ERTMS
European Rail Traffic Management System
and the 2007-2013 TEN-T Programme +
Corridor implementation
**Corridor A**

**Rotterdam–Genoa**

ERTMS Corridor A stretches from the sea port of Rotterdam (an extension to the Belgian ports of Antwerp and Zeebrugge is already foreseen) to the port of Genoa, right through the heart of the European Union along the so-called “Blue Banana”. This is the most heavily industrialised north to south route in Europe and connects Europe’s prime economic regions. The countries directly involved are The Netherlands, Belgium, Germany, Switzerland and Italy. The length of the Rotterdam-Genoa route is 1,400 km.

The “Blue Banana” includes key economic centres such as Rotterdam, Amsterdam, Duisburg, Cologne, Frankfurt, Mannheim, Basel, Zurich, Milan and Genoa. All of these urban areas are served and connected by Corridor A, which also has indirect links to London and Brussels. Corridor A also has corresponding links to Corridors C, D and F.

This important geographical position together with the resulting fact that Corridor A carries by far the greatest transport volume in Europe, makes the Rotterdam-Genoa route an important enabler for international rail freight transport in Europe.

**Corridor B**

**Stockholm–Copenhagen–Hamburg–Munich–Verona–Bologna–Naples**

ERTMS Corridor B stretches north to south from Stockholm in Sweden to Naples in Italy, overlaying in part the path of TEN-T Priority Project 1, the railway axis Berlin-Verona/Milano-Bologna-Napoli-Messina-Palermo and of Priority Project 20, the railway axis Fehmarn belt. Corridor B’s ERTMS implementation will create the longest EU ERTMS Corridor with its 3,900 km of track.

The full implementation of Corridor B will bring relief to road traffic in the five countries crossed (Sweden, Denmark, Germany, Austria and Italy) as more operators switch to rail as a more convenient and reliable means of transport. It will also ensure future demands for freight transport in the countries involved are met, encouraging intermodality and modal shift whilst at the same time fostering rail interoperability.

Corridor B intersects ERTMS Corridors F and D.

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**ERTMS Corridors**

**3 Member States**

- NL DE IT + (CH)

**€110.6 million co-financing from the TEN-T budget, for:**

- 17 projects contributing to the corridor
- 1,156 km of track to be equipped
- 491 Locomotives to be equipped

**5 Member States**

- SE DK DE AT IT

**€49.1 million co-financing from the TEN-T budget, for:**

- 8 projects contributing to the corridor
- 590 km of track to be equipped
- 201 Locomotives to be equipped
Corridor C

Antwerp–Basel / Lyon

ERTMS Corridor C is a dedicated freight rail route crossing Belgium, Luxembourg, France and Switzerland starting in Antwerp and ending in Lyon. Two secondary ramifications lead to Basel and Ambérieu-en-Bugey. The extension to Rotterdam (not included in the current European Deployment Plan) involves the fourth Member State, The Netherlands. Its position is strategic for freight transport, as it links two of the main ports in Europe with other major industrial areas. Corridor C crosses five countries, with four different rail electrification and five different signalisation systems, for a total of 1,700 km.

It connects major industrial areas such as Antwerp, Rotterdam, Gent, Liège and the Lorraine and Lyon regions with markets and key intermodal nodes. Traffic volumes along the Corridor are expected to increase by 60% between 2005 and 2020.

The introduction of ERTMS along the Corridor will contribute to stimulating the increase in rail freight traffic and shift freight from road, thus relieving congestion in the affected countries. ERTMS will ensure faster, safer and more reliable rail freight transport, which will encourage operators to look at this mode for their needs.

Corridor C meets Corridor A in Basel and Rotterdam and Corridor D in Lyon and Ambérieu-en-Bugey.

Corridor D

Valencia–Barcelona–Lyon–Turin–Trieste–Ljubljana–Budapest

ERTMS Corridor D crosses the EU from west to east, linking Valencia in Spain with Budapest in Hungary through Lyon, Turin and Ljubljana. The Corridor partly overlays TEN-T Priority Project 19, the high speed rail interoperability in the Iberian Peninsula, and Priority Project 6, the railway axis Lyon-Trieste-Divača/Koper-Divača-Ljubljana-Budapest-Ukrainian border, with a total length of around 2,700 km.

Corridor D will ensure a fast, safe and efficient freight rail transport across the EU, boosting the sector's competitiveness and fostering modal shift from less environmentally friendly modes of transport.

Studies forecast annual growth in the demand for freight transport services of 3.7% to 7.8% for the five countries involved in Corridor D. To tackle this increase, initiatives such as Corridor D offer a valid alternative to simply increasing road transport, providing a service which is more efficient in terms of journey times, reliability and capacity.

The Corridor interlinks with ERTMS Corridor C in France, A and B in Italy and E in Hungary.
**Corridor E**

**Dresden–Prague–Brno–Vienna–Budapest/Vienna–Constanța**

ERTMS Corridor E stretches from the German city of Dresden to Constanța on the Romanian Black Sea coast, in a roughly northwest to southeast path. The Corridor, which was extended beyond Budapest in 2008, coincides almost entirely with TEN-T Priority Project 22, the railway axis Athina–Sofia–Budapest–Wien–Práha–Nürnberg/Dresden.

The importance of Corridor E lies in the fact that it connects the EU’s most important port on the Black Sea with major industrial areas such as Bratislava, Prague, and Vienna. The Corridor also runs along the EU’s longest river, the Danube, thus encouraging intermodality between rail and water for freight transport.

Member States along Corridor E have confirmed its importance by submitting national ERTMS deployment plans committing them to equip major parts with ERTMS by 2015.

Corridor E interlinks ERTMS Corridor D in Hungary.

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**Corridor F**

**Aachen–Berlin–Warsaw–Terespol**

ERTMS Corridor F is an east to west rail link starting in Aachen (Germany) and then passing through Berlin, Poznań, and Warsaw before finally reaching Terespol at the Polish border with Belarus. The Corridor also includes a branch from Rossau in Germany to Legnica in Poland.

The Corridor was developed to foster modal shift from road to rail for freight transport and it will be entirely equipped with ERTMS by 2020, in line with European priorities.

To facilitate freight traffic between west and east, it was decided to expand Corridor F to the North Sea ports of Antwerp/Zeebrugge and Rotterdam. This step was taken after the intensification of commercial flows between The Netherlands, Belgium, Germany, Poland, and the countries of the former USSR and Asia.

Corridor F crosses ERTMS Corridors A, B, and C, thus serving to increase the efficiency of the Corridor and the competitiveness of the entire rail sector.
European Rail Traffic Management System (ERTMS)
is a major European initiative aiming at safer and more competitive rail transport. The implementation of ERTMS will replace more than 20 different train control-command systems currently in use in Europe with a single harmonised system. This will enable the safe and uninterrupted movement of trains throughout Europe, achieving optimisation of the capacity and efficiency of infrastructure — thus lowering costs for rail operators and increasing safety and capacity for operators and passengers alike.

ERTMS is made up of two key components:

1. European Train Control System (ETCS):
an automatic train protection system to replace the existing individual Member State systems, thus enabling trains to cross national borders more easily.

2. Global System for Mobile Communications – Railway (GSM-R):
an international wireless communication standard for railway communication and applications, used for data transfer between trains and trackside control centres.

The implementation of ERTMS is a key priority of the European Commission and it has championed its support via various initiatives to build cooperation and speed up the actual works — including Memoranda of Understanding (MoU) with key railway stakeholders, a formal Deployment Plan and direct grants through programmes such as the Trans-European Transport Network (TEN-T) Programme.

TEN-T and ERTMS
ERTMS is a key part of TEN-T Policy. Under the 2007-2013 TEN-T Programme, three dedicated ERTMS calls for proposals have been launched, providing an overall financial support of around €535 million for more than 50 projects. These grants have focused on the equipment of lines and trains, as well as activities related to the MoU, such as ERTMS testing and the definition of the technical specifications. Some successful implementation efforts aided by this funding are already in evidence.

The implementation of the ERTMS projects funded by the TEN-T Programme is followed by the TEN-T Executive Agency (TEN-T EA), ensuring the technical and financial project management from start to finish.

About the TEN-T Executive Agency
Based in Brussels, the TEN-T Executive Agency was created by the European Commission in 2006. Its mission is to support the European Commission and TEN-T project managers and promoters, by ensuring the technical and financial management of the projects and the successful implementation of the TEN-T Programme. The Agency is in charge of all open TEN-T projects under the 2000-2006 and 2007-2013 funding schemes. The projects represent all transport modes — air, rail, road, and maritime/inland waterway — plus logistics and intelligent transport systems, and involve all EU Member States.

TEN-T ERTMS Statistics
for the 2007-2013 financial framework

€535.4 million in ERTMS TEN-T co-financing

More than 50 projects*
24 projects are contributing to trackside
23 to onboard
13 to MoU

*Certain projects contribute to more than one category.
ERTMS Activities

**The ERTMS environment (trackside and onboard)**
Due to the nature of its functions, the ERTMS system is split in two sub-systems: **trackside** and **onboard**.

**Trackside**
Trackside ERTMS deployment involves the installation of ERTMS equipment along railway tracks. The core elements are ETCS Eurobalises, which are special transceivers installed at intervals between the rails that provide track information to the ETCS system installed in the locomotive.

The other key elements making up trackside ERTMS, depending on the ETCS Level, are:

- A radio communication network (GSM-R)
- Lineside electronic units (LEU), which generate the data to be sent by the Eurobalises
- Radio Block Centres (RBC), which elaborate messages to be sent to the train via GSM-R
- Loops (Euroloop), which transmit signalling information in advance via track circuits
- Radio Infill units, which transmit signalling information in advance via GSM-R

**Trackside TEN-T implementation**
1,847 km of track to be equipped, of which:
- 5,691 km of first deployment
- 2,058 km of upgraded track
- 98 km of pilot track

**Onboard**
Onboard ERTMS installation involves fitting (installation during the time of the construction of a new locomotive), retrofitting (installation on an existing locomotive) or upgrading (locomotive has already been equipped with ETCS based on one of the previous versions of SRS) locomotives so that their European Vital Computer may be able to interpret the signals from the ETCS trackside elements (e.g. Eurobalises) installed on the track.

Once the system is harmonised, an ETCS equipped locomotive will be able to operate on any portion of ETCS-equipped rail track, without suffering from compatibility problems, enabling rail companies to operate freight and passenger trains across national borders.

**Onboard TEN-T implementation**
1,695 Locomotives to be equipped, of which:
- 215 fitted
- 860 retrofitted
- 620 upgraded

**Memorandum of Understanding (MoU)**
In March 2005, the European Commission, together with representatives of the rail infrastructure industry, signed the first MoU establishing the basic principles of the EU’s ERTMS deployment strategy. Its objective was to define each actor’s contribution to ensure the progressive setting up of an ERTMS equipped network within 10-12 years. In order to facilitate this work, the European Commission appointed Mr Karel Vinck as ERTMS coordinator in July 2005. Mr Vinck has promoted an approach based on the coordinated deployment of ERTMS along six important freight Corridors (A through F).

In 2008, the second MoU was signed by the Commission and the European railway associations (CER, UIC, UNIFE, EIM, GSM-R Industry Group and ERFA) to speed up the overall deployment of ERTMS. The Commission followed this up with the adoption of the European Deployment Plan for ERTMS in July 2009, which provides for the progressive deployment of ERTMS along the main European rail routes in the 2015-2020 time horizon.

Related to these two MoUs are several other horizontal activities aiming at the development and consolidation of the ERTMS system specifications. One of the recent achievements of these MoU activities was the successful adoption of new Baseline 3 specification, which represents the latest set of ERTMS functionalities.

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**Disclaimer**
This publication focuses solely on ERTMS implementation funded by the EU’s 2007-2013 TEN-T Programme and, as such, does not reflect the actual situation of overall ERTMS deployment in the EU Member States.

The data used is accurate as of 28 February 2012 and includes the 2011 ERTMS Call projects. All funding values represent the theoretical maximum for each project/corridor.

Locomotives may operate on more than one ERTMS corridor.

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