



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΥΠΟΥΡΓΕΙΟ ΥΠΟΔΟΜΩΝ ΚΑΙ ΜΕΤΑΦΟΡΩΝ

**NATIONAL IMPLEMENTATION PLAN FOR THE TSI
'CONTROL-COMMAND AND SIGNALLING SUBSYSTEMS
OF THE RAIL SYSTEM IN THE EUROPEAN UNION'**



HELLENIC REPUBLIC

MINISTRY OF INFRASTRUCTURE AND TRANSPORT

I. INTRODUCTION

In accordance with Commission Regulation (EU) No 2016/919 of 27 May 2016 on the technical specification for interoperability (TSI) relating to the control-command and signalling subsystems of the rail systems in the European Union, the Member States shall notify the European Commission of an approved National Implementation Plan (NIP) for the above-mentioned TSI with a view to the progressive implementation of interoperability in the EU rail network.

This matter comes within the framework of Greece's above-mentioned obligation, and is updated at the latest within five years of its adoption.

The following legal framework was taken into account when drawing up the NIP:

- Commission Regulation (EU) No 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;
- Commission Implementing Regulation (EU) 2017/6 of 5 January 2017 on the European Rail Traffic Management System European deployment plan.

The following bodies contributed to/were consulted for the NIP:

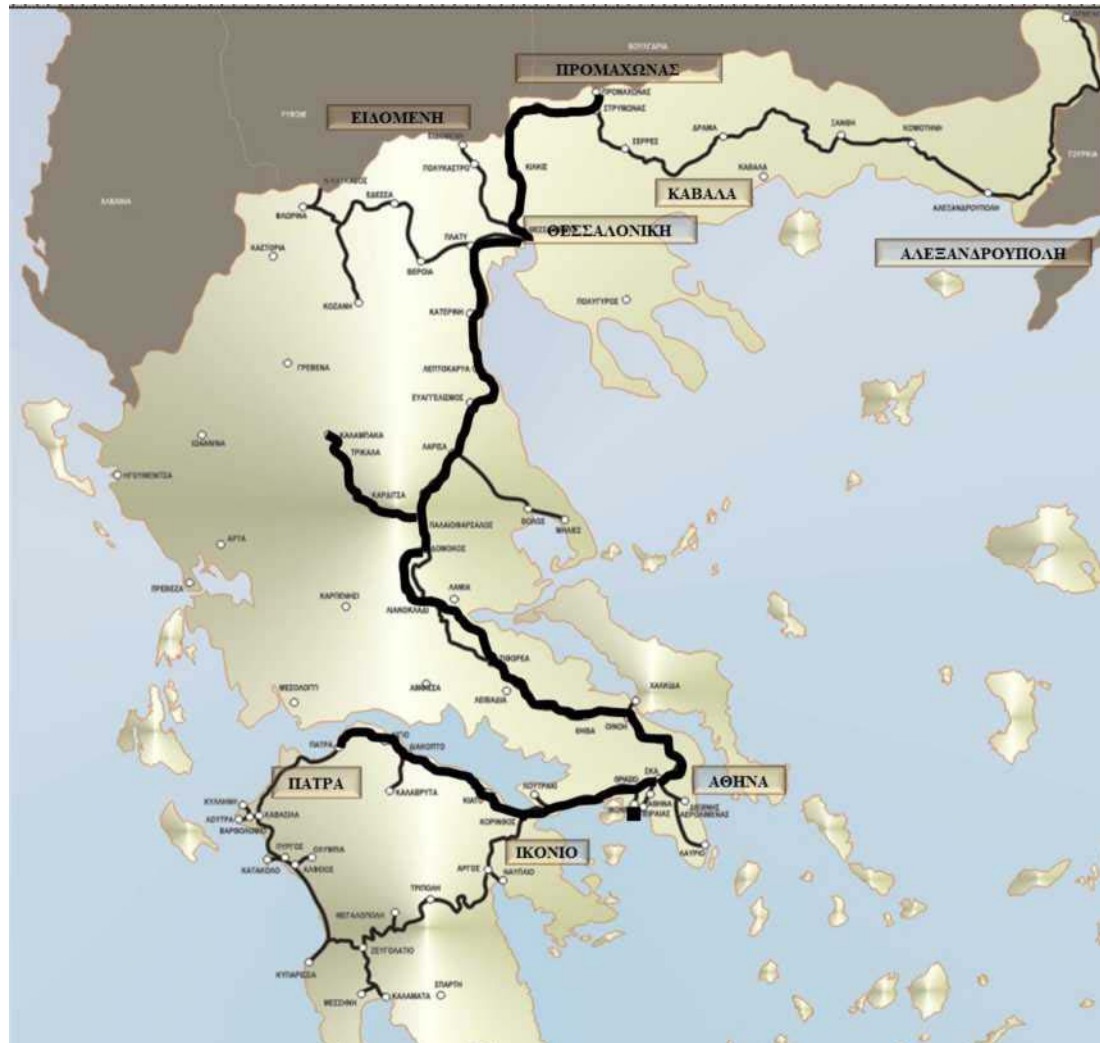
1. The Regulatory Authority for Railways (RAS), which performs the duties of National Security Authority;
2. The Hellenic Railways Organisation (OSE A.E.), which performs the duties of Infrastructure Manager;
3. ERGA OSE (ERGOSE A.E.), a subsidiary of the OSE for the management of OSE projects;
4. The Railway Property Management Company (GAIAOSE A.E.), responsible for the management of rolling stock;
5. TRAINOSE Transport – Transport Services for Passengers and Cargo Limited Railway Company (TRAINOSE A.E.), a rail transport supply company;
6. Urban Railways (STASY A.E.), a railway transport supply company.

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In Greece, the Hellenic Railways Organisation (OSE AE) manages the railway infrastructure and its subsidiary company ERGA OSE AE., and has undertaken the modernisation of the railway network, including the installation of modern ERTMS - European Rail Traffic Management System systems (ETCS - European Train Control System and GSM-R - Global System for Mobile communications-Rail).

In particular, ERGOSE has made it a priority to install ERTMS on the basic railway axis in Greece, namely the Patras – Athens – Thessaloniki – Eidomeni – Promachonas (PATHEP) axis with the necessary branches (to the International Airport El. Venizelos, freight port of Piraeus – Ikonio, Chalkida, Kalambaka). This axis is a section of the core TEN-T network (in accordance with Regulation 1315/13) and also a section of the Orient-East Med Corridor, the aim being to complete its modernisation by 2030.



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II. DESCRIPTION OF THE EXISTING SITUATION

1) SIGNALLING

A two-way signalling system with remote administration has already been established on the basic Greek rail axis Kiato – Σιδηροδρομικό Κέντρο Αχαρνών - Acharnon Railway Centre - SKA – Thessaloniki – Eidomeni/Promachonas (PATHE/P) (also including the Inoi-Chalkida section) – with the exception of the Tithorea-Domokos section under construction. Due to extensive failures and sabotage after first being commissioned, this system now has major problems.

The restoration/upgrading of the signalling system for the SKA – Thessaloniki – Promachonas section (except Tithorea - Domokos) started in 2014 and is programmed for completion at the start of 2019, when it will become operational again. To date, the signalling system has been restored over the Acharnai – Inoi and Plati – Thessaloniki sections, and has been put into use without remote administration.

Over the SKA-Kiato, Thessaloniki – Eidomeni and Inoi-Chalkida sections, the system already installed is presenting similar problems, due to extensive damage/sabotage. However, there are plans to redevelop it.

2) TELECOMMUNICATIONS

OSE's existing communications network (fixed and wireless) is analogue. Communication between stations with remote administration takes place via a public network, while wireless communications are either via wireless transceivers at VHF frequencies (class B system), or through rental of the TETRA public system.

3) 'CONTROL-COMMAND AND SIGNALLING' TRACKSIDE SUBSYSTEM

• CLASS A TRAIN PROTECTION SYSTEM (ETCS)

From 2002, ERGOSE had already installed (over 202.7 km of line) and is continuing to gradually install the class A train protection system, ETCS level 1 on the PATHE/P railway system (over 674.5 km of line), as a superstructure over the conventional signalling system.

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Specifically, to date the works to install the ETCS system on the Kiato - SKA – Airport – Treis Gefyres, Thriasso – Ikonio, and Plati – Thessaloniki sections have been completed.

The ETCS level 1 system is not yet operational anywhere on the line since the necessary regulatory procedures (i.e. tests, certification, etc.) have not been completed. As already mentioned, the ETCS system already installed on the SKA – Kiato section is not yet operational due to extensive sabotage and vandalism.

The OSE network has never used a national automatic train protection system (class B system). Transfer from the existing class B system to the class A ETCS system is therefore not an issue.

- **VOICE RADIO COMMUNICATION SYSTEM, CLASS A (GSM-R)**

The GSM-R radio system (class A system), which at this stage ensures voice radio communication, has already been installed and is operational over 707 km of the PATHE/P railway, except for the Tithorea-Domokos, Kiato-Patra and Thessaloniki/Eidomeni sections. There are 103 base stations and 70 station terminals at stations and remote administration centres.

The commissioning/use of the system will take place after a transitional period of parallel operation with the existing Class B radio system *CH-Greek Railways radio system*, and upon completion of the required regulatory procedures.

The above-mentioned system was established on the basis of specifications FRS 7 and SRS 15.

4) 'CONTROL-COMMAND & SIGNALLING' ON-BOARD SUBSYSTEM

- **TRAIN PROTECTON SYSTEM (ETCS)**

The ETCS level 1 equipment (version 2.3.0.d) in 94 power units has already been installed under contracts managed by ERGOSE and is operational.

Furthermore, the ERTMS system compatible with the European specifications adopted in 2003 has been installed in the dual-voltage metro trains running between 'DOUKISSIS PLAKENTIAS– AIRPORT' (in total 7 trains, 14 driver's cabs).

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The automatic train protection system (ETCS) is compatible up to level 2 (Level 2, baseline 1).

The above-mentioned subsystem is not yet operational, and a series of tests will be necessary in a section of the line with a functioning signalling system and an operational ETCS trackside system, in parallel with completing staff training & the Infrastructure Manager approving the new Traffic Regulation and the National Safety Authority approving the adoption and operation of the new subsystem.

Annex III indicates the number and type of engine units which have been equipped with the ETCS level 1 train protection system.

• VOICE RADIO COMMUNICATION SYSTEM (GSM-R)

Principally in order to cover the checks and tests necessary for the GSM-R system, GSM-R rolling stock has been established in 120 power units, under the contract managed by ERGOSE, with the supply of 90 mobiles (handhelds).

In addition to this, the above-mentioned 7 dual-voltage metro trains are equipped with the GSM-R voice radio communication system which operates in E-GSM and R-GSM frequency bands and is compatible with the MORANE 2 specifications.

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III. AIM OF THE TSI NATIONAL IMPLEMENTATION PLAN CCS STRATEGY

The aim of the current National Implementation Plan under Regulation 2016/919 on the Technical specification for interoperability relating to the 'control-command and signalling' subsystems of the rail system in the European Union is:

- ✓ rolling out the ETCS level 1 trackside system over a total length of 2 104 km, i.e.:
 - on all the PATHE/P railway axes and on their major sections (namely Inoi - Chalkida, Thriasio - Ikonio, suburban railway of Attica, Palaiofarsalos-Kalambaka, Larissa-Volos), 1 146 km in length
 - on the Strimonas – Alexandroupoli – Ormenio (border with Bulgaria), Patra-Pirgos – Kalamata (with the sections to Ancient Olympia and Katakolo), Plati-Florina and Koropi-Lavrio sections, 958 km in length;
- ✓ bringing into operation the ETCS level 1 on-board system which has been installed on trains running on the OSE network;
- ✓ installing and bringing into operation the GSM-R voice communication system:
 - on the entire PATHE/P line including its main branches, total length 1 146 km;
 - on the Strimonas – Alexandrououpoli – Ormenio and Plati – Florina sections, length 641 km.

The timing for bringing the above systems into operation is set below by subsystem.

1) 'CONTROL-COMMAND & SIGNALLING' TRACKSIDE SUBSYSTEM

• CLASS A TRAIN PROTECTION SYSTEM, (ETCS)

Except for the sections in which the installation of ETCS level 1 system has already been completed, or which are currently at the installation stage, under contracts already signed, ETCS level 1 is to be installed in the following sections under new contracts which will be the subject of a call for tenders:

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ATHENS-PATRA AXIS

SKA - Kiato

Since the signalling system and ETCS level 1 that have already been installed have been damaged/sabotaged, this section is scheduled to be tendered out for reconstruction and upgrading the ETCS on baseline 3. It is estimated that this section will become operational by 2025.

Rododafni - Patra

On this section, over a total of approximately 36 km, the signalling system and ETCS level 1 will be installed under new works contracts that are in the tender/tender programming preparatory phase. It is estimated that this section will become operational by 2030.

ATHENS-THESSALONIKI AXIS

Treis Gefyres – S.S. Athens - Piraeus Section

On the above section, the signalling system and ETCS level 1 is scheduled for installation by means of future tendering, and is expected to become operational in 2030.

THESSALONIKI-EIDOMENI (BORDERING FYROM) SECTION

On this section, over a total length of 77 km, a signalling system and ETCS level 1 is to be installed under a new works contract which is currently in the tender preparation phase. It is estimated that this section will be operational by 2025.

PALAIOFARSALOS-KALAMBAKA BRANCH

This section, which is 80 km in length, is in the tender completion phase for new contract work, which will include the installation of the signalling system and ETCS. It is estimated that this section will be operational by 2025.

LARISA-VOLOS BRANCH

Similarly, this section, which is 61 km in length (part of the detailed TEN-T network), is in the tender preparation phase for a new works contract, which will include the installation of the signalling system

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and I ETCS. It is estimated that this section will be operational by 2025.

STRIMONAS – ALEXANDROUPOLI – ORMENIO SECTION

This section of the existing line, 485 km in length, is to be upgraded, and the signalling system and ETCL level 1 are to be installed. It is estimated that this section will be operational after 2030.

PATRA-PYRGOS-KALAMATA SECTION

The existing railway line on this section, which is 285 km in length, and also includes the branches for Ancient Olympia and Katakolo, is to be upgraded, and the signalling system and ETCS level 1 installed. It is estimated that this section will be operational after 2030.

KOROPI-LAVRIO SECTION

The Attica suburban railway is to be extended from Koropi to the port of Lavrio, 32 km in length, with installation of signalling and ETCS level 1. It is estimated that this section will be operational after 2030.

PLATI - FLORINA SECTION

OSE will examine the installation of the ETCS system on the Plati – Lorina section. For the implementation of the relevant plan, OSE will draw up the appropriate studies and try to include it in EU co-financing programmes. Otherwise, funding will be needed from the Public Investment Programme to ensure that project implementation, without co-financing, is within the set timetable.

Annex I shows a supervisory diagram which presents the operating times of ETCS level 1 on the network sections. It should be noted that these times also include estimations for the completion of all the necessary procedures – after the completion of the system installation – required for the infrastructure manager to render it operational.

Please note that the ETCS system to be installed under future contracts will be level 1, baseline 3 (x=1), to ensure:

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- technical compatibility with the ETCS train system (baseline 2) which has already been installed on 94 trains,
- full compliance with Commission Regulation (EU) 2016/919 and Implementing Regulation (EU) No 2017/6 on the ERTMS European Deployment Plan.

- **VOICE RADIO COMMUNICATION SYSTEM, CLASS A (GSM-R)**

A GSM-R voice radio communication system is to be installed on the following sections:

- Tithorea-Domokos (106 km)
- Kiato-Patra (108 km)
- Thessaloniki-Eidomeni (77 km)
- Palaiofarsalos-Kalambaka (80 km)
- Sepolia underground, 1.9 km long (on the section from the exit S.S. Athens – Treis Gefyres)

The system should be operational in:

- 2023, for the Tithorea-Domokos section, and
- 2030, for the remaining sections.

Moreover, the OSE is to examine the installation of the GSM-R voice communication system on the Larisa – Volos and Plati – Florina sections. To draw up the relevant plans, OSE will undertake the relevant studies and endeavour to have them included in the EU co-financing programmes. Otherwise, funding from the Public Investment Programme will be necessary in order to carry out the works, which would not be co-financed, within the set timetable.

Annex II presents a supervisory diagram showing the GSM-R operation times on the various sections of the network.

2) 'CONTROL-COMMAND AND SIGNALLING' ON-BOARD SUBSYSTEM

- **TRAIN PROTECTION SYSTEM, CLASS A (ETCS)**

Apart from the 94 power units in which ERGOSE has installed the ETCS, GAIOSE is planning to install ETCS in another 26 units (Level 1, Baseline 2, version 2.3.0.d) within the next 15 years, as outlined in Annex III.

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- **VOICE RADIO COMMUNICATION SYSTEM, CLASS A (GSM-R)**

Apart from the 90 mobiles (handhelds) and the 120 power units in which ERGOSE has installed GSM-R, GAIOSE is not planning to install GSM-R in additional units.

The information provided in Chapters II & III is set out in the following table:



Network section	Length (km)	Type of line	ETCS						GSM-R		
			Level ETCS	Baseline	Version	Construction phase	Estimated entry into operation	Observations	Construction phase	Estimated entry into operation	Observations
Rododafni – Patra	36.8	dual	1	3	3, X=1	Future installation	2030		Future installation	2030	
Kiato – Rododafni	71	Dual	1	2	2.3.0d	Under construction	2025		Future installation	2030	
Korinthos – Kiato	24.4	Dual	1	2	2.2.2	(Installation completed)/XA	2025	2	Installation completed	2020	
Thriasio – Korinthos	66.6	Dual	1	2	2.2.2	(Installation completed)/XA	2025	2	Installation completed	2020	
SKA - Thriasio	13.0	Dual / quadruple	1	2	2.2.2	(Installation completed)/XA	2025	2	Installation completed	2020	
SKA – Plakentias	10	Dual	1	2	2.3.0d	Installation completed	2020	1	Installation completed	2020	
Plakentias – Athens International Airport 'El. Venizelos'	22	Dual	1	2	2.2.2	Installation completed	2020	1 & 3	Installation completed	2020	
Thrasiou Pediou - N.E.L. Piraeus (Neo Ikonio)	17.0	Single	1	2	2.3.0d	Installation completed	2020	1	Installation completed	2020	
Inoi – Chalkida	22.0	Single	1	2	2.3.0d	Under construction	2020	1	Installation completed	2020	
Piraeus – S.S. Athens	10.0	Dual	1	3	3, X=1	Future installation	2030		Installation completed	2020	



Network Section	Length (km)	Type of line	ETCS						GSM-R		
			Level ETCS	Baseline	Version	Construction phase	Estimated entry into operation	Observations	Construction phase	Estimated entry into operation	Observations
S.S. Athens – Treis Gefyres (ground)	3.8	Dual	1	3	3, X=1	Future Construction	2030		Installation completed	2020	4
S.S. Athens – Treis Gefyres (underground)	1.9	Quadruple	1	3	3, X=1	Future Construction	2030		Future Construction	2030	4
Treis Gefyres – SKA	5.4	Quadruple	1	2	2.3.0d	Installation completed	2020	1	Installation completed	2020	
SKA – Tithorea	145.5	Dual	1	2	2.3.0d	Under Construction	2020	1	Installation completed	2020	
Tithorea – Domokos	106	Dual	1	2	2.3.0d	Under Construction	2023	1	Future Construction	2023	
Domokos – Plati	187	Dual	1	2	2.3.0d	Under Construction	2020	1	Installation completed	2020	
Plati - TX1	37.3	Dual	1	2	2.3.0d	Installation completed	2020	1	Installation completed	2020	
TX1 - TX5/ Thessaloniki	7	Multiple	1	2	2.3.0d	Installation completed	2020	1	Installation completed	2020	
Palaiofarsalos – Kalambaka	80.0	Single	1	3	3, X=1	Future Construction	2025		Future Construction	2030	
Larisa – Volos	61.0	Single	1	3	3, X=1	Future Construction	2025		Future Construction	>2030	
Thessaloniki - Strimonas - Promaxonas	143.0	Single	1	2	2.3.0d	Under Construction	2020	1	Installation completed	2020	



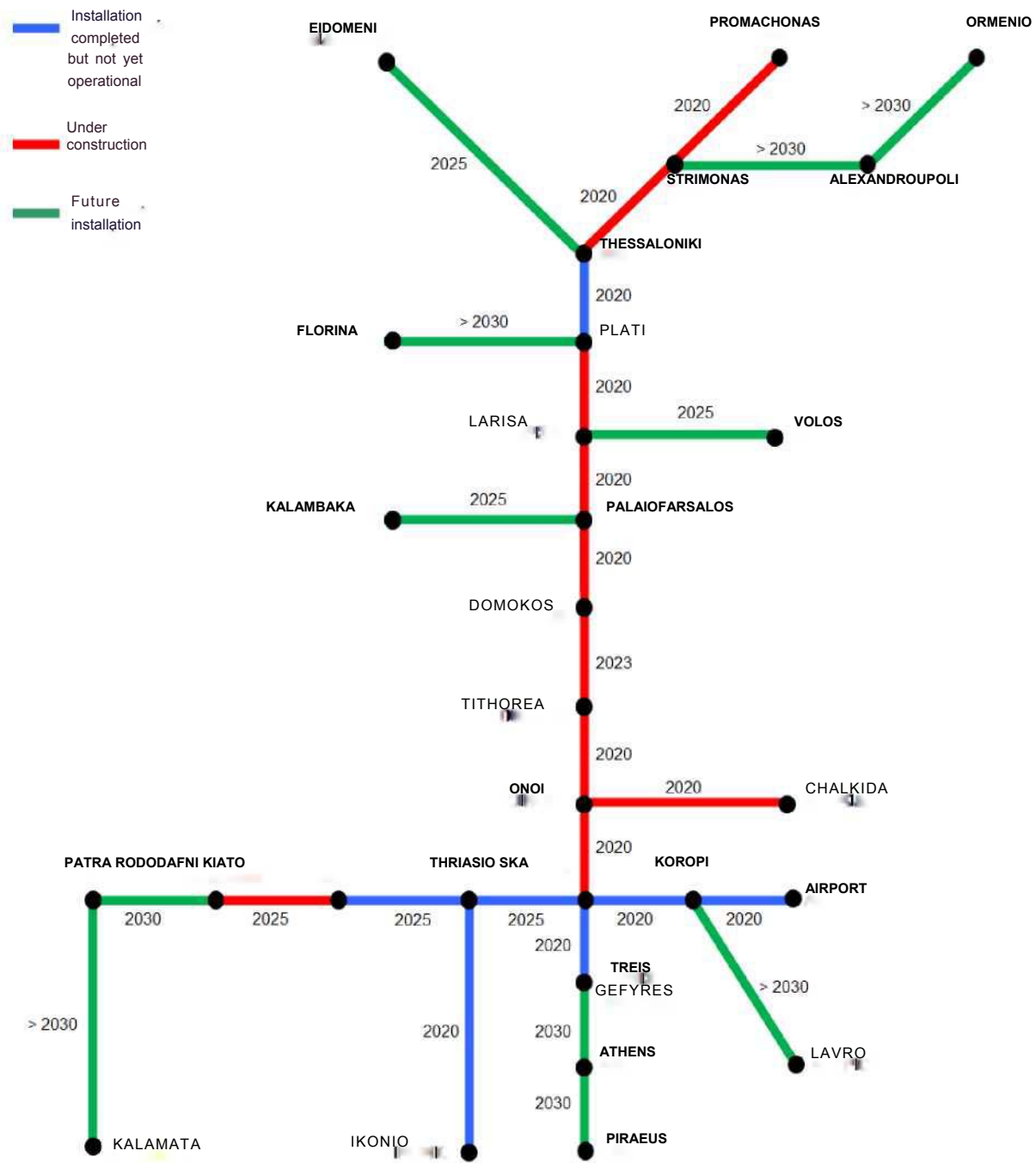
Network Section	Length (km)	Type of line	ETCS						GSM-R		
			Level ETCS	Baseline	Version	Construction phase	Estimated entry into operation	Observations	Construction phase	Estimated entry into operation	Observations
Strimonas – Alexandroupoli	310.5	Single	1	3	3, X=1	Future Construction	>2030		Future Construction	>2030	
Alexandroupoli-Ormenio	174.0	Single	1	3	3, X=1	Future Construction	>2030		Future Construction	>2030	
Plati – Florina	156.6	Single	1	3	3, X=1	Future Construction	>2030		Future Construction	>2030	
Thessaloniki - Eidomeni	77.0	Single	1	3	3, X=1	Future Construction	2025		Future Construction	2030	

Observations:

1. The infrastructure manager has to complete the necessary regulatory procedures for the on board ETCS to become operational.
2. ETCS Level 1 will be restored and the older version of its baseline will be replaced by the interoperable baseline 3, X=1 version.
3. The Plakentias - Athens International Airport 'Eleftherios Venizelos' section has been equipped with 2004 ETCS level 1, version 2.2.2. The Infrastructure Manager will put the system into operation, as ETCS v2.3.0.d has been tried out on rolling stock.
4. Please note that GSM-R has already been installed in the section of the line that is aboveground from the S.S. Athens exit to Treis Gefyres. It is also planned to install it in the underground section, which is 1.9 km long, once installation has been completed.

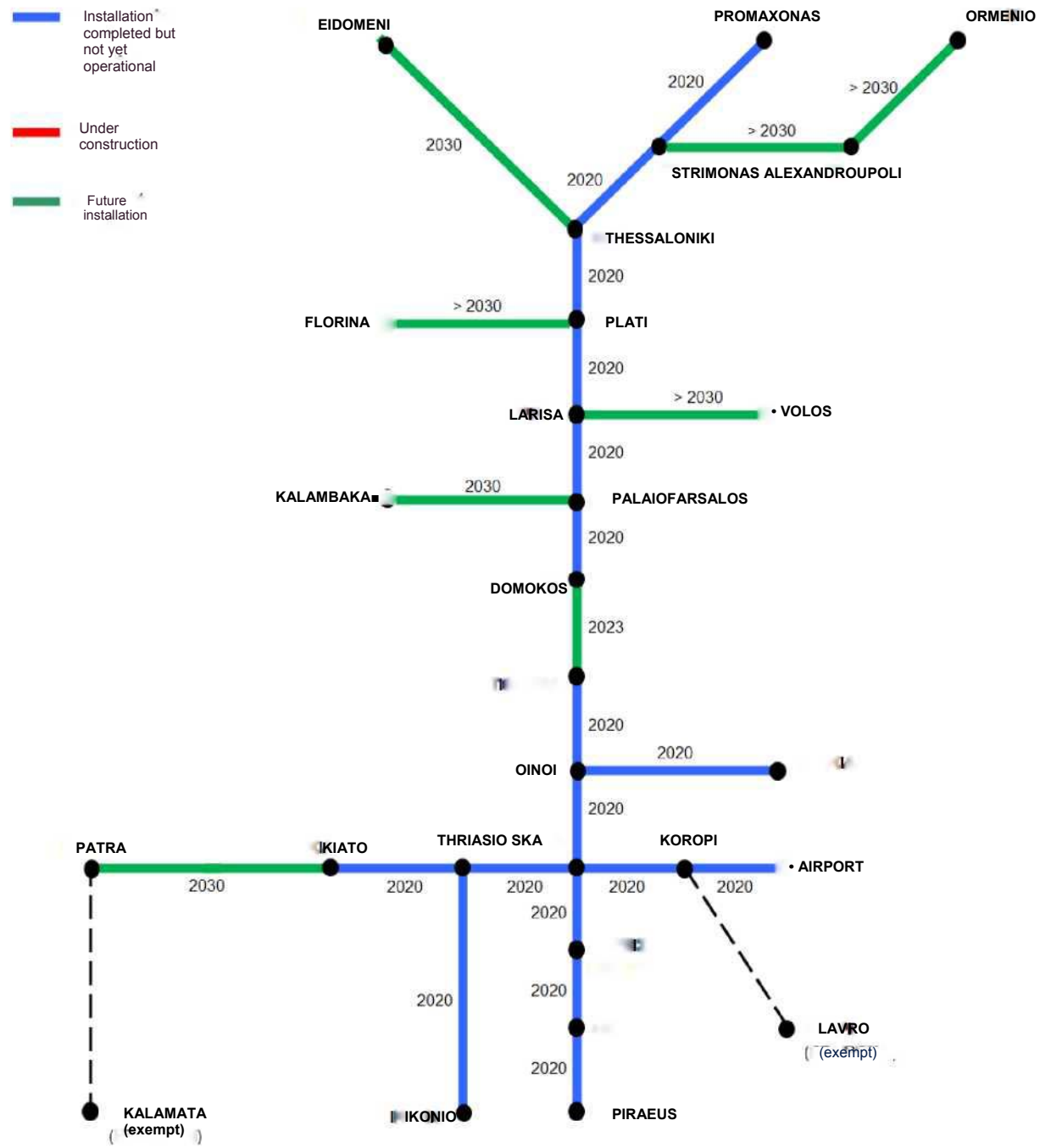


Annex I Timetable for bringing the ETCS trackside system into service





Annex II
Timetable for bringing the GSM-R trackside system into service





ANNEX III:
INSTALLATION OF THE ETCS SYSTEM (LEVEL 1, BASELINE 2, VERSION 2.3.0.D) IN ENGINE UNITS

Construction	Type of engine units	Number of units which have installed ETCS	Number of units which will install ETCS
Railbus (STADLER)	DMU for local and suburban trains	11	5
MAN 2000 (MAN)	DMU for local and suburban trains	12	2
Adtranz class 220 (BOMBARDIER)	Diesel Loco for passenger and freight trains	24	9
Intercity (AEG & LEW)	DMU for Intercity trains	7	1
High Performance Locomotive 120 (SIEMENS)	Electric Loco for passenger and freight trains	23	6
EMU DESIRO (SIEMENS)	EMU for local and suburban trains	17	3
Series II/Double Voltage metro-train (MITSUBISHI/ROTEM)	EMU metro-trains	7 ¹	-

¹ LEVEL 2, BASELINE 1