e)* or f)	c)	d)* or e)
Controller towards the Train Driver	d) or e)* or f)	NA	NA	b) or e)*	a) or b) or d) or e)*	e)	e)	a)* or b)	b) or e)*	e)* or f)	c)	a)	e)	c)	d) or e)*
Multi-Train	d) or e)* or f)	NA	NA	a) or b) or e)*	b) or d) or e)*	e)	e)	a)	d) or e)* or f)	d) or e)* or f)	c)	a)	e)	c)	d) or e)*
Train Staff towards a Ground User (joined by the Driver)	d) or e)* or f)	a)	a)	a)	a)	e)	e)	a)	a)	a)	a)	a)	e)	a)	d) or e)*
Ground User towards Train Staff (joined by Driver)	d) or e)* or f)	a)	a)	a)	a)	e)	e)	a)	a)	a)	a)	a)	e)	a)	d) or e)*

Incoming communication	Generic Voice Communication	Train Driver towards the Controller	Urgent Train Driver towards the Controller	Controller towards the Train Driver	Multi-Train	Train Staff towards a Ground User (joined by the Driver)	Ground User towards Train Staff (joined by Driver)	Urgent Multi-Train	Banking Voice Communication	Shunting Voice Communication	REC-Alert(stand-alone is (M-Vx))	REC-Voice	On-Train Voice Communication	Critical Advisory Messaging services-safety related Data Communication	Messaging service
Connected communication															
Urgent Multi-Train	d) or e)* or f)	NA	NA	b) or e)* or f)	d) or e)* or f)	e)	e)	d) or e)*	d) or e)* or f)	d) or e)* or f)	c)	a)	d) or e)* or f)	c)	d)* or e)
Banking Voice Communication	d) or e)* or f)	NA	NA	a)* or b)	a) or b) or e)*	e)	e)	a)* or b)	NA	d) or e)* or f)	c)	a)* or b)	e)	c)	d) or e)*
Shunting Voice Communication	d) or e)* or f)	NA	NA	b) or e)*	d) or e)*	e)	e)	d) or e)*	d) or e)* or f)	b) or e)* or f)	c)	a)	e)	c)	d) or e)*
REC-Alert (stand-alone is (M-Vx))	d) or e)* or f)	NA	NA	c) or e)*	c) or d) or e)*	e)	e)	c) or e)*	c) or d) or e)*	c) or d) or e)*	c)	c)	c)	c)	d)* or e)
REC-Voice	d)* or e) or f)	NA	NA	d)* or e)	d) or e)* or f)	e)	e)	d) or e)*	d)* or e) or f)	d)* or e) or f)	c)	e)	d)* or e) or f)	c)	d)* or e)
On-Train Voice Communication	d) or e)* or f)	NA	NA	a) or c) or e)*	a)* or e)	a) or e)*	a) or e)*	a)* or e)	a) or e)*	a) or e)*	c)	a)	b) or e)* or f)	c)	d) or e)*
Critical Advisory Messaging services-safety related Data Communication	d) or e)* or f)	NA	NA	c)	c)	e)	e)	c)	c)	c)	c)	c)	c)	c)	d)* or e)
Messaging service	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
No ongoing com	d) or e)* or f)	NA	NA	a)	a)	e)	e)	a)	a)	a)	a)	NA	e)	a)	d) or e)*

Table I-1: Call arbitration incoming for Driver

Call arbitration outgoing

The following definitions apply:

a) Outgoing communication is established, previously connected communication is queued (User addressed but not connected); (M-V3)
b) Outgoing communication is established and automatically Merged with the previously connected communication; (M-Vx)
c) Outgoing communication is established, previously communication is kept connected; (M)
d) Outgoing communication is not established. (M)
* Default behavior; (M) NA = Not applicable

Outgoing communication	Generic Voice Communication	Train Driver towards the Controller	Urgent Train Driver towards the Controller	Controller towards the Train Driver	Multi-Train	Train Staff towards a Ground User(joined by the Driver)	Ground User towards Train Staff (joined by Driver)	Urgent Multi-Train	Banking Voice Communication	Shunting Voice Communication	REC-Alert (stand-alone is (M-Vx))	REC-Voice	On-Train Voice Communication	Critical Advisory Messaging services-safety related Data Communication	Messaging service
Ongoing communication															
Generic Voice Communication	a)* or b) or d)	a)	a)	NA	a)	NA	NA	a)	a)	a)	c)	a)	a)	c)	c)* or d)
Train Driver towards the Controller	a)* or d)	a)* or b) or d)	a)* or b)	NA	a)* or b) or d)	NA	NA	a)* or b)	a)* or b) or d)	d)	c)	a)	a)* or b)	c)	c)* or d)
Urgent Train Driver towards the Controller	a)* or d)	d)	d)	NA	d)	NA	NA	a)* or b)	d)	d)	c)	a)* or b)	a)* or b)	c)	c) or d)*
Controller towards the Train Driver	a)* or d)	a)* or b) or d)	a)* or b)	NA	a)* or b) or d)	NA	NA	a)* or b)	a)* or b) or d)	d)	c)	a)	a)* or b)	c)	c)* or d)
Multi-Train	a)* or d)	a)* or b)	a)	NA	d)	NA	NA	a)	a)* or b) or d)	a)* or d)	c)	a)	a)* or b)	c)	c)* or d)
Train Staff towards a Ground User (joined by the Driver)	a)* or d)	a)	a)	a)	a)	NA	NA	a)	a)	a)	a)	a)	a)* or b)	a)	c)* or d)
Ground User towards Train Staff (joined by Driver)	a)* or d)	a)	a)	a)	a)	NA	NA	a)	a)	a)	a)	a)	a)* or b)	a)	c)* or d)
Urgent Multi-Train	a)* or d)	a)* or b) or d)	a)* or b) or d)	NA	d)	NA	NA	d)	d)	d)	c)	a)	a)* or b)	c)	c) or d)*
Banking Voice Communication	a)* or d)	b)	b)	NA	a)* or b) or d)	NA	NA	a)* or b)	b)	d)	c)	a)	a)* or b)	c)	c)* or d)
Shunting Voice Communication	a)* or d)	b)	b)	NA	a)* or d)	NA	NA	a)* or d)	d)	a)* or b) or d)	c)	a)	a)* or b)	c)	c)* or d)
REC-Alert (stand-alone is (M-Vx))	c)* or d)	c)* or d)	c)* or d)	NA	c)* or d)	NA	NA	c)* or d)	c)* or d)	c)* or d)	c)	c)	c)	c)	c) or d)*

Outgoing communication	Generic Voice Communication	Train Driver towards the Controller	Urgent Train Driver towards the Controller	Controller towards the Train Driver	Multi-Train	Train Staff towards a Ground User(joined by the Driver)	Ground User towards Train Staff (joined by Driver)	Urgent Multi-Train	Banking Voice Communication	Shunting Voice Communication	REC-Alert (stand-alone is (M-Vx))	REC-Voice	On-Train Voice Communication	Critical Advisory Messaging services-safety related Data Communication	Messaging service
Ongoing communication															
REC-Voice	d)	d)	d)	NA	d)	NA	NA	d)	d)	d)	c)	a)* or d)	d)	c)	c) or d)*
On-Train Voice Communication	a)* or d)	a)* or b)	a)* or b) or d)	NA	a)* or b)	NA	NA	a)* or b) or d)	a)* or b)	a)* or b)	c)	a)* or d)	a)* or b)	c)	c)* or d)
Critical Advisory Messaging services-safety related Data Communication	c)	c)	c)	NA	c)	NA	NA	c)	c)	c)	c)	c)	c)	c)	c) or d)*
Messaging service	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table I-2: Call arbitration outgoing for Driver

Appendix J Priority ordering

In this appendix the ordering of FRMCS Applications for priority are specified.

The ordering of priorities is according to the row's. In total seven priority levels are defined and are numbered with letters A to G.

The way the priority shall be understood is that in the case there are no resources available when a User wants to setup a new communication, the priority is used to free up resources. So an FRMCS Application with a higher priority can take over resources from lower priority FRMCS Applications.

Example: When there is an active ATO communication and a REC-voice is initiated and there is congestion on the transportlayer of FRMCS, the REC-Voice Communication pre-empts the ATO communication.

The table is intended to be future proof. When new FRMCS Applications are added to this document, they are configured into the priority table.

#	Caterogy	FRMCS Application (section number and name)
A	Railway emergency priority	10.11 REC-alert 10.11 REC-voice 10.11 REC-data
B	Railway operation high priority	10.18 Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train 10.19 Urgent Multi-Train Voice Communication for Drivers 11.15 Critical Advisory Messaging services- safety related Data Communication 11.34 On-Train safety device to ground communication
C	Control-command (safety) priority	11.4 Automatic Train Protection communication
D	Railway operation medium priority	10.3 On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train 10.4 On-Train incoming Voice Communication from the Controller towards a Train Driver 10.5 Multi-Train Voice Communication for Drivers 10.6 Banking Voice Communication 10.8 Shunting Voice Communication 11.3 Role management and presence
E	Railway operation normal priority	10.10 Ground to ground Voice Communication 10.15 On-Train outgoing Voice Communication from Train Staff towards a Ground User 10.16 On-Train incoming Voice Communication from a Ground User towards Train Staff 10.21 On-Train Voice Communication 10.23 On-Train Voice Communication towards passengers (Public Address) 11.5 Automatic Train Operation communication 11.9 Monitoring and control of critical infrastructure 11.18 Safety key management Data Communication 11.33 Passenger Information System Data Communication
F	Non railway operation priority	11.19 On-Train Telemetry communications 11.27 Messaging Services 11.28 Transfer of data
G	Any others	10.2 Generic Voice Communication 11.2 Generic Data Communication

Table J-1: Priority ordering

Appendix K Group Identities

This table shows the internationally harmonized Group Identities. Implementers are allowed to define Groups Identities for national use.

Group Identity	Description
1000 – 1049	Multi-Train-Drivers
1050 – 1099	for future use
1200 – 1249	Train Staff
1250 – 1299	for future use
1300 – 1349	Public Address
1350 – 1399	for future use
1600 – 1649	Catering Staff
1650 – 1699	for future use
2000 – 2999	Shunting Team
3000 – 3999	Maintenance Team
4000 – 4999	Railway security Team
5000 – 9999	for future use

Table K-1: Group Identities

Appendix L Metadata per FRMCS Applications & Communication Service

This table specifies which metadata shall be recorded per FRMCS Application & Communication Service.

FRMCS Application or FRMCS Communication Service	Metadat item	a) Initiator's Subscriber Identity	b) Initiator's User Identity	c) Initiator's Functional Identity	d) Initiator's Location Information upon initiation	e) Addressed Users Subscriber Identity	f) Addressed Users User Identity	g) Addressed Users Functional Identity	h) Addressed Users Location Information	i) Timestamp of initiation of the communication	j) Timestamp of termination of the communication	k) Timestamp of a User connecting to the communication	l) Timestamp of a User disconnecting from a communication	m) Timestamp for any request to talk	n) Timestamp for any revoke to talk	o) Initiating area identification (e.g. REC)	p) Addressed area identification (e.g. REC)	q) Timestamp of Merging of communications	r) Priority level	s) Cause of termination
Generic Voice Communication case no LDA		x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
Generic Voice Communication case LDA		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Generic Voice Communication case LDA _ Addressed Area		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of a Train		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x
On-Train incoming Voice Communication from the Controller towards a Train Driver		x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x
Multi-Train Voice Communication for Drivers		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Banking Voice Communication		x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
Trackside Maintenance Voice Communication		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Shunting Voice Communication		x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x

FRMCS Application or FRMCS Communication Service	Metadat item	a) Initiator's Subscriber Identity	b) Initiator's User Identity	c) Initiator's Functional Identity	d) Initiator's Location Information upon initiation	e) Addressed Users Subscriber Identity	f) Addressed Users User Identity	g) Addressed Users Functional Identity	h) Addressed Users Location Information	i) Timestamp of initiation of the communication	j) Timestamp of termination of the communication	k) Timestamp of a User connecting to the communication	l) Timestamp of a User disconnecting from a communication	m) Timestamp for any request to talk	n) Timestamp for any revoke to talk	o) Initiating area identification (e.g. REC)	p) Addressed area identification (e.g. REC)	q) Timestamp of Merging of communications	r) Priority level	s) Cause of termination
Ground to ground Voice Communication		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Railway Emergency Communication		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
On-Train outgoing Voice Communication from Train Staff towards a Ground User		x	x	x	x	x	x	x	x	x	x	x	x						x	x
On-Train incoming Voice Communication from a Ground User towards Train Staff		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Urgent Multi-Train Voice Communication for Drivers		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
On-Train Voice Communication		x	x	x	x	x	x	x	x	x	x	x	x						x	x
On-Train Voice Communication towards passengers (Public Address)		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Generic Data Communication		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Role management and presence		x	x	x	x	x	x	x		x									x	x
Automatic Train Protection		x	x	x	x	x	x	x	x	x	x	x	x						x	x

FRMCS Application or FRMCS Communication Service	Metadat item	a) Initiator's Subscriber Identity	b) Initiator's User Identity	c) Initiator's Functional Identity	d) Initiator's Location Information upon initiation	e) Addressed Users Subscriber Identity	f) Addressed Users User Identity	g) Addressed Users Functional Identity	h) Addressed Users Location Information	i) Timestamp of initiation of the communication	j) Timestamp of termination of the communication	k) Timestamp of a User connecting to the communication	l) Timestamp of a User disconnecting from a communication	m) Timestamp for any request to talk	n) Timestamp for any revoke to talk	o) Initiating area identification (e.g. REC)	p) Addressed area identification (e.g. REC)	q) Timestamp of Merging of communications	r) Priority level	s) Cause of termination
Automatic Train Operation		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Monitoring and control of critical infrastructure		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Access to recording of communications		x	x	x						x	x									
Shunting Data Communication		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Critical Advisory Messaging services- safety related Data		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Key Management System Data Communication		x	x	x	x	x	x	x	x	x	x	x	x						x	x
On-Train Telemetry		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Messaging services		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Transfer of data Communication		x	x	x	x	x	x	x	x	x	x	x	x						x	x
Passenger Information System Data Communication		x	x	x	x	x	x	x	x	x	x	x	x						x	x
On-Train safety device to ground communication		x	x	x	x	x	x	x	x	x	x	x	x						x	x

Table L-1: Metadata per FRMCS Application & Communication Service

Appendix M Short Dialling Codes

The below table specifies which short dialling codes shall be used for which FRMCS Application, which Functional Identity is used within the FRMCS Application. It is also shown the way it is harmonised.

Short Dialing Code	Functional Identity	FRMCS Application	Usage
0000-0999	-	Not used	-
1000-1119	-	Generic Voice Communication based on initiator's Geographical Position or initiator's Functional Identity	Reserved for internationally harmonised national use
1120-1129	-	Not used (reserved for 112 calls)	-
1130-1198	-	Generic Voice Communication based on initiator's Geographical Position or initiator's Functional Identity	Reserved for internationally harmonised national use
1199	-	Generic Voice Communication based on initiator's Geographical Position	Reserved for international use
1200	PrimaryController	On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train: Driver to Primary Controller	Internationally harmonised for national use
1201-1298	-	On-train outgoing Voice Communication from the Train Driver towards the Controller(s) of the train	Reserved for international use
1299	PrimaryControllerUrgent	Urgent On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train: Urgent Driver to Primary Controller	Internationally harmonised for national use
1300	SecondaryController	On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train: Driver to Secondary Controller	Internationally harmonised for national use
1301-1398	-	On-train outgoing Voice Communication from the Train Driver towards the Controller(s) of the train	Reserved for international use
1399	SecondaryControllerUrgent	On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train: Driver to Primary Controller: Urgent Driver to Secondary Controller	Internationally harmonised for national use
1400	PowerSupplyController	On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train: Driver to Power Supply Controller	Internationally harmonised for national use
1401-1498	-	On-train outgoing Voice Communication from the Train Driver towards the Controller(s) of the train	Reserved for international use
1499	PowerSupplyControllerUrgent	On-Train outgoing Voice Communication from the Train Driver towards the Controller(s) of the Train: Driver to Primary Controller: Urgent Driver to Power Supply Controller	Internationally harmonised for national use

Short Dialing Code	Functional Identity	FRMCS Application	Usage
1500-1599	-	Generic Voice Communication based on initiator's Geographical Position	Reserved for internationally harmonised national use
1600	TrainStaffToGround	On-train outgoing Voice Communication from Train Staff towards a Ground User	Internationally harmonised for national use
1601-1699	-	Generic Voice Communication based on initiator's Geographical Position	Reserved for internationally harmonised national use
1700-1776	-	Generic Voice Communication based on initiator's Geographical Position	Reserved for international use
1777	TrainReady	Train Departure Data Communications	Internationally harmonised for national use
1778-1799	-	Generic Voice Communication based on initiator's Geographical Position	Reserved for international use
1800-1899	-	Generic Voice Communication based on initiator's Geographical Position	Reserved for internationally harmonised national use
1900-1999	-	Generic Voice Communication based on initiator's Geographical Position	Reserved for internationally harmonised national use
2000-2099	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2100-2199	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2200	MultiTrainUrgent	Urgent Multi-Train Voice Communication for Drivers: Urgent Multi-Train Communication for Drivers	Internationally harmonised for national use
2201-2249	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2250-2269	tbd	Local Operation Communication	Internationally harmonised for national use
2270-2298	tbd	Train Preparation	Internationally harmonised for national use
2299	REC	Railway Emergency Communication	Internationally harmonised for national use
2300-2399	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2400-2499	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2500-2529	Shunting	Shunting Voice Communication	Internationally harmonised for national use
2530-2539	tbd	Communication at stations and Depots	Internationally harmonised for national use

Short Dialing Code	Functional Identity	FRMCS Application	Usage
2540-2554	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2555	MultiTrain	Multi-Train Voice Communication for Drivers: Multi-Train Communication for Drivers	Internationally harmonised for national use
2556-2559	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2560-2569	tbd	Trackside Maintenance Voice Communication	Internationally harmonised for national use
2570-2579	tbd	Controller groups	Internationally harmonised for national use
2580-2599	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2600-2699	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2700-2799	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2800-2899	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
2900-2999	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area	Reserved for internationally harmonised national use
3000-3099	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3100-3199	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3200-3202	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3203	PublicAddress	On-Train Voice Communication towards passengers (Public Address)	Internationally harmonised for national use

Short Dialing Code	Functional Identity	FRMCS Application	Usage
3204-3299	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3300-3399	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3400-3499	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3500-3599	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3600-3699	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3700-3799	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3800-3899	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
3900-3999	-	Generic Voice Communication based on initiator’s Geographical Position with addressed area in broadcast mode	Reserved for internationally harmonised national use
4000-9999	-	For future use	-

Table M-1: Short Dialling Codes

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