I HEREBY APPROVE:

IVAYLO MOSKOVSKI
Minister of Transport, Information Technology and Communications

Round seal of the Ministry of Transport, Information Technology and Communications of the Republic of Bulgaria

Signature - illegible

Rectangular stamp:
Ministry of Transport, Information Technology and Communications

1000 Sofia, 9, Dyakon Ignatii Str., tel. 9409/603 568 662 650
Reg. No. 10-05-72 Date 05.07.17

NATIONAL IMPLEMENTING PLAN on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

June, 2017
Sofia
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbreviations</td>
<td>Page 3</td>
</tr>
<tr>
<td>Preamble</td>
<td>Page 5</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>Page 5</td>
</tr>
<tr>
<td>2. OBJECTIVE</td>
<td>Page 6</td>
</tr>
<tr>
<td>3. RATIONALE</td>
<td>Page 6</td>
</tr>
<tr>
<td>3.1. EUROPEAN AND NATIONAL POLICIES</td>
<td>Page 6</td>
</tr>
<tr>
<td>3.2. METHODOLOGY FOR DRAWING UP THE NIP</td>
<td>Page 17</td>
</tr>
<tr>
<td>4. CURRENT SITUATION</td>
<td>Page 18</td>
</tr>
<tr>
<td>4.1. CURRENT STATUS OF THE CCS SUBSYSTEM</td>
<td>Page 18</td>
</tr>
<tr>
<td>4.2. CURRENT STATUS OF THE SYSTEMS INSTALLED ON LINES AND ROLLING STOCK</td>
<td>Page 19</td>
</tr>
<tr>
<td>5. STRATEGY OF THE NATIONAL IMPLEMENTING PLAN ON THE TSI CCS</td>
<td>Page 25</td>
</tr>
<tr>
<td>5.1. SCOPE OF THE PLAN</td>
<td>Page 29</td>
</tr>
<tr>
<td>5.1.1. GEOGRAPHICAL SCOPE</td>
<td>Page 29</td>
</tr>
<tr>
<td>5.1.2. TECHNICAL SCOPE</td>
<td>Page 36</td>
</tr>
<tr>
<td>5.2. DEFINING A STRATEGY</td>
<td>Page 37</td>
</tr>
<tr>
<td>5.3. DESCRIPTION OF THE MEASURES TAKEN TO ENSURE OPEN MARKET CONDITIONS FOR THE LEGACY CLASS B TRAIN PROTECTION SYSTEMS</td>
<td>Page 39</td>
</tr>
<tr>
<td>6. FUNDING</td>
<td>Page 44</td>
</tr>
<tr>
<td>7. FOLLOW-UP AND FEEDBACK</td>
<td>Page 47</td>
</tr>
<tr>
<td>7.1. LIST OF ASSETS AND COMPARISON TO THE GOALS</td>
<td>Page 47</td>
</tr>
<tr>
<td>7.2. UPDATING THE PLAN</td>
<td>Page 48</td>
</tr>
<tr>
<td>8. CONCLUSION</td>
<td>Page 48</td>
</tr>
</tbody>
</table>
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>ABBREVIATION</th>
<th>FULL NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERTMS</td>
<td>European Rail Traffic Management System</td>
</tr>
<tr>
<td>ETCS</td>
<td>European Traffic Control System</td>
</tr>
<tr>
<td>GSM-R</td>
<td>Global system for mobile communications - Railway</td>
</tr>
<tr>
<td>ECTF</td>
<td>European Clean Transport Facility</td>
</tr>
<tr>
<td>CCS</td>
<td>Control, command and signalling</td>
</tr>
<tr>
<td>Decision 2012/88/EU</td>
<td>Commission Decision 2012/88/EU on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system</td>
</tr>
<tr>
<td>Decision 2012/696/EU</td>
<td>Commission Decision 2012/696/EU amending Decision 2012/88/EU on the technical specifications for interoperability relating to the control-command and signalling subsystems of the trans-European rail system</td>
</tr>
<tr>
<td>Decision 2015/14/EU</td>
<td>Commission Decision 2015/14/EU amending Decision 2012/88/EU on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system</td>
</tr>
<tr>
<td>Decision 2006/679/EC</td>
<td>Commission Decision 2006/679/EC on the technical specifications for interoperability relating to the control-command and signalling subsystems of the trans-European conventional rail system</td>
</tr>
</tbody>
</table>
### National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

<table>
<thead>
<tr>
<th>ABBREVIATION</th>
<th>FULL NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRIC</td>
<td>National Railway Infrastructure Company</td>
</tr>
<tr>
<td>TFEU</td>
<td>Treaty on the Functioning of the European Union</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>RTA</td>
<td>Railway Transport Act</td>
</tr>
<tr>
<td>IPDA</td>
<td>Integration of Persons with Disabilities Act</td>
</tr>
<tr>
<td>RAEA</td>
<td>Railway Administration Executive Agency</td>
</tr>
<tr>
<td>ICTS</td>
<td>Information and communication technologies and systems</td>
</tr>
<tr>
<td>ITS</td>
<td>Integrated Transport Strategy until 2030</td>
</tr>
<tr>
<td>MTITC</td>
<td>Ministry of Transport, Information Technology and Communications</td>
</tr>
<tr>
<td>NIP</td>
<td>National Implementing Plan</td>
</tr>
<tr>
<td>BP</td>
<td>Block post</td>
</tr>
<tr>
<td>IC</td>
<td>Interoperability constituents</td>
</tr>
<tr>
<td>TSI(s)</td>
<td>Technical Specification(s) for Interoperability</td>
</tr>
</tbody>
</table>
PREAMBLE

Definitions and terms in accordance with Commission Regulation (EU) 2016/919 of 27 May 2016 on the technical specification for interoperability relating to the ‘control-command and signalling’ subsystems of the rail system in the European Union are used in the National Implementing Plan on the technical specification for interoperability:

**TSIs** are the specifications which should be met by each subsystem or part thereof, in order to comply with the essential requirements and provide interoperability of the rail system.

Pursuant to **Regulation 2016/919**, the Control-Command and Signalling Subsystem shall include the following parts:
1. train protection;
2. voice radio communication;
3. data radio communication;
4. train detection.
The Class A train protection system is ETCS, whilst the Class A radio system is GSM-R.

1. INTRODUCTION

The National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystem (NIP CCS) was drafted pursuant to Article 6(4) and 6(5) of Regulation 2016/919.

The technical specification for interoperability shall apply to all new, upgraded or renewed ‘trackside control-command and signalling’ and ‘on-board control-command and signalling’ subsystems of the rail system as defined in points 2.3 and 2.4 of Annex II to Directive 2008/57/EC.

Regulation 2016/919, a recast of the Technical Specification for Interoperability relating to Control-Command and Signalling (TSI CCS), was drafted by the European Railway Agency (ERA) pursuant to Article 12 of Regulation 881/2004 of the European Parliament and of the Council and shall ensure that the TSIs are adapted to the technical progress, market trends and social requirements, as well as propose to the Commission the amendments to the TSIs which it considers necessary. Regulation 2016/919 entered into force on 5 July 2016.

Pursuant to the requirements of Regulation 2016/919, the NIP shall run over a period of at least fifteen years and shall be updated regularly, at least every five years.

This NIP is compliant with the strategic goals formulated in the Strategy for implementation of technical specifications for interoperability of conventional rail system in the Republic of Bulgaria, approved by the Minister of Transport, Information Technologies and Communications in September 2013, and, in particular, Annex No 6 Strategy for implementation of TSI Control-Command and Signalling (CCS) of the trans-European rail system. This TSI was adopted by Commission Decision 2012/88/EU of 25 January 2012 on the technical specification for
interoperability relating to the control-command and signalling subsystems of the trans-European rail system.

2. OBJECTIVE

Main objective
Establishing pre-conditions for ensuring a high level of safety of the transport process of the trans-European conventional rail system, high level of safety of the transported haulage and passengers, the service staff, the technical equipment, the environment and the people who are in the area of this process. One of the key positions in ensuring the safety of the transport process of the trans-European conventional rail system is taken by the control-command and signalling subsystem.

Specific objectives:
First specific objective
Establishing pre-conditions for ensuring technical and operational compatibility of the on-board equipment of the CCS system, which is installed on the rolling stock, property of Bulgarian railway undertakings, with the control-command-signalling-track-side assembly of the trans-European conventional rail system.

Second specific objective
Establishing pre-conditions for ensuring technical and operational compatibility of the track-side assembly of the CCS system with the on-board equipment of the rolling stock of the European carriers that have access to the national railway infrastructure, including elimination of the differences in the road signs of the railway administrations of the EU member states.

3. RATIONALE

The identification of the national railway lines, included in the National Plan of the Republic of Bulgaria for deployment of ERTMS, follows the development plans with regard to the railway infrastructure in the country, in accordance with the following main strategic documents, developed at European and national level.

3.1. EUROPEAN AND NATIONAL POLICIES

Europe 2020 strategy

In 2010, the European Council endorsed the Europe 2020 strategy, proposed for tackling the financial crisis and preparing the European economy for the challenges of the next decade. The document offers specific actions at European and national level for the achievement of high levels of employment, low-carbon economy and social and territorial cohesion.

Three mutually reinforcing priorities have been set:

- **Smart growth** - developing an economy based on knowledge and innovation
- **Sustainable growth** - promoting a more resource efficient, greener and more competitive economy.
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

- **Inclusive growth** - fostering a high-employment economy delivering social and territorial cohesion.

Five **headline targets** have been defined at EU level for the achievement of the priorities:

- 75% of the population aged 20-64 should be employed;
- 3% of the EU's GDP should be invested in R&D;
- The ‘20/20/20’ climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right);
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree;
- 20 million less people should be at risk of poverty.

To ensure that each member state tailors the Europe 2020 strategy to its particular situation, EC proposes that EU goals are translated into national targets and trajectories.

**White Paper 2011 Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system**

The document outlines the long-term strategy of the EU for development of the transport sector by 2050 and focuses on the reduction of harmful emissions and transport perspectives within the context of the Europe 2020 strategy, without prejudice to mobility.

The EC roadmap reviews the challenges in the sector, provides a vision with a rather ambitious horizon by 2050, sets out ten goals with regard to policymaking, and proposes a list of forty specific initiatives to achieve the goals.

**The goals** have been defined according to the type of transport and include the following:

- The policy with regard to **urban transport** is aimed at using cleaner and efficient vehicles, and cleaner fuels, providing for:
  - a 50% decrease in the number of conventionally-fuelled cars by 2030 and their phasing out in cities by 2050
  - the creation of a CO2-free city logistics in major urban centres by 2030
  - the halving of road casualties by 2020 and moving this number close to zero in 2050.
- With regard to passenger and freight **intercity transport**, it provides for:
  - a decrease in the share of road transport; 50% of all medium-distance transport should shift to rail and waterborne transport;
  - by 2050 the majority of medium-distance passenger journeys over 300 km should be undertaken by rail transport;
  - 30% of road freight over 300 km should shift to rail or waterborne transport by 2030, and more than 50% by 2050.
- With regard to **long-distance and intercontinental transport**, air and maritime transport will continue to dominate, and, therefore, the focus is placed on the new engines and traffic management systems, in order to increase efficiency and reduce harmful emissions:
  - low-emission fuels in aviation should reach 40% by 2050; also by 2050, the emissions from maritime bunker fuels should be reduced by 40%;
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

- complete modernisation of Europe's air traffic control system by 2020 and completion of the Single European Sky and the European Common Aviation Area;
- deployment of intelligent land and waterborne transport management systems (ERTMS, ITS, RIS, SafeSeaNet, LRIT, etc.).

Guidelines for the development of the trans-European transport network

The development of an efficient trans-European transport network (TEN-T) is a key element of the Lisbon Strategy for competitiveness and increase in the number of jobs on the continent. If Europe wishes to realise its economic and social potential, it is essential for it to build the missing connections, remove the narrow sections of its infrastructure and ensure sustainability of the transport network in the future.

Due to the increasing traffic between member states, which is expected to double in 2020, the investments necessary for the modernisation and development of an adequate TEN-T, which meets the needs and the expansion of the EU, will amount to EUR 550 billion in the period 2010-2030, out of which some EUR 215 billion are designated to priority axes and projects. Given the scale of the investments, it is extremely important to prioritise the projects which are implemented in close cooperation with national governments, guaranteeing efficient cooperation at European level.


This Regulation establishes guidelines for the development of a trans-European transport network comprising a dual-layer structure consisting of the comprehensive network and of the core network, the latter being established on the basis of the comprehensive network. It identifies projects of common interest and specifies the requirements to be complied with for the management of the infrastructure of the trans-European transport network.

The core network, which consists of the most important international connections that shall be realised by 2030 and the comprehensive network which shall ensure full coverage on the territory of the EU and access to all regions, shall be completed by 2050. The two layers cover all types of transport: road, railway, air, maritime and inland waterway transport, as well as intermodal platforms. The implementation of the core network will be facilitated using a corridor approach, under which nine corridors will provide the basis for the co-ordinated development of the infrastructure.
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

Map 1. Core TEN-T Network, including railway infrastructure, ports and terminals
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

Map 2. Map of the trans-European railway network on the territory of the Republic of Bulgaria

On the territory of Bulgaria, the following axes are part of the TEN-T core railway network:

- Vidin – Sofia – Kulata;
- Dragoman (Serbian border) – Sofia – Plovdiv – Burgas/Svilengrad (Turkish/Greek border);
- Sofia – Radomir – Gyueshevo (Macedonian border);
- Sofia – Mezdra – Gorna Oryahovitsa;
- Ruse – Stara Zagora – Dimitrovgrad.

In addition to the axes of the core network, the following axes, part of the TEN-T comprehensive network, have also been identified:

- Ruse – Varna;
- Gorna Oryahovitsa – Varna;
- Karnobat – Sindel.
Core network sections of cross-border nature
Railway axis Sofia – Serbian border
Railway axis Sofia – Macedonian border
The rail and road terminals of the core network on the territory of the Republic of Bulgaria are: Gorna Oryahovitsa, Plovdiv, Ruse and Sofia; and Dragoman and Svilengrad are part of the comprehensive network.

Map 3. Map of Orient/East-Med Corridor

Multiannual Financial Framework 2014-2020

On 29 June 2011, the EC adopted a proposal for the next multiannual financial framework for the period 2014-2020: ‘A Budget for Europe 2020’, which provides for the creation of a new integrated instrument for investing in EU infrastructure priorities in Transport, Energy and Telecommunications: the ‘Connecting Europe Facility’ (CEF). Subsequently, on 19 October 2011, the Commission approved a proposal for a Regulation on the creation of CEF (with a total budget of EUR 50 billion), which will replace the current Regulation No 680/2007 on the trans-European transport and energy networks.

National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

The transport funding provided for the period 2014-2020 amounts to EUR 31.7 billion (includes EUR 10 billion ring fenced in the Cohesion Fund for transport projects in the cohesion countries); it will be used to support:

- Priority projects along the nine corridors for implementation of the core network (described in an annex to the Regulation);
- Horizontal projects in the core network related to the implementation of new technologies and innovations (SESAR, ERTMS, etc.).


The aim of the Regulation is the establishment of international rail corridors on which freight trains can run under good conditions and easily pass from one national network to another. The Regulation provides for the cooperation and coordination between member states and the respective infrastructure managers, and between member states and European third countries, if necessary. It places emphasis on the creation of additional administrative simplifications for railway operators like Corridor One-Stop Shop (C-OSS). The document defines nine initial rail freight corridors. The track-side of freight corridor Orient/East-Med passes through the Republic of Bulgaria: Prague – Vienna/Bratislava – Budapest/Bucharest – Constanta/Vidin – Sofia – Thessaloniki – Athens. During the negotiations on the trans-European transport network, the track-side of the corridor on the territory of Bulgaria was further completed with the axis Sofia – Plovdiv – Burgas/Svilengrad – Turkish border. Since the beginning of 2015, an alternative track has also been included on our territory (Ruse-Sindel-Karnobat-Nova Zagora-Simeonovgrad-Svilengrad), on which corridor trains can run.
EUROPEAN RAIL TRAFFIC MANAGEMENT SYSTEM (ERTMS) EUROPEAN DEPLOYMENT PLAN

The European Union strongly supports the deployment of a wide ETCS and GSM-R network along the corridors of the trans-European transport network (ETCS-Net). This will ensure continuity of the signalling and information services and will in this way generate considerable benefits for the users of railway networks, through a radical technological change.

EC’s Decision of 28 March 2006 on the interoperability relating to the control-command and signalling systems of the conventional rail system required the preparation and adoption of an ERTMS European Deployment Plan, based on the national plans for development of ERTMS, drawn up by the member states. These national plans were submitted to the EC in the autumn of 2007.

The ERTMS European Deployment Plan (approved by Commission Decision C (2009) 5607 of 22 July 2009) provides for the equipment of significant parts of six ERTMS corridors by 2015 and the equipment of the remaining sections by 2020. The document also includes the connection of many main freight centres and terminals. By 2020 all main freight areas in Europe are projected to be equipped with ERTMS, as part of an interconnected and interoperable system.

In parallel, the objective of the document is to ensure that, gradually, locomotives, multiple units and other railway vehicles equipped with ERTMS can have access to an increased number of
National Implementing Plan on the technical specification for interoperability relating
to the ‘control, command and signalling’ subsystems of the rail system in the European Union

lines, ports and marshalling yards without needing national signalling equipment in addition to
ERTMS. Currently, it does not require the removal of the existing national ALS systems (known
as class B systems) on the lines included in the plan. However, by the date specified in the
European Deployment Plan, equipment with a Class B system shall not be a track access
condition to lines included in the deployment plan for locomotives, multiple units and other
railway vehicles equipped with ERTMS.

Commission Implementing Regulation (EU) 2017/6 on the European Rail Traffic Management
System European deployment plan was adopted in view of the update of the timetable for the
deployment of the ERTMS on railway networks, in order to take into account the state of
ERTMS deployment made by the member states.

The update of the deadlines for deployment of the ERTMS on the corridors of the TEN-T core
network will help provide a clearer vision for the availability of ETCS along the entire European
network for all railway operators and will allow them to better plan the investments related to the
provision of on-board equipment for ERTMS.

Pursuant to Commission Decision of 22 July 2009 (amending Decision 2006/679/EU), all new
locomotives and multiple units, ordered after 1 January 2012 or which were planned to be put
into service after 1 January 2015, shall be equipped with on-board equipment for ERTMS. This
requirement does not apply to new shunting locomotives or to other new locomotives and
multiple units, if they are designated exclusively to national service.

WORK PLANS FOR ERTMS

Pursuant to Article 47 of Regulation (EU) 1315/2013 of the European Parliament and of the
Council on Union guidelines for the development of the trans-European transport network, two
work plans for ERTMS were developed in close cooperation between the consultants and the
member states and representatives of the stakeholders.

Key focus during the discussion of both work plans for ERTMS was the drawing up of one
realistic and binding European plan for deployment of ERTMS, which should replace the
existing Deployment Plan of 2009.

The second work plan (approved in December 2016) indicates and includes specific time
horizons for deployment of ERTMS on the corridors of the TEN-T core network. The plan
reviews the main principles that should be laid down in the new deployment plan and presents
three scenarios that outline the economic benefits of the deployment of the ERTMS.
Strategy and ERTMS National Deployment Plan in the Republic of Bulgaria

In 2012, the Minister of Transport, Information Technology and Communications approved the Strategy and National Plan for Deployment of the European Rail Traffic Management System (ERTMS) in the Republic of Bulgaria.

The strategy defines the priority axes and the respective railway lines/sections of the rail infrastructure of the Republic of Bulgaria, on which deployment of ERTMS should be envisaged.

When determining the priority axes, the following have also been considered: the possibilities of the Republic of Bulgaria to provide financial resources for the short- and mid-term implementation of the plan, the level of preparation and the plans for implementation of the investment projects for modernisation and rehabilitation of the railway network, the problems related to the implementation of investment projects in the country, the traffic forecasts, etc.

**Priority axes of overriding European interest:**

Axis Vidin-Sofia-Kulata

Axis Kalotina-Sofia-Plovdiv-Svilengrad-Kapikule

Axis Plovdiv-Karnobat-Burgas
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

Priority axes of general European interest:

Railway lines Radomir-Gyueshevo, Mezdra-Gorna Oryahovitsa and Karnobat-Sindel

Axis Ruse-Gorna Oryahovitsa-Stara Zagora-Dimitrovgrad

Axis Ruse-Kaspichan-Sindel-Varna

Priority axes of national interest:

Axis Sofia-Karlovo-Zimnitsa

Railway line Gorna Oryahovitsa-Kaspichan

National Development Programme: Bulgaria 2020

The National Development Programme: Bulgaria 2020 (NDP BG2020) is the leading strategic and programming document detailing the objectives of the development policies of the country by 2020. The vision, objectives and priorities of NDP BG2020 are defined on the basis of a socioeconomic analysis drawn up for this purpose, as well as the submissions received as a result of the public discussions at each stage of the drafting of the document. The formulated objectives of the government policies will ensure the achievement of accelerated economic growth and raising the standard of living of the Bulgarian citizens in the medium and long term.

The document was drawn up in 2012 and was approved by Decision No 1057/27.12.2012 of the Council of Ministers. Priority 8 ‘Improving transport connectivity and access to markets’ sets the main priorities and measures in the transport sector, as a part of the economic development of the country by 2020. Triennial action plans have been drafted for the implementation of the NDP: Bulgaria 2020, respectively, for the periods 2014 – 2016 and 2015 – 2017.

Integrated Transport Strategy for the period until 2030

The Integrated Transport Strategy for the period until 2030 represents a comprehensive plan for sustainable development of the transport system of the Republic of Bulgaria and a framework for investments in transport. The document complies with the requirements for the scope, structure and content of a comprehensive transport plan and complies with the applicable thematic prerequisites for ESIF for the period 2014-2020, undertaken as a commitment in the Partnership Agreement with the Republic of Bulgaria. The strategy defines the contribution of the Republic of Bulgaria to the Single European Transport Area, in accordance with the general priorities under Article 10 of Regulation (EU) No 1315/2013 of the European Parliament and of the Council, including priorities for investments in the core and comprehensive TEN-T network and in secondary connectivity.
EUROPEAN REGULATORY FRAMEWORK

The European framework of the Strategy provides for the creation of an interoperable rail backbone between European countries (called ETCS-Net) which enables the development of new and improved quality rail services that can ultimately heighten the competitive profile of rail transport, notably in those market segments of major growth potential — e.g. international freight transport.

- Commission Decision 2012/88/EU on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system;
- Commission Decision 2012/696/EU amending Decision 2012/88/EU on the technical specifications for interoperability relating to the control-command and signalling subsystems of the trans-European rail system;
- Commission Decision 2015/14/EU amending Decision 2012/88/EU on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system;
- Commission Decision 2006/679/EC on the technical specifications for interoperability relating to the control-command and signalling subsystems of the trans-European conventional rail system;
- Commission Regulation (EU) 2016/919 on the technical specification for interoperability relating to the ‘control-command and signalling’ subsystems of the rail system in the European Union;

NATIONAL LEGAL FRAMEWORK

The main laws, which are directly attributable to the issues related to the realisation of the strategy, are:
- Railway Transport Act;
- Spatial Development Act;
- Technical Requirements to Products Act;
- Occupational Health and Safety Act, etc.

A number of important issues are regulated in some regulations of national significance like:
- Regulation No 3 on the structure of electrical installations and electricity lines of the Ministry of Energy and Energy Resources;
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

- Regulation No 4 on railway level crossings of the Ministry of Transport and the Ministry of Interior (MoI);
- Regulation No 2 on fire-construction – technical norms of the Ministry of Regional Development and Public Works (MRDPW) and MoI;
- Regulation No 69 on the signs and signals for occupational safety and fire protection of the Ministry of Labour and Social Policy (MLSP) and MoI, etc.
- Regulation No 55 on the design and construction of railway lines, railway stations, railway level crossings and other rail infrastructure elements;
- Regulation No 58 on the rules for technical operation, movement of trains and railway signalling;
- Regulation No 54 on the medical and psychological requirements for staff engaged in the rail transport of passengers and goods and in activities accompanying that transport and on the examinations conducted prior to departure (prior to shift duty).

3.2. METHODOLOGY FOR DRAWING UP THE NIP

The National Implementing Plan was drawn up in compliance with item 7.4.4. ‘National Implementation Plans’ of Regulation 2016/919.

Experts from the RAЕA, MTITC, NRIC and railway undertakings have worked on the NIP.

The National Implementing Plan is linked to the Strategy for implementation of the TSIIs for the conventional rail system in the Republic of Bulgaria (2013-2030), approved by the Minister of Transport, Information Technology and Communications in September 2013, and more specifically, its Annex No 6 Strategy for implementation of TSI Control-Command and Signalling (CCS) of the trans-European rail system, where the TSI concerned was adopted by Commission Decision 2012/88/EU of 25 January 2012 on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system.

4. CURRENT SITUATION

This section reviews the existing situation and the status of both railway infrastructure and railway vehicles (locomotives and multiple units), and only in respect of the possibility and readiness for deployment of the ERTMS as a whole and by separate/main system components.

The main components of the system are the following:

**GSM-R**, which is a radio system, based on a GSM standard, using different frequencies that are set for the railways, as well as a number of additional and specific functions. It is a radio system which is used for exchange of information (voice communication and data) between the track and the train.
ETCS (European Train Control System), known as Automatic Locomotive Signalling. A computer located in the locomotive, Eurocab, compares the train speed, as indicated by the track, with the maximum speed allowed and automatically slows down the train (or stops it), if this speed is exceeded. That is why ETCS is also called System for Automatic Train Speed Adjustment.

ETCS and GSM-R are computer-based systems with more rapid technological evolution and with potentially shorter life expectancy in comparison with traditional signalling and telecommunication systems and devices. This calls for a proactive deployment strategy to avoid potential system obsolescence prior to system deployment reaching maturity levels.

ETML (European Traffic Management Layer) is an application for rail traffic management designed to optimise train movement through ‘intelligent’ interpretation of timetables and data for the actual movement of trains. It includes enhanced traffic planning and management in real time.

4.1. CURRENT STATUS OF THE CCS SUBSYSTEM

The rail infrastructure manager – NRIC manages 297 stations, 16 block posts (BP) and 380 stops as at 30.06.2016; out of them, 279 stations, 7 BPs and 380 stops are open for passenger traffic.

The requirements of TSI CCS are complied with in stages upon realisation of the projects implemented by the NRIC, included in the Operational Programme ‘Transport’ and financed by EU funds, upon construction of new stations or modernisation of new or existing stations.

4.2. CURRENT STATUS OF THE SYSTEMS INSTALLED ON LINES AND ROLLING STOCK.

TRACKSIDE SYSTEMS

In accordance with the Annexes to the Technical Specification for Interoperability relating to Control-Command and Signalling (CCS), the existing Class A and Class B systems are:

- The sections Sofia – Septemvri and Plovdiv – Stara Zagora – equipped with the EBICAB – 700 system (TSI CCS Annex B) – length of the line 184 km
- The sections rail node Plovdiv and Stara Zagora – Burgas – equipped with the ETCS system Level 1 (SRS ver. 1.2.0/1998) – length of the line 233 km
- The section Plovdiv – Svilengrad – ETCS Level 1 (SRS ver. 2.3.0d) and GSM-R for voice communication are fitted – 143 km
- The section Septemvri – Plovdiv – ETCS Level 1 is fitted (SRS ver. 2.3.0d) – length of the line 53 km
- The section Sofia – Plovdiv – GSM-R for voice communication is fitted – length of the line 155 km
- The main railway lines – equipped with train radio, analogue, at a frequency of 450 MHz (TSI CCS Annex B Bulgarian radio system) – 1950 km.
Currently, the System for Automatic Train Speed Adjustment (ALS – Automatic Locomotive Signalling) exists along the railway axis Sofia – Plovdiv – Stara Zagora – Burgas. An ALS system, type JZG 703, by ERICSSON, Sweden, based on a 12-bit balise (track inductor), began operation along the Sofia – Plovdiv section in 1985. The section Plovdiv – Stara Zagora (excluding Plovdiv node) is equipped precisely with balises, production absorbed by ZAT-Sofia of the balises of the JZG 703 system.

The section Stara Zagora-Burgas and rail node Plovdiv are equipped with an ETCS system Level 1, with a commercial name ALTRACS BDZ. The system is supplied by ALKATEL, Austria; the project is financed under the PHARE Programme. The ALTRACS BDZ system is version 1.2.0/1998 – this is the version of the System Requirements Specification (SRS), existing at the time of signing of the contract.

The project ‘Reconstruction and electrification of the railway line Plovdiv-Svilengrad-Turkish/Greek border’ and optimization of the line for speed of 160 km/h’ was completed. The project was implemented by distributing the activities both by type of work and on a geographical basis. Tests were performed and interoperability certificates are to be issued for the activities under the Systems phase, which also include deployment of ERTMS (ETCS Level 1 + GSM-R).

The status of the remaining projects related to the deployment of ERTMS is the following:

- **Railway line Plovdiv – Burgas** – two technical assistance projects, related to ERTMS elements, are completed, and namely: ‘Technical Assistance for laying fiber optic cable along the Plovdiv-Burgas railway line’ and ‘Technical Assistance for development of the additional computer interlocking along the Karnobat - Burgas railway section’. The scope of the technical assistance projects include an update of the existing ALS, the development of an optic cable, GSM-R and 28 computer interlockings, whereas all activities related to the security systems are included under the ‘Rehabilitation of the Plovdiv – Burgas railway line, Phase 2’ project, which will be financed under the Operational Programme ‘Transport and Transport Infrastructure’ (OPTTI).

- **Railway line Vidin – Sofia** – the project ‘Technical Assistance for modernisation of the Vidin-Sofia railway line’ was developed and it has been completed. Construction in the Vidin-Mezdra /Ruska byala/ section is envisaged for the period after 2020. ETCS Level 1 + GSM-R has been set.

- **Railway line Sofia-Plovdiv** - the project ‘Technical Assistance for modernisation of the Sofia-Plovdiv railway line’ was developed. The Septemvri – Plovdiv section was completed under the OPT 2007-2013 and computer interlocking and ETCS Level 1 have been developed under it. Under the same project, GSM-R was developed for the entire track Sofia-Plovdiv. ETCS Level 1 for the Sofia – Septemvri section will be developed under OPTTI in the period 2018-2023.

- **Railway line Sofia-Dragoman** – the project ‘Technical Assistance for modernisation of the Sofia-Dragoman railway line’ was developed. Construction work for the Sofia section, including Central Station – Voluyak, is envisaged for the period 2014-2020. The section
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

from Voluyak to Serbian border in currently being designed; it is planned to be developed after 2020.
ETCS - Level 1 + GSM-R has been set.

- **Railway line Sofia – Pernik – Radomir** - the project ‘Technical Assistance for modernisation of the Sofia – Pernik - Radomir railway line’ is being developed, which includes deployment of ERTMS Level 1 along the entire line. Construction work is envisaged for the period 2021-2027.

- **Railway line Radomir – Gyueshevo** – the conceptual design for the ‘Technical Assistance for modernisation of the Radomir – Gyueshevo railway line’ project was developed; it has been completed. A technical project is to be drawn up, which includes deployment of ERTMS Level 1 along the entire line. Construction work is envisaged for the period after 2027.

- **Railway line Ruse – Varna** - the project ‘Technical assistance for restoration of design parameters along Ruse-Varna railway line’ was developed; it has been completed.
ETCS - Level 1 + GSM-R has been set.

- **Railway line Karnobat – Sindel** – the project ‘Doubling and electrification of the Karnobat-Sindel railway line’ was developed. The project has been completed and the site is in an advanced stage of construction by rail, and currently activities are frozen due to lack of financial resources.
ETCS - Level 1 with GSM-R has been set.

For the purposes of the technical and financial assessment for the deployment of the ERTMS under all of the above projects, assumptions have been made to maintain the ETCS application level to Level 1, under the technical assistance projects drawn up, as well as for the construction contracts that are currently being implemented or are to be signed.

The following map shows the railway axes, covered by the abovementioned projects related to the deployment of the ERTMS.
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

Map 6. Main railway axes, covered by projects related to the deployment of the ERTMS

<table>
<thead>
<tr>
<th>Route Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vidin – Sofia – Radomir ETCS Level 1 and GSM-R</td>
</tr>
<tr>
<td>Kalotina – Sofia – Plovdiv – Svilengrad – Kapikule ETCS Level 1 and GSM-R</td>
</tr>
<tr>
<td>Plovdiv – Karnobat – Burgas/Sindel ETCS Level 1 and GSM-R</td>
</tr>
<tr>
<td>Ruse – Varna ETCS Level 1 and GSM-R</td>
</tr>
<tr>
<td>Radomir – Gyueshevo ETCS Level 1 and GSM-R</td>
</tr>
</tbody>
</table>
The allocated locomotive fleet is significantly obsolete, with 70% of it being older than 30 years and 37% of them are more than 40 years old. Locomotive maintenance is getting harder due to the closing of specialized plants (Railway Factory – Sofia and LVZ – Ruse), which were undergoing major renovations. This led to an accumulation of considerable delays in scheduled maintenance in the past years. There are delays and difficulties related to the supply of spare parts and deliveries of original spare parts are almost suspended. Also, as a result of sudden breakdown of massive and expensive main units, locomotives are being decommissioned for an extended period of time and they are sidelined temporarily (on a monthly basis) and on an annual
basis, and no repairs are performed on them. Locomotives in poor technical condition are scrapped or put up for sale.

Considering the number of rolling stock which is not operational due to repairs, expected repairs or sidelining, BDZ – PP EOOD uses around 44% of its locomotives and multiple units to realise locomotive traction.

The shortage of working locomotives forces BDZ-PP EOOD to rent for its operational activity against payment serviceable locomotives whose technical resource is not exhausted, property of BDZ-TP EOOD.

This circumstance creates the following specific priorities for BDZ-PP EOOD: investment of funds for major repairs, which are set in the business plan of the company, and gradual decommissioning of some series tractive rolling stock that are more than 35-40 years old and completely obsolete.

**AVAILABLE ON-BOARD EQUIPMENT OF THE TRACTIVE ROLLING STOCK, PROPERTY OF BDZ-PASSengers EOoD, FOR THE ERTMS/ETCS SYSTEM OR OTHER SYSTEMS;**

As of February 2017, the number of tractive rolling stock of BDZ-PP EOOD, which are equipped with ERTMS/ETCS, is as follows:
- ERTMS/ETCS system, Level 1, version 1.2.0 (ALTRACS – BDZ) with integrated internal specific transmission module STM – **38 pcs.**;
- ERTMS/ETCS system, Level 1, version 2.3.0 d – 1 pc. (locomotive No 46211)

In order to guarantee controlled train movement in the Plovdiv – Svilengrad section (version ETCS V.2.3.0 d) (because the scope of the project does not provide for the equipment of a train rolling stock), in 2009 MTITC applied for funding from the EU budget under the TEN-T programme for upgrade of the existing system (trackside and on-board equipment), which should ensure the safe and controlled movement of locomotives, currently equipped with ETCS V.1.2.0, in the Plovdiv – Svilengrad section, as well as of railway vehicles, equipped with version ETCS V.2.3.0 d (current interoperability standard) and with the updated version 3.0.0., on the railway line in the Plovdiv (Stara Zagora) – Burgas section, which is equipped with ETCS V.1.2.0. The application was rejected and this issue is still pending. Other possible solutions will be sought.
On-board equipment for tractive rolling stock ETCS and GSM-R

Currently, the status of the fleet of main line electrical and diesel locomotives, electrical and diesel multiple units of BDZ-PP EOOD with regard to Automatic Locomotive Signalling equipment is as follows:

<table>
<thead>
<tr>
<th>Tractive rolling stock</th>
<th>Available fleet</th>
<th>Equipped with ETCS version 1.2.0</th>
<th>Equipped with ETCS Level 1, version 2.3.0 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Electric locomotives</td>
<td>92 pcs.</td>
<td>26 pcs.</td>
<td>-</td>
</tr>
<tr>
<td>Series 43, 44 and 45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Electric locomotives</td>
<td>18 pcs.</td>
<td>11 pcs.</td>
<td>1 pc.</td>
</tr>
<tr>
<td>Series 46 200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Diesel locomotives</td>
<td>13 pcs.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Series 07</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Electrical multiple units</td>
<td>25 pcs.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>series 30/31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Diesel multiple units series</td>
<td>25 pcs.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>37 pcs.</td>
<td></td>
<td>1 pc.</td>
</tr>
</tbody>
</table>

The current on-board equipment (ETCS, version 1.2.0) was installed in 1999 and is designed to combine compatibility of the STM (specific transmission module) functions for interaction with JZG 703 and ETCS trackside equipment – Level 1 of the ALTRACS system along the Sofia – Plovdiv – Burgas line. In order to guarantee controlled train movement in the Plovdiv – Svilengrad section (equipped with ETCS, version 2.3.0 d), it is necessary to install completely new on-board equipment on the TRS, since the existing on-board equipment (ETCS, version 1.2.0) cannot be upgraded and the two systems are incompatible. In the period until 2020, which is transitional in the development of the Automatic Locomotive Signalling, there will be lines equipped with different systems or versions.

AVAILABLE ON-BOARD EQUIPMENT OF THE TRACTIVE ROLLING STOCK, PROPERTY OF BDZ – CARGO EOOD

The locomotive fleet of BDZ – Cargo EOOD consists mainly of diesel and electric train locomotives series 06.000, 07.000, 55.000, 42.000, 43.000, 44.000, 45.000 and 46.000, diesel and electric shunting locomotives series 51.000, 52.000 and 61.000.
The locomotives property of BDZ – Cargo EOOD, which are equipped with the automatic locomotive signalling (ALS) system ALTRACS-BDZ, ETCS – Level 1 is installed on electric train locomotives series 46.000.
Full description of the ALTRACS-BDZ system, as well as the rules and method of operation of the standard and conversed on-board equipment of the system are given in the ‘Driver’s manual’
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

– document 3 BU 81200 1220 TCAPZ, based on which in BDZ – Cargo EOOD was drawn up and approved an ‘Instruction for operation and maintenance of the on-board equipment of the automatic locomotive signalling system ALTRACS-BDZ ИТПС 701-2/15’.

AVAILABLE ON-BOARD EQUIPMENT OF THE TRACTIVE ROLLING STOCK, PROPERTY OF OTHER RAILWAY UNDERTAKINGS

Private freight railway undertakings do not have rolling stock, which have available operating on-board ETCS and GSM-R equipment.

An exception is Rail Cargo Carrier – Bulgaria EOOD, which uses electric locomotives SIEMENS ES64 U2 for its operations, which are equipped with ETCS Level 2 that includes: Indusi80 modified for V4, as well as with a continuous locomotive signalling system – a linear type LZB with integrated train auto-stop spot system – PZB I 80 (PZB 90 system) for V5.

In their activity, Rail Cargo Carrier – Bulgaria EOOD ensures the movement of the international freight trains of Rail Cargo Group Austria on the territory of the Republic of Bulgaria. The Siemens ES64 U2 locomotives – 44 pcs., rented by Rail Cargo Carrier – Bulgaria EOOD for the operation of these trains, are property of ÖBB PRODUKTION GmbH-Austria; they enter with trains from Romania and leave the Bulgarian territory once again with trains in the opposite direction. Usually, one locomotive entering Bulgaria operates two trains.

Currently, 2 ÷ 3 locomotives are used every day and an average of 18 ÷ 22 locomotives is used monthly. The locomotives have additional authorisations for placing in service in the Republic of Bulgaria, but they run with the ETCS and GSM-R on-board equipment switched off.

5. STRATEGY OF THE NATIONAL IMPLEMENTING PLAN ON THE TSI CCS

This NIP is compliant with the strategic goals formulated in the Strategy for implementation of technical specifications for interoperability of conventional rail system in the Republic of Bulgaria, approved by the Minister of Transport, Information Technologies and Communications in September 2013, and, in particular, Annex No 6 Strategy for implementation of TSI Control-Command and Signalling (CCS) of the trans-European rail system, adopted by Commission Decision 2012/88/EU of 25 January 2012 on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system, and in compliance with the Integrated Transport Strategy for the period until 2030.

MIGRATION STRATEGY DEVELOPMENT

Based on this National Plan for deployment of ERTMS, it is necessary to define:

- A migration strategy, which sets the conditions for transition of the existing infrastructure and rolling stock subsystems to the respective ERTMS level, without violating safety requirements.
- Possible limitations, which may influence the implementation of the plan for deployment of the ERTMS.
Infrastructure and railway vehicle subsystems to which the migration strategy should be applied

The existing signalling system Class B (EBICAB 700), installed along the Sofia – Plovdiv – Stara Zagora section, should be upgraded to ERTMS/ETCS Level 1 by 2020.

During the migration phase, when the signalling system Class B will be replaced by a unified system Class A, the engineering structures will be managed in compliance with the safety and interoperability requirements. This is the responsibility of the NRIC, in cooperation with the supplier of the respective system, in accordance with the TSI for Control-Command and Signalling for the trans-European high-speed and conventional rail systems.

The existing ETCS L1 version 1.2.0 (ALTRACS) along the Stara Zagora – Burgas section will have to be upgraded, in order to comply with the ETCS baseline for interoperability.

Strategy for replacement of the rolling stock of BDZ-PP EOOD;

In 2012, an expert board carried out a feasibility study for the delivery of a new rolling stock for the provision of passenger transport, by type and technical parameters. Following an in-depth analysis of the currently effective Train Timetable, the prospects for development of the railway infrastructure in the 2016-2022 period and the possibilities in this regard for the development of passenger transport, the expert board has determined the following train categories:

1. Suburban passenger trains operating up to 50 km.
2. Regional passenger and fast trains operating up to 200 km.
3. Fast and express daily trains – intercity trains operating over 200 km.
4. Night and international trains.

In order to reduce operating costs and drastically improve the transport service offered, when determining the rolling stock necessary to cover the Train Timetable, the following has been set: an increase in the share of multiple units for realisation of passenger transport, with a tendency, after a delivery of new multiple unit-type rolling stock, for the locomotives and coaches to service up to 30% of the total number of trains.

NRIC’s Programme for rehabilitation of the railway network by 2020 provides for modernisation of the Septemvri-Plovdiv railway section – part of the trans-European railway network; ‘Reconstruction and electrification of the Plovdiv-Svilengrad railway line along corridors IV and IX’ and ‘Rehabilitation of railway infrastructure along sections of the railway line Plovdiv – Burgas’. The main goal is to increase the speed along the railway track up to 160 km/h for conventional passenger trains.

The upgrade and modernisation of the rolling stock is essential for the operation of long-distance transport. Currently, this transport is made only by conventional rolling stock (locomotives with coaches). In BDZ – Passengers EOOD there is a great shortage of locomotives which are suitable
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

for servicing the Train Timetable, as well as passenger coaches which comply with the European standards for quality, comfort and safety. The new rolling stock will be used exclusively for suburban transport services along the busiest and modernised sections of the railway network – Line I (Sofia – Plovdiv – Svilengrad) and Line VIII (Plovdiv – Burgas).

One of the long-term measures set by BDZ – Passengers EOOD to ensure the servicing of the Train Timetable and improve the quality of the service offered is the purchasing and supply of new rolling stock, which should be equipped with on-board equipment for the ETCS system, Level 1, version 2.3.0 d and the GSM-R system.

BDZ – Cargo EOOD is part of the Group of the Holding BDZ EAD. The investment programme of the ‘Restructuring and development plan of the Group of the Holding BDZ EAD’ for the 2015-2020 period, developed in March 2015, does not provide for cash flows for delivery and assembly of modern on-board locomotive equipment for deployment of ETCS.

The investment programme for the period 2016-2022 envisages cash flows for the modernisation of 19 locomotives and overhaul of 42 locomotives.

The locomotive fleet necessary for operation is 95 pieces with reconditioning of 61 locomotives, i.e. the technical safety of the operational fleet will be increased by 64%.

The funds necessary for the railway factories overhaul and the modernisation of the locomotives amount to BGN 7-10 million annually.

The overhaul costs are around BGN 650-750 thousand and the cost for modernisation amounts to BGN 1,500 thousand.

The overhaul costs in the railway factories increase every year and the funds necessary for the replacement of the locomotive fleet are constantly increasing. Delivery and assembly of modern on-board locomotive equipment for deployment of ETCS in the locomotives that will be overhauled and modernised would cost as much as the overhaul itself.

MIGRATION STRATEGY

When developing the migration strategy for transition of the existing infrastructure and railway vehicle subsystems to the respective ERTMS level, the priorities set in this national plan shall be followed.

The main ERTMS system will be established under the ‘Reconstruction and electrification of the railway line Plovdiv-Svilengrad-Turkish border’ project and the existing train control Class B will be upgraded to a Class A system with the implementation of the activities for deployment of the ERTMS along the Sofia – Plovdiv – Stara Zagora railway line.

The ‘Reconstruction and electrification of the railway line Plovdiv-Svilengrad-Turkish border’ project includes installation of ERTMS/ETCS Level 1 and GSM-R Voice. This railway line will
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

be the first ERTMS line in compliance with TSI CCS. This project will also provide the complete subsystems of the GSM-R network (NSS), including a mobile service centre which is essential for call monitoring.

The train control system Class B will be upgraded to Class A with the deployment of the ERTMS along the Sofia – Plovdiv – Stara Zagora railway line. Additionally, the existing ERTMS/ETCS Level 1 along the Stara Zagora – Burgas section will have to be upgraded with an ETCS baseline for interoperability.

The GSM-R NSS system, which will be implemented under the ‘Reconstruction and electrification of the railway line Plovdiv-Svilengrad-Turkish border’ project, will be upgraded, if necessary, to the capacity required for providing connection to the systems along the other railway axes. Subsequently, in order to develop the ERTMS network in the Republic of Bulgaria with ETCS Level 1/Level 2 and GSM-R, the rest of the lines will be included in accordance with the priorities set.

The existing fleet of ERTMS equipped locomotives and multiple units will have to be upgraded to use ETCS and GSM-R. ERTMS Level 2 will be applied, in order to ensure flexibility when using the rolling stock.

Due to the transition from an old analogue system to a new digital system, like GSM-R, there is a need to ensure continuous operational and transport process with regard to train movement along the railway axes, on which the two systems will be available. This will be achieved by supplying the tractive rolling stock with dual mode on-board equipment.

After most trains are supplied with the respective on-board equipment, it will be possible to also extend the use of ERTMS along regional lines, although it is hard to provide economic justification for the need to deploy trackside equipment along them.

The Train Detection Systems will be modernised together with the ETCS system for the respective part of the line with interoperable systems.

Along a line equipped with ERTMS/ETCS and/or GSM-R, additional Class B equipment will not be installed, which would allow the use of an existing rolling stock along such line, equipped with Class B systems.

Possible limitations

When deploying the ERTMS, there might be some problems which limit the implementation of this plan and which are related to:

- The provision of funding for the projects which have already been planned
- The provision of funding for replacement of signalling systems Class B with signalling systems Class A
- The control of the implementation of the projects planned and the need to take corrective measures
- The provision of new rolling stock equipped with ERTMS/ETCS Level 2
The timely planning and realisation of the specific training programmes for the different staff target groups

5.1. SCOPE OF THE PLAN

The scope of the NIP, in compliance with the scope and requirements of the TSI CCS, is related to the conventional rail system of the Republic of Bulgaria. Currently, a high-speed rail system will not be developed in Bulgaria.

5.1.1. Geographical scope

The National Implementing Plan shall apply to the trans-European rail system, i.e. the trans-European conventional rail system and the high-speed rail system, as defined in items 1 and 2 of Annex I to Directive 2008/57/EC (Railway Interoperability Directive).

The geographical scope of this TSI is the network of the whole rail system, which includes:

1) The trans-European conventional rail system network, as described in Annex I, Section 1.1 of Directive 2008/57/EC;
2) The trans-European high-speed rail system network, as described in Annex I, Section 2.1 of Directive 2008/57/EC;
3) Other parts of the network of the rail system in the Union, included following the extension of the scope, as described in Annex I, Section 4 of Directive 2008/57/EC, but excludes the cases referred to in Article 1(3) of Directive 2008/57/EC.

Future infrastructure

The lines which have to be modernised or reconstructed should also be equipped with ERTMS, in accordance with the European directives. Based on the information from the Integrated Transport Strategy, mainly by 2020, modernisations have been made and are projected to be made along the West – East axis: Serbian border – Turkish border/Port Burgas.
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

Table 1. Projects – structure, implementation phase, periods of implementation and indicative values of the projects included

<table>
<thead>
<tr>
<th>Period of implementation</th>
<th>Programme</th>
<th>Projects</th>
<th>From</th>
<th>To</th>
<th>Amount (without VAT) - BGN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>From</td>
<td>To</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>From</td>
<td>To</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROJECTS FROM THE PREVIOUS PROGRAMMING PERIOD, COMPLETED AFTER THE BASE 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATIONAL PROGRAMME ‘TRANSPORT AND TRANSPORT INFRASTRUCTURE’ 2014-2020; CEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

<table>
<thead>
<tr>
<th>Phase</th>
<th>Program</th>
<th>Project Description</th>
<th>Start Year</th>
<th>End Year</th>
<th>Funding</th>
<th>Contract Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Construction Phase</td>
<td>OPTTI 2014-2020</td>
<td>Rehabilitation and modernisation of the Plovdiv-Burgas railway section, Phase 2</td>
<td>2016</td>
<td>2022</td>
<td>675 092 693</td>
</tr>
<tr>
<td>6</td>
<td>Design and Construction Phase</td>
<td>CEF</td>
<td>Modernisation of the Sofia-Septemvri railway line, section Kostenets-Septemvri</td>
<td>2016</td>
<td>2022</td>
<td>348 641 613</td>
</tr>
<tr>
<td>7</td>
<td>Construction Phase</td>
<td>CEF</td>
<td>Development of Sofia Railway Junction: Sofia-Voluyak Railway Section</td>
<td>2016</td>
<td>2020</td>
<td>203 819 092</td>
</tr>
<tr>
<td>8</td>
<td>Construction Phase</td>
<td>CEF</td>
<td>Development of Plovdiv Railway Junction</td>
<td>2017</td>
<td>2020</td>
<td>224 870 977</td>
</tr>
<tr>
<td>9</td>
<td>Design and Construction Phase</td>
<td>OPTTI 2014-2020</td>
<td>Reconstruction of key groups of stations along the axes where railway infrastructural projects are realised</td>
<td>2017</td>
<td>2020</td>
<td>26 000 000</td>
</tr>
<tr>
<td>10</td>
<td>Implementation</td>
<td>OPTTI</td>
<td>Design and Implementation</td>
<td>2017</td>
<td>2021</td>
<td>107 200 000</td>
</tr>
</tbody>
</table>
### National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

<table>
<thead>
<tr>
<th>Phase</th>
<th>2014-2020</th>
<th>deployment of control-command systems in rail transport</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Preparation Phase</td>
<td>OPTTI 2014-2020</td>
<td>Technical assistance for survey of the Ruse-Turkish border railway axis</td>
<td>2017</td>
<td>2019</td>
</tr>
<tr>
<td>13</td>
<td>Implementation Phase</td>
<td>OPTTI 2014-2020</td>
<td>Analysis and update of the ‘Strategy for Integration of the Bulgarian Railway Infrastructure into the European Network for Intermodal Transport’</td>
<td>2018</td>
<td>2019</td>
</tr>
<tr>
<td>14</td>
<td>Implementation Phase</td>
<td>PPP</td>
<td>Construction of intermodal terminal in Central-North Planning Region in Bulgaria - Ruse</td>
<td>2018</td>
<td>2020</td>
</tr>
</tbody>
</table>

### Projects planned for implementation under national funding and/or government loans from IFI by 2022

<table>
<thead>
<tr>
<th>Phase</th>
<th>NF or IFI loans</th>
<th>Modernisation of the railway line Voluyak – Dragoman</th>
<th>2017</th>
<th>2022</th>
<th>258 681 037</th>
<th>TEN-T 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Construction Phase</td>
<td>NF or IFI loans</td>
<td>Restoration of the design parameters of the railway line Ruse – Varna</td>
<td>2018</td>
<td>2022</td>
<td>749 082 890</td>
</tr>
<tr>
<td>3</td>
<td>Construction Phase</td>
<td>NF or IFI loans</td>
<td>Modernisation and rehabilitation of the railway section Mezdra – Gorna Oryahovitsa</td>
<td>2018</td>
<td>2022</td>
<td>647 663 250</td>
</tr>
<tr>
<td>4</td>
<td>Design and Construction</td>
<td>NF or IFI loans</td>
<td>Restoration of the design parameters</td>
<td>2018</td>
<td>2022</td>
<td>466 000 000</td>
</tr>
</tbody>
</table>
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

<table>
<thead>
<tr>
<th>Phase</th>
<th>Construction Phase</th>
<th>NF or IFI loans</th>
<th>Modernisation of the railway line Gorna Oryahovitsa – Kaspichan</th>
<th>2018</th>
<th>2022</th>
<th>338 400 000</th>
<th>TEN-T 3</th>
</tr>
</thead>
</table>

Projects planned for implementation after 2022

<table>
<thead>
<tr>
<th>Phase</th>
<th>Construction Phase</th>
<th>NF or IFI loans</th>
<th>Modernisation of the railway line Vidin – Sofia: railroad section Vidin – Medkovets</th>
<th>2022</th>
<th>2027</th>
<th>882 730 910</th>
<th>TEN-T 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Construction Phase</td>
<td>NF or IFI loans</td>
<td>Modernisation of the railway line Sofia – Pernik</td>
<td>2023</td>
<td>2026</td>
<td>400 000 000</td>
<td>TEN-T 1</td>
</tr>
<tr>
<td>3</td>
<td>Construction Phase</td>
<td>NF or IFI loans</td>
<td>Modernisation of the railway line Pernik – Radomir</td>
<td>2023</td>
<td>2025</td>
<td>303 271 257</td>
<td>TEN-T 1</td>
</tr>
<tr>
<td>4</td>
<td>Construction Phase</td>
<td>NF or IFI loans</td>
<td>Development of railway junction Sofia (without the Sofia – Voluyak section)</td>
<td>2022</td>
<td>2027</td>
<td>419 625 303</td>
<td>TEN-T 1</td>
</tr>
<tr>
<td>5</td>
<td>Construction Phase</td>
<td>NF or IFI loans</td>
<td>Modernisation of the railway line Radomir – Gyueshevo</td>
<td>2022</td>
<td>2027</td>
<td>933 320 005</td>
<td>TEN-T 1</td>
</tr>
<tr>
<td>6</td>
<td>Design and Construction Phase</td>
<td>NF or IFI loans</td>
<td>Modernisation of railway sections Medkovets – Ruska Byala and Ruska Byala – Stolnik</td>
<td>2022</td>
<td>2034</td>
<td>3 644 938 638</td>
<td>TEN-T 1</td>
</tr>
<tr>
<td>7</td>
<td>Preparation and Construction Phase</td>
<td>NF or IFI loans</td>
<td>Modernisation of the railway line Ruse – Gorna Oryahovitsa – Dimitrovgrad</td>
<td>2022</td>
<td>2027</td>
<td>1 985 049 330</td>
<td>TEN-T 1</td>
</tr>
<tr>
<td>8</td>
<td>Preparation and Construction Phase</td>
<td>NF or IFI loans</td>
<td>Modernisation of the railway line Radomir – Kulata</td>
<td>2022</td>
<td>2027</td>
<td>1 691 154 792</td>
<td>TEN-T 1</td>
</tr>
</tbody>
</table>
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

**Lines for deployment of ERTMS by 2023**
- ETCS Level 1 – Voluyak – Sofia – Elin Pelin
- ETCS Level 1 – Plovdiv – Karnobat – Burgas
- ETCS Level 1 – Ruse – Kaspichan

Map 7. Deployment of ERTMS in the Republic of Bulgaria by 2023
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

Lines/sections for deployment of ERTMS after 2023

- ETCS Voluyak – Kalotina
- ETCS Vidin – Sofia – Radomir -
- ETCS Level 1 – Radomir – Kulata
- ETCS Kaspichan – Sindel – Varna
- ETCS Karnobat – Sindel
- ETCS Radomir – Gyueshevo
- ETCS Mezdra – Gorna Oryahovitsa – Kaspichan
- ETCS Ruse – Gorna Oryahovitsa – Stara Zagora – Dimitrovgrad
- ETCS Sofia – Karlovo – Zimnitsa

Map 8. Deployment of ERTMS in the Republic of Bulgaria after 2023

Future rolling stock

In order to provide maximum operational versatility with regard to the rolling stock, the ERTMS on-board equipment, which will be installed, will include ETCS Level 2 and GSM-R for voice and data. The number of locomotives necessary by year, based on forecasts, will be equipped in accordance with a schedule, which applies to the whole railway network and which includes the locomotives necessary for the renewal of the locomotive fleet and the modernization of the active locomotives.
Upgrading the existing rolling stock is very expensive and requires time, so that the simultaneous installation of ETCS Level 2 and GSM-R on board will minimize the time during which the available rolling stock will be decommissioned due to the realization of assembly work.

The trains moving in the sections, which are equipped with ALS Class B, will be equipped with specific transmission modules (STM). Their installation will be combined with the fitting of an ETCS Level 2/GSM-R system to reduce the costs for assembly of on-board equipment and the time, during which the rolling stock will be decommissioned.

5.1.2. Technical scope

The National Implementing Plan is fully consistent with the TSI CCS, determined in the Annex of Regulation 2016/919. Functional and technical specifications of the subsystems have been set in accordance with:

- Item 4.2.1. - Control-Command and Signalling safety characteristics relevant to interoperability;
- Item 4.2.2. - On-board ETCS functionality;
- Item 4.2.3. - Trackside ETCS functionality;
- Item 4.2.4. - Mobile communication functions for railways GSM-R;
- Item 4.2.5. - ETCS and GSM-R air gap interfaces;
- Item 4.2.6. - On-Board Interfaces Internal to Control-Command and Signalling;
- Item 4.2.7. - Trackside Interfaces Internal to Control-Command and Signalling;
- Item 4.2.8. - Key Management.

The functional and technical interface specifications with other subsystems, in accordance with TSI CCS, are:

- Infrastructure Subsystem – implementation of Infrastructure TSI with regard to the parameters:
  - Train detection systems (space for installation);
  - Eurobalise communication (space for installation);
  - Euroloope communication (space for installation);
  - Visibility of trackside Control-Command and Signalling objects.
  (item 4.3.3. Interfaces to Infrastructure Subsystem of TSI CCS)
- Rolling Stock Subsystem – implementation of Rolling Stock TSI with regard to the parameters (item 4.3.2. Interface to the Rolling Stock Subsystem of TSI CCS):
  - Compatibility with trackside train detection systems: vehicle design;
  - Electromagnetic compatibility between rolling stock and Control-Command and Signalling trackside equipment;
  - Train braking performance and characteristics;
  - Position of Control-Command and Signalling on-board antennas;
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

- Isolation of on-board ETCS functionality;
- Data interfaces;
- Visibility of trackside Control-Command and Signalling objects;
- Interface to data recording for regulatory purposes;
- Commands to rolling stock equipment;
- Emergency braking command;
- Construction of equipment.

5.2. DEFINING A STRATEGY

In order to achieve the main goal of the NIP – deployment of the European Train Control System (ETCS) and decommissioning Class B systems, as well as ensuring technical and operational compatibility of the trackside Control-Command and Signalling and on-board Control-Command and Signalling subsystems in Bulgaria, the following series of activities have been adopted, which determine the NIP strategy:

1) Accelerated implementation of ERTMS/ETCS Level 1 and Level 2 in the national rail system, including:
   - Trackside Control-Command and Signalling subsystem and On-board Control-Command and Signalling – automatic train protection with the respective trackside and on-board equipment, GSM-R;
   - route-computer interlocking with interoperable systems for the detection of rolling stock on the station section with and without switches;
   - automatic interlocking to ensure the movement of trains in between stations;
   - monitoring system for rolling stock in motion (Checkpoint).

2) Transposition of the requirements of TSI CCS into the requirements for all investment projects for modernisation and reconstruction of sections of Bulgaria’s railway network and primarily of European corridor sections;

3) Creation of appropriate environment and settings for the transition to Level 2 of the Trackside Control-Command and Signalling subsystem and On-board Control-Command and Signalling in the investment projects, whose implementation has not started yet;

4) Creating preconditions for ensuring the necessary degree of safety for the basic level control-command and signalling through the reconstruction of relay safety systems (e.g. interlocking systems) that are at or beyond the limit of their resources and their replacement with route-computer systems;

5) Continuing the technical policy for interoperable train detection systems, both in between stations and at the stations;

6) Assessment of the appropriateness of extending the station tracks, respectively, the distances from the input to the output signal from the main track for the same direction of movement and transition to signalling distances greater than 1000-1200 m for speed up to 160 km/h;
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

The main activities for realisation of the main goal, sub-goals and tasks related to the implementation of the NIP include, but are not limited to:

Updating, clarifying and re-editing of Regulation No 57 of 9.06.2004 for achievement of interoperability of the national rail system with the rail system within the European Union;
1) Creating and implementing the legal base of the MTITC, derived from and consistent with the Technical Requirements to Products Act for the certification of products used in the Infrastructure, Energy, Control-Command and Signalling, and Rolling Stock subsystems;
2) Finding options for translation from English to Bulgarian, for the general use of documents, referenced in the TSI /ERA guides and guidelines/
3) Urgency for the creation of appropriate expert units or groups in the railway companies, which will attend a training that includes a specific form of testing and an issuing of the respective certificate;
4) Conformity assessment of the Trackside Control-Command and Signalling subsystem and the On-board Control-Command and Signalling subsystem and parts thereof, which have been deployed, for compliance with the TSI, the national safety rules and the technical rules
5) Carrying out tests to determine the electromagnetic compatibility of the tractive rolling stock equipment of each carrier of the railway administration of an EU member state with the trackside train detection systems operated in Bulgaria;
6) Delivery, in the framework of implementing investment projects, of training simulators for the drivers of tractive units for operation of the on-board equipment of the On-board Control-Command and Signalling subsystem, including, in case of a failure of the latter, of simulators for the operation of the trackside equipment of the Trackside Control-Command and Signalling subsystem for the training of the technical personnel operating this equipment, including in case of occurrence of failures and emergency situations.

Replacement of the safety systems and devices should be made by considering above all the national strategy for deployment of the ERTMS in the Republic of Bulgaria and the NIP, and also by taking into account the following trends in this area:
- the blurring of distinctions between the two large groups of systems – in stations and between stations;
- narrowing of the space for application of the specific fail-safe methods and technical devices, and their associated small-batch and inefficient production;
- altering the ratio between hardware and software and increasing the role of the programming component in security systems;
- introducing mobile communications in the security systems, including in the technical equipment for railway travel safety;
- interoperability and unification of the train control systems in Europe.
5.3. DESCRIPTION OF THE MEASURES TAKEN TO ENSURE OPEN MARKET CONDITIONS FOR THE LEGACY CLASS B TRAIN PROTECTION SYSTEMS

DEPLOYMENT OF ERTMS IN THE REPUBLIC OF BULGARIA

The following was considered in regard to the deployment of ERTMS in the Republic of Bulgaria:

- current status of the preparation and implementation of infrastructure projects
- current status of the preparation and implementation of investment projects for tractive railway vehicles
- possible sources of funding for these projects
- the possibilities of the Republic of Bulgaria to provide the financial resources for implementation of these projects in the short- and mid-term
- experience in regard to the implementation of investment projects in the Republic of Bulgaria.

Central to the deployment of the ERTMS in the Republic of Bulgaria is to guarantee to the maximum degree the realisation of commitments already made by the Republic of Bulgaria for the development of the railway infrastructure at European level.

Infrastructure

The approach selected is for the implementation of investment projects for modernisation/reconstruction of the railway infrastructure, which include activities for the joint installation of ETCS and GSM-R. The specifics of the implementation of this type of activities show that it is not necessary and would not be technically and economically viable to separate the installation of the ETCS and the GSM-R, and vice versa, when implementing an investment project.

For the purposes of the assessment for selection of the best option for deployment of the ETCS Level 1 or ETCS Level 2, an approach is selected to determine such an option for each separate railway section or line, from the ones subject to this assessment.

When implementing ERTMS in the Republic of Bulgaria, the following criteria will be considered:

- Results of the Financial and Economic Analyses carried out for specific railway sections or lines
- Technical compatibility with existing neighbouring railways or neighbouring railways which are in advanced stage of implementation, in neighbouring countries of the Republic of Bulgaria.
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

- Period for deployment of the ERTMS/ETCS on neighbouring railway lines and neighbouring countries of the Republic of Bulgaria.
- Traffic forecast for the railway lines and sections.

**Tractive railway vehicles**

In order to allow maximum operational flexibility in regard to railway vehicles, the on-board ERTMS equipment, which will be installed, should be ETCS Level 2 and GSM-R voice and data. Retrofitting of the existing railway vehicles is very expensive and requires time, so that the implementation of the whole Level 2/GSM-R system in one step could also minimize the lack of available railway vehicles when they are decommissioned during the time necessary for carrying out the assembly.

As a result of the assumptions made, the findings and the criteria used for the deployment of ERTMS in the Republic of Bulgaria, for each separate railway line or section of the railway infrastructure and the respective railway vehicles, which will be operated along the railway line or section concerned, an **ERTMS Deployment Plan in the Republic of Bulgaria was drawn up, which is given in Table 2.**
Table 2. Plan, including dates for deployment of ERTMS in the Republic of Bulgaria

<table>
<thead>
<tr>
<th>Railway line/railway section</th>
<th>Trackside equipment*</th>
<th>On-board equipment**</th>
<th>Period for deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equipment type</td>
<td>Amount in €</td>
<td>Financing sources</td>
</tr>
<tr>
<td>Plovdiv-Svilengrad-Turkish border</td>
<td>ETCS Level 1</td>
<td>included in inv. amount of a project under TA</td>
<td>ISPA, EIB, partially OPT, SB</td>
</tr>
<tr>
<td></td>
<td>GSM-R Voice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plovdiv-Burgas</td>
<td>Upgrade of ETCS Level 1</td>
<td>included in inv. amount of projects under TA – optic cable and 2 interlocking systems</td>
<td>partially OPT, CF, ERDF, SB</td>
</tr>
<tr>
<td></td>
<td>GSM-R Voice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kalotina-Sofia</td>
<td>ETCS Level 1</td>
<td>included in inv. amount of projects under TA</td>
<td>CF, ERDF, SB</td>
</tr>
<tr>
<td></td>
<td>GSM-R Voice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sofia-Plovdiv</td>
<td>ETCS Level 1</td>
<td>included in inv. amount of projects under TA</td>
<td>CF, ERDF, SB</td>
</tr>
<tr>
<td></td>
<td>GSM-R Voice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vidin-Sofia</td>
<td>ETCS Level 1</td>
<td>included in inv. amount of projects under TA</td>
<td>CF, ERDF, SB</td>
</tr>
<tr>
<td></td>
<td>GSM-R Voice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sofia-Radomir</td>
<td>ETCS Level 1</td>
<td>included in inv. amount of projects under TA</td>
<td>CF, ERDF, SB</td>
</tr>
<tr>
<td></td>
<td>GSM-R Voice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Technology</td>
<td>Level</td>
<td>Specifications</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>Karnobat-Sindel</td>
<td>ETCS</td>
<td>Level 1</td>
<td>Included in inv. amount of projects under TA</td>
</tr>
<tr>
<td>Ruse-Kaspichan-Varna</td>
<td>ETCS</td>
<td>Level 1</td>
<td>Included in inv. amount of projects under TA</td>
</tr>
<tr>
<td>Radomir-Gyueshevo</td>
<td>ETCS</td>
<td>Level 1</td>
<td>Included in inv. amount of projects under TA</td>
</tr>
<tr>
<td>Mezdra-Gorna Oryahovitsa</td>
<td>ETCS</td>
<td>Level 2</td>
<td>84,738,229</td>
</tr>
<tr>
<td>Radomir-Kulata</td>
<td>ETCS</td>
<td>Level 1</td>
<td>8,175,194</td>
</tr>
<tr>
<td>Gorna Oryahovitsa-Kaspichan</td>
<td>ETCS</td>
<td>Level 2</td>
<td>67,872,853</td>
</tr>
<tr>
<td>Ruse-Gorna Oryahovitsa</td>
<td>ETCS</td>
<td>Level 2</td>
<td>45,659,919</td>
</tr>
<tr>
<td>Gorna Oryahovitsa-Dimitrovgrad</td>
<td>ETCS</td>
<td>Level 2</td>
<td>81,858,774</td>
</tr>
</tbody>
</table>
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

<table>
<thead>
<tr>
<th>Sofia-Karlovo-Zimnitsa</th>
<th>ETCS Level 2</th>
<th>CF, ERDF, SB and/or TEN-T/CEF</th>
<th>ETCS Level 2</th>
<th>Operators, CF, ERDF, SB and/or TEN-T/CEF</th>
<th>After 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>133,277,603</td>
<td>CF, ERDF, SB and/or TEN-T/CEF</td>
<td>23,870,000</td>
<td>Operators, CF, ERDF, SB and/or TEN-T/CEF</td>
<td>387,000</td>
</tr>
<tr>
<td>GSM-R Voice/ Data</td>
<td>38,693,498</td>
<td>GSM-R Voice/ Data</td>
<td>3,850,000</td>
<td>GSM-R Voice/ Data</td>
<td>360,000</td>
</tr>
<tr>
<td>Total for infrastructure</td>
<td>543,977,513</td>
<td>Total for TRS</td>
<td>80,640,000</td>
<td>Average for 1 TRS</td>
<td>360,000</td>
</tr>
<tr>
<td>Average per km for the lines analysed</td>
<td>464,541</td>
<td>Average for 1 TRS</td>
<td>310,000</td>
<td>Average for 1 TRS</td>
<td>360,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GSM-R for 1 TRS</td>
<td>50,000</td>
<td>Average for 1 TRS</td>
<td>360,000</td>
</tr>
</tbody>
</table>

* The average amount is lower than the average for ETCS Level 2 because the line Radomir-Kulata was planned with ETCS Level 1
** The investments for on-board equipment are based on the projected number of locomotives along the respective line as per the cost-benefit analysis

Projects in advanced design and/or construction phase, for which ERTMS deployment parameters have been set
Projects analysed in the ERTMS Deployment Strategy

The data on the investment amounts by system components, deployment periods and financing sources is given in the respective sections of the ERTMS Deployment Strategy. Because the National Strategic Reference Framework may change for the programming period after 2013, the reference EU funds are given as sources of financing.

**Personnel – operations and maintenance**

When planning and carrying out the necessary staff training, related to the deployment of the ERTMS, the following target groups are formed:

- signalmen and staff authorising train movements at NRIC
- maintenance technicians at the Signalling and Telecommunication unit at NRIC
- drivers of railway vehicles at the railway undertakings
- vehicle maintenance technicians at the railway undertakings.

Each of the personnel target groups defined will be trained by means of personalised programmes, whose volume and content correspond to the specific activities and responsibilities of the officials in regard to the management, operation and maintenance of the ERTMS. The training programmes will be consistent with the academic degree, age, professional experience and length of service of the respective workers and employees. The terms and duration of the qualification courses, as well as the need to organise both basic and refresher training, will be determined by the detailed, mid-term plans for deployment of the ERTMS and the migration strategies adopted.
The Ministry of Transport, Information Technology and Communications, NRIC and the railway undertakings will carry out organisational actions, directed at a system of planned initiatives, which should ensure the targeted, substantiated and planned staff training, in order to transition to operational processes that are based on the implementation of new technologies, as follows:

- Studying the organisation of operational processes based on the technologies for trackside and locomotive equipment: ETCS1/ETCS2, ETCS2/ETCS2, ETCS/ETCS1, incl. GSM-R. Similarities and differences between the operational processes followed at the moment and the ones based on new technologies should be established, based on foreign best practices and own experience.
- Determining similarities and differences in the functional characteristics of the units affected by the change, in order to plan effective measures.
- Based on the results from the activities under items 1 and 2, the job structure of the affected units should be redefined. When describing the new/updated job descriptions, special attention should be paid to:
  - the general requirements for the position
  - the set of skills and competencies for qualitative performance of production activities.
- In compliance with the basic requirement for each specific position and the set of skills and competencies for qualitative performance of production activities, requirements will be developed, based on which:
  - staff recruitment and selection will be realised
  - performance management will be carried out (incl. performance assessment)
  - staff training and development will be planned.

6. FUNDING

Funding within the EU shall be provided in accordance with:

**Regulation (EU) No 1300/2013** on establishing a Cohesion Fund in order to strengthen the economic, social and territorial cohesion of the Union in the interests of promoting sustainable development. This Regulation establishes the tasks of the Cohesion Fund and the scope of its support with regard to the Investment for growth and jobs goal referred to in Article 89 of Regulation (EU) No 1303/2013.

**Regulation (EU) No 1303/2013 on the European funds** - under the Cohesion Fund (CF) and the European Regional Development Fund, Bulgaria will have EUR 1.604 billion (CF – EUR...
1.144 billion and ERDF – EUR 0.460 million) for the development of transport infrastructure along the trans-European transport network. The funds will be spent under OP ‘Transport and Transport Infrastructure’ 2014 – 2020, approved on 19.12.2014. EUR 572 million of the total amount are committed to the development of railway infrastructure.

**Regulation (EU) No 1316/2013 of the European Parliament and of the Council establishing the Connecting Europe Facility (CEF)** - projects of common interest in the sectors of transport, telecommunications and energy infrastructures will be funded. The total financial resource in the transport sector is EUR 26.2 billion, including EUR 11.3 billion, which are transferred from the CF and will be spent in accordance with its rules. The funding for Bulgaria under the cohesion part of the CEF, amounting to EUR 406 million, will be directed mainly to railway projects.

Funds from the State Budget are also provided for the implementation of the requirements for the rolling stock. In accordance with the PSO Contract, in force as of 01.01.2010, the State grants BDZ-Passengers EOOD capital transfers for the purchase of rolling stock under special conditions. In 2011 and 2012, the capital transfers amount to BGN 20 million (EUR 10.23 million) annually and in the last 3 years – to BGN 30 million (EUR 15.34 million) annually. These funds, regarded as insufficient for the purchasing of new rolling stock, are the only actual source of financial resources for BDZ-PP EOOD. The serious financial situation and the obsolete rolling stock of BDZ-PP EOOD do not allow and give no possibility for the conclusion of bank loan contracts.

**Funding through the Connecting Europe Facility (CEF)**


The funds allocated for the funding of projects in the transport sector in the following programming period amount to EUR 31.7 billion, incl. EUR 21.7 billion budget of the Fund and EUR 10 billion transferred from the Cohesion Fund for spending through the CEF to the cohesion countries. CEF is a centrally managed instrument, established on the principle of competitive selection of projects. The goal is to select the most mature offers, with the highest added value for the EU.

**Distribution of funds from the CEF budget (EUR 21.7 billion)**

- **Studies** – up to 50%
- **Construction activities:**
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

- for railway and inland waterways – up to 20%, for activities that aim at eliminating bottlenecks
- up to 30% and for the facilitation of border crossings – up to 40%
- for travel connections at ports and airports to the hinterland, activities to reduce the noise in rail transport, construction of port and intermodal terminals – up to 20%

- **Traffic management systems and services:**
  - ERTMS: up to 50%
  - for all other traffic management systems, freight transport services, construction of safe parking sites along the roads of the core network, as well as activities for the development of motorways of the sea – up to 20%

- **Obtaining a bonus** – the abovementioned percentages may be increased by 10% for activities that contribute to the synergy in border crossings, achieving the goals with regard to fight against climate change or reducing the emissions of greenhouse gasses.

### Distribution of the Cohesion Fund resources (EUR 10 billion)

- **Studies** – up to 80-85%
- **Construction activities:**
  - for railway and inland waterways – up to 80-85%
  - for land border crossings – up to 80-85%
  - travel connections at ports and airports to the hinterland, construction of port and intermodal terminals – up to 80-85%
  - activities to reduce the noise in rail transport: up to 20%
- **Traffic management systems and services:**
  - ERTMS: up to 80-85%
  - for all other traffic management systems - up to 80-85%
  - freight transport services, construction of safe parking sites along the roads of the core network, as well as activities for the development of motorways of the sea – up to 20%

### Funding options

The general description of the options for EU funding for infrastructure and railway vehicles is presented in the ERTMS Deployment Strategy. This section presents the general guidelines with regard to the funding options.

### Guidelines for seeking funding:

Operational Programme Transport 2014-2020 reviews the options for financing the modernisation and upgrade of the railway infrastructure, respectively, the development of ETCS.

In the period 2014-2020, one of the main financial instruments for financing the development of the trans-European transport network is also the Connecting Europe Facility. It will be introduced by Regulation (EU) No 1316/2013 repealing Regulation (EC) No 680/2007 on the
trans-European transport and energy networks. An analysis is to be performed with regard to the possibilities of the different subjects, which are involved in the deployment of the ERTMS, to apply under the Connecting Europe Facility.

Public-private partnership is one of the main instruments for the implementation of projects in different sectors of the economy, incl. in the field of transport infrastructure. In this regard, it is sought to engage the private sector in railway investment projects, respectively, ERTMS.

The options for financing the railway infrastructure and railway vehicles for passenger transport from the national budget, by means of capital transfers, are also used. In 2015, new multiannual Contract was signed between the State and the NRIC for long-term planning and financing of the construction, maintenance, development and operation activities with regard to the railway infrastructure. The provision of capital transfers to the Company is made under the Contract and in compliance with the amount, provided for in the annual acts on the state budget of the Republic of Bulgaria.

In 2009, a Contract for the realisation of public transport services in the field of rail transport on the territory of the Republic of Bulgaria was signed between the Ministry of Transport and BDZ-Passengers EOOD, which became effective on 01.01.2010 and has a term of fifteen years. The Contract provides for the possibility to grant capital transfers from the state budget for the purchase of new passenger railway vehicles, if certain conditions are met.

Other possible financing sources are related to the receipt of loans from different credit institutions.

7. FOLLOW-UP AND FEEDBACK

7.1. LIST OF ASSETS AND COMPARISON TO THE GOALS

The follow-up to the development of the NIP is the drawing up of a list of the assets that help achieve the sub-goals:

1) the barriers and obstacles for the deployment of the ETCS and the GSM-R Class A radio system are identified;
2) information about its users is provided;
3) the progress is monitored and assessed.

Under the Fourth Railway Package, ERTMS deployment shall be made in accordance with a harmonised model, developed within the EU and monitored by the European Railway Agency.

7.2. Updating the plan

In order to implement the National Implementing Plan of the TSI, the following preconditions shall be considered:
National Implementing Plan on the technical specification for interoperability relating to the ‘control, command and signalling’ subsystems of the rail system in the European Union

- The financial resources and terms for phased implementation of the TSI shall be set in the annual plans, developed in the following years by the NRIC and the railway undertakings;
- In regard to the need for considerable investments for the implementation of the TSI, a possibility for cooperation shall be sought between the NRIC, railway undertakings and other stakeholders.
- In order to encourage the NRIC and the railway undertakings, possibilities for the provision of additional resources from the European funds and the state budget are to be sought.

In case there are significant changes in the preconditions, which will alter the activities, terms and investments, this Plan shall be updated regularly – at least every five years, pursuant to Article 8(3) of Regulation 2016/919.

8. CONCLUSION
The approach of the rail infrastructure manager and the railway undertakings to the implementation of the NIP and the deployment of the ERTMS system shall be proactive and shall be supported by the state administration authorities.

In this way, it will contribute to the accelerated realisation of the projects for deployment of the ERTMS in the Republic of Bulgaria, especially in regard to:
- improving the safety standard of rail transport;
- increasing the speed and capacity of the lines;
- effective traffic control;
- compliance with the conditions for interoperability, in accordance with the EU directives;
- access of the rolling stock of Bulgarian operators to the railway network of neighbouring countries;
- use of GSM-R;
- maintaining the economically important position of rail transport in transit transport.