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Functional Requirements Specification
for
enhanced Location Dependent Addressing

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EVOLUTION SHEET

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1. INTRODUCTION

1.1. Scope

This Functional Requirements Specification specifies the requirements for enhanced Location Dependent Addressing (eLDA) from a functional and performance perspective. The proposed eLDA solution shall fulfill the requirements as outlined below.

The implementation of eLDA is optional. If implemented, this specification is mandatory.

1.2. Background

Train drivers need to be able to contact controllers and other staff at the push of a single button. As the train moves through different areas, the required points of contact are liable to change. As a consequence it is necessary to provide a means of addressing calls from a train to certain functions based on the location of the train.

Within GSM-R, the basic means of determining the location of a train for the purpose of location dependent addressing is based on cell dependent routing. The EIRENE FRS and SRS mandate the minimum requirements for the current solution of LDA in FRS section 11.4 and SRS section 11.7.

It is recognised that the accuracy of cell dependent addressing is not sufficient for all operational scenarios. Several railways have therefore indicated that an enhanced system is required. To provide a greater degree of accuracy, additional information from (external) location information sources is necessary.

1.3. Objective

The objective of the eLDA FRS is to specify the functional requirements on the eLDA solution by providing:

1. A solution which improves the accuracy of the current system for Location Dependent Addressing;

2. Interoperability between railways;

3. Economies of scale if possible.

The eLDA Interface Requirements Specification (eLDA IRS) defines the system interface requirements.

1.4. References

Document Title	*Document Number*	*Issue*	*Date*	*Author*
EIRENE FRS	MDA 029D009	5.0	December 2000	EIRENE User Group
EIRENE SRS	MDA 029D010	13.0	December 2000	EIRENE Project Team
FFFS for Location Dependent Addressing	F 10 T 6001	3	July 2000	MORANE
FIS for Location Dependent Addressing	F 12 T 6001	2	July 2000	MORANE
eLDA IRS	LDA_WG162	4.0	December 2002	eLDA Working Group

1.5. Abbreviations and Definitions

ELDA	Enhanced Location Dependent Addressing
ERTMS	European Rail Traffic Management System
GSM-R	GSM for Railways
LDA	Location Dependent Addressing
SDC	Short Dialling Code
RBC	Radio Block Centre

2. FUNCTIONAL REQUIREMENTS eLDA

2.1. Definition

a. An eLDA call is defined as a call from a mobile user (typically a driver of a train) to a particular function (typically a controller), where the actual called party address is determined by the location of the calling party. (I)

2.2. eLDA scope

a. eLDA applies to the range of short codes as defined in the numbering plan of EIRENE for:

   - Primary controller;
   - Secondary controller;
   - Power supply controller;
   - Train control (e.g. RBC);

   Numbers for these functions are assigned in the numbering plan of EIRENE ([EIRENE SRS]). (M)

b. eLDA may be applied to other 4-digit EIRENE shortcodes (please refer to [EIRENE SRS] for a list). (O)

c. The called party address of an eLDA call is exclusively to be determined by the dialed Short Dialing Code (representing a particular function) and the location of the calling party at the time of calling. (M)

d. eLDA is applicable to mobile originated point to point voice and data calls initiated by a EIRENE mobile station that provides eLDA location information as specified in the eLDA IRS. (M)

e. eLDA is not applicable to: (I)

   - Railway emergency calls;
   - Group- and broadcast calls;
   - GPRS calls;
   - SMS message transfer.

f. eLDA system information (e.g. train location information) may be used by other railway applications such as passenger information systems, tracking and tracing systems and on-board ticket systems. (O)
   Remark: this is not a requirement which is within the scope of the eLDA specification (at the moment it is not covered in the EIRENE specification). (I)

g. eLDA location information is not intended to be used for safety critical railway applications. (I)

2.3. Operational aspects

a. eLDA call setup shall not require any additional manual action from a mobile user, in comparison with LDA call setup. (M)

b. The correspondence between the locations and the destination of the eLDA call shall be configurable to support dynamic changes in controller area boundaries (e.g. controller area boundaries will change from peak to off-peak periods during the working day or over longer periods, areas may change to match changes in railway organisation or traffic demand). (M)

c. The eLDA function shall not preclude cell dependent routing (cell dependent routing is specified in [EIRENE FRS] and [EIRENE SRS]). (M)

d. The eLDA function shall use cell dependent routing as a fall back mechanism in case of failure. (M)

3. PERFORMANCE REQUIREMENTS

a. eLDA will increase the call set up times for point to point calls and may exceed the times as identified in EIRENE. Note that these call set up times are optional in the EIRENE specifications. The call set up time required for eLDA is not relevant for achieving interoperability and is therefore a national issue. (I)

b. The location of the calling party at the time of issuing an eLDA call (as determined by the eLDA function) shall, at the border of controller and RBC areas, fulfill the following accuracy requirements:

   - The need to discreetly identity trains on different (possibly adjacent) tracks is a national matter. (I)
     The typical and minimum centre to centre distance between two tracks is respectively 4 and 3.34 metres. In case of rail over rail over crossings, the minimum distance in altitude is 5 metres. (I)

   - The longitudinal accuracy to be achieved is a national matter. (I)

   - The eLDA system shall be specified in such a way that it will be possible to transmit train location data over the air-interface with a granularity equivalent to a distance of 1 metre or better. (M)