ETCS
together for rail safety across Europe

ETCS Master Plan
for rail safety in Belgium

INFRABEL
Right On Track

Contents

Together for rail safety across Europe

With the progressive implementation of the ETCS* safety system on our network, we are taking a major step forward on the way to a safe, strong and interoperable European railway area. It is also the materialization of a common motto for our customers: Safety first!

* ETCS – European Train Control System

A railway area across borders

Under the impulse of Europe, major railway projects were initiated in the early 1990's in order to promote, particularly, the development of a high-speed railway network and the establishment of transnational freight corridors.

Implementation of these major projects brought to light that the existence of a joint transport offer would not suffice. It soon became clear that a number of technical obstacles would have to be overcome before we could talk about a European railway area.

One of the major obstacles turned out to be the lack of an interoperable safety system.

In the early 1990s, some twenty different signalization systems coexisted on the European railways, critical components, it must be pointed out, for rail traffic management and safety.

This was of course irreconcilable with the intention to evolve towards a European rail net which profiles itself as being a durable alternative to other means of transport. Boundaries would have to be taken down for this.

The development and installation of an interoperable safety system then became a sine qua non for a unified European railway area, which would be without boundaries and completely safe. This search would eventually lead us to ETCS.

ETCS: worth the effort

"With ETCS, we are building a safer European rail network together across Europe" - that is what the infrastructure managers, European authorities and the whole of the rail sector in essence reconfirmed with the Memorandum of Understanding signed by the Railway Sector, the European Commission and the European Railway Agency on 16 April 2012 in Copenhagen.

This confirmation of a joint commitment in support of installing the ETCS safety system on all the major European railway connections by 2020 was an important step towards increasingly safe cross-border train transport.

Only developed at the end of the 1990s, it shows that in 2012 we had come a long way with the train control system. The system development was largely over and done with, and we had come to a turning point where implementation became more important.

Almost 5 years later, the implementation is progressing in Belgium as well as in the rest of Europe. The first European Deployment Plan from 2012 will be extended in 2016 under the influence of the European TEN-T policy.

In less than 20 years, ETCS has become the standard reference in rail safety equipment.

Safety as first priority !

Railway safety has always been a priority in Belgium. Infrabel's strategic plan FOCUS (2012 – 2016) has reconfirmed safety as the top priority of the Belgian railway infrastructure manager.

Since its establishment in 2005, Infrabel has made considerable efforts to equip its infrastructure with a safety system offering effective coverage and compatible with an interoperable European system. In October 2011, a few months before the Copenhagen Declaration, it presented an "ETCS Master Plan" to the Belgian Parliament.

Its objective is clear and ambitious: to equip the entire Belgian railway network with the European ETCS safety system by 2022

"The Europe-wide migration towards ERTMS* is a crucial step towards a Single European Railway Area and a safe railway system in Europe. It is a necessity to come to a successful modal shift. Thanks to the impulse of the European Commission, the European Railway Agency, and to the involvement of all actors in de railway sector, we have taken a clear and crucial decision on the future of rail transport."

Luc Lallemand

CEO Infrabel
Chairman UIC Rail System Forum

* ERTMS - European Rail Traffic Management System

02

An ambitious ETCS migration strategy

Our ambition is to progressively improve the Belgian railway to be among the top 3 safest networks in Europe. The means for achieving this are described in detail in the "ETCS Master Plan". In collaboration with the railway operators, we are doubling our efforts to meet each of the 4 major deadlines that determine the path to our success.

The ETCS Master Plan

The strategy of progressively equipping the Belgian infrastructure with ETCS is ambitious.

It was detailed in the "ETCS Master Plan" presented by Infrabel and SNCB* before the Special Committee on Railway Safety on 19 October 2011.
The total cost for the infrastructure manager was estimated at 2,004 billion euro in 2011.

It is financed by annual state funding and within the framework of the European subsidies.

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

2007-EU-60400-P

Deployment of ERTMS on the corridor Antwerp – Basel/Lyon

2012-BE-60027-P

Deployment of ETCS on railway lines in Belgium (HSL2,L10, L36C/2)

2014-BE-TM-0655-S

ETCS: development of the generic design Level 2, key catalyst for the roll- out of ETCS 2 in Belgium

2014-BE-TM-0660-W

Deployment of ETCS Level 1 on the rail section Ans – Angleur

* SNCB : Société National des Chemins de fer Belge

3 levels combined

The ETCS Master Plan aims to implement the 3 distinct levels of the ETCS system (level 1, level 2 and Limited supervision) depending on the needs and specificities of the network.

ETCS Level 1

• Constant monitoring of the train speed and emergency braking if the maximum authorised speed is exceeded.

• STOP functionality in case of passing a signal at red.

• Transmission of information via balises placed at the foot of signals, but also up the line from them.

ETCS Level 2

• Constant monitoring of the train speed and emergency braking if the maximum authorised speed is exceeded.

• STOP functionality in case of passing a red signal.

• Transmission of information from the ground to the driver's cab and inversely via GSM-R* antennas (specifically for rail).

ETCS Level 1 - Limited Supervision

• STOP functionality in case of passing a red signal.

• Transmission of information via balises placed at the foot of signals, but also up the line from them.

• Tailor-made solution allowing for the selection of the required functions to achieve the appropriate level of safety.

* GSM-R - GSM For Railways. ** TBL1+: Transmission Balise Locomotive
*** To be decided officially

4 successive phases

Four major successive deadlines have been set out for the implementation of the ETCS Master Plan.

Phase 1 - situation end 2015

TBL1+** programme completed;

Phase 2 - 2016-2022

Network fully equipped with ETCS;

Phase 3 - 2025***

Making ETCS the technical standard for operators travelling on the Belgian network and limited access to ETCS equipped trains only;
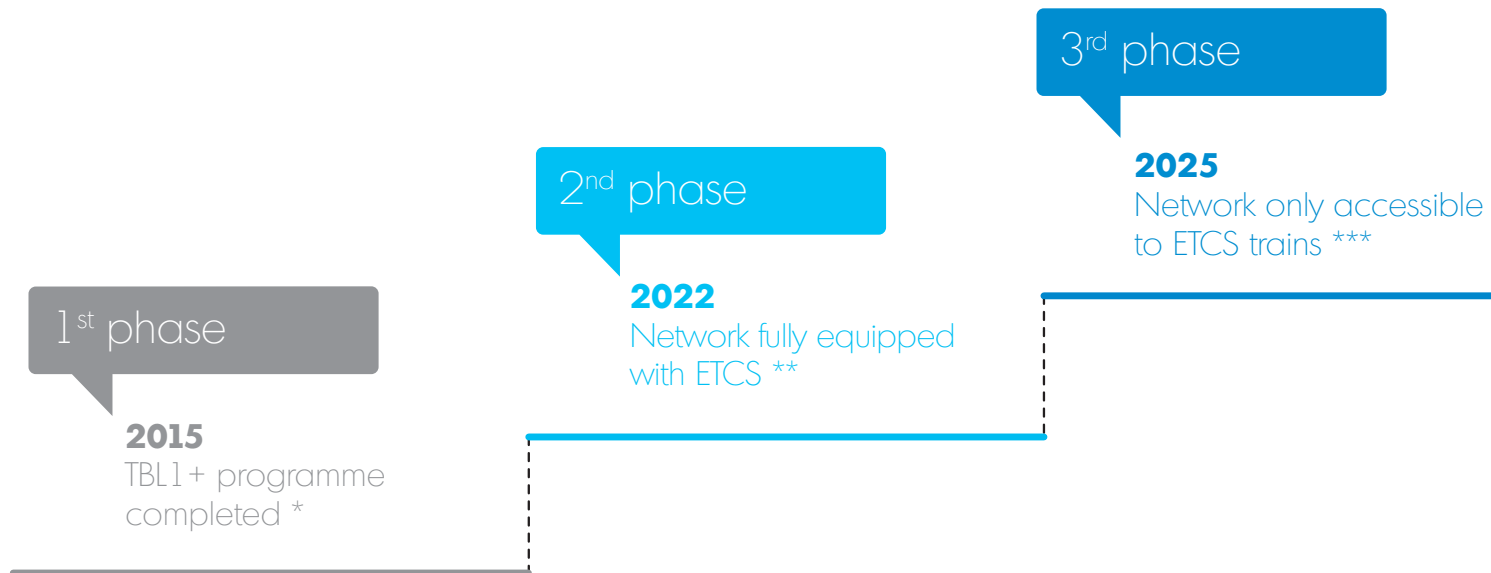
Phase 4 - 2030-2035***

Convergence towards a homogeneous version of ETCS – level 2.

ETCS phased migration strategy

3rd phase

2025
Network only accessible to ETCS trains ***

2nd phase

2022
Network fully equipped with ETCS **

1st phase

2015
TBL1+ programme completed *

* Basic implementation (99.9% efficiency coverage) fully executed. ** And the TBL1+ system   *** To be decided officially

4ʳᵈ phase

2030 > 2035
Convergence to a homogeneous
version (ETCS level 2) ***

Goal achieved:

All of the railway traffic
secured with ETCS

03

Situation on the Belgian railway network

With a network covered by GSM-R since 2009, and entirely equipped with the TBL1+ system since 2015, we have managed to gradually improve our level of safety. Today, the process of equipping our infrastructure with the ETCS system is continuing at a rapid pace. By 2022, all train travel will be entirely monitored thanks to this system. Furthermore, we have the ambition to make our network only accessible to ETCS trains by 2025.

Focus on Belgian infrastructure *

The Belgian railway network has 3,631 km of tracks. There are 9,831 switches and crossings, nearly 11,000 signals and 1,818 level crossings.

All signals on the main tracks are equipped with the driver assistance system called Crocodile. With this train protection system, the driver is warned by a gong or an indicator light (the so called 'Memor'), depending on the status of the signal he is passing.

Infrabel has the ambition to optimize the management of its safety systems and to dismantle the Crocoldile safety system, as ETCS rolls out. In doing so, we avoid dual signalling, which will enhance the asset management of the infrastructure manager and railway operators, and also the ergonomics of the individual train driver.

Since 2009, the entire Belgian infrastructure has also been covered by an interoperable mobile telephone network – GSM-R. This is installed along the tracks, in the train driver's cabine and in the monitoring bodies and traffic management system (signal boxes and Traffic Control – the Belgian national centre for railway traffic management and coordination).

Today, the interoperability of the GSM-R, coupled with ETCS (GSM-R + ETCS = ERTMS), is considered the reference among the communication systems of European railway networks.

*Core figures on 31/12/2014

TBL1+: a first step to ETCS

Since 2008, Belgium has equipped its network with a complementary driver assistance system: the TBL1+ system. This completed and reinforced the existing driver assistance aids ("Memor" or "Gong whistle" type).

The TBL1+ system is based on eurobalises using packet 44, which send out an electromagnetic signal received by an antenna placed under the locomotive. It enables the activation of automatic braking if a train is going faster than 40 km/h at a distance of approximately 300m from a red signal, or if it passes a red signal.

Currently 7,573 signals* are equipped with this system. They guarantee an effective coverage of 99.99% over the entire Belgian railway network.

Core figures on 31/12/2015
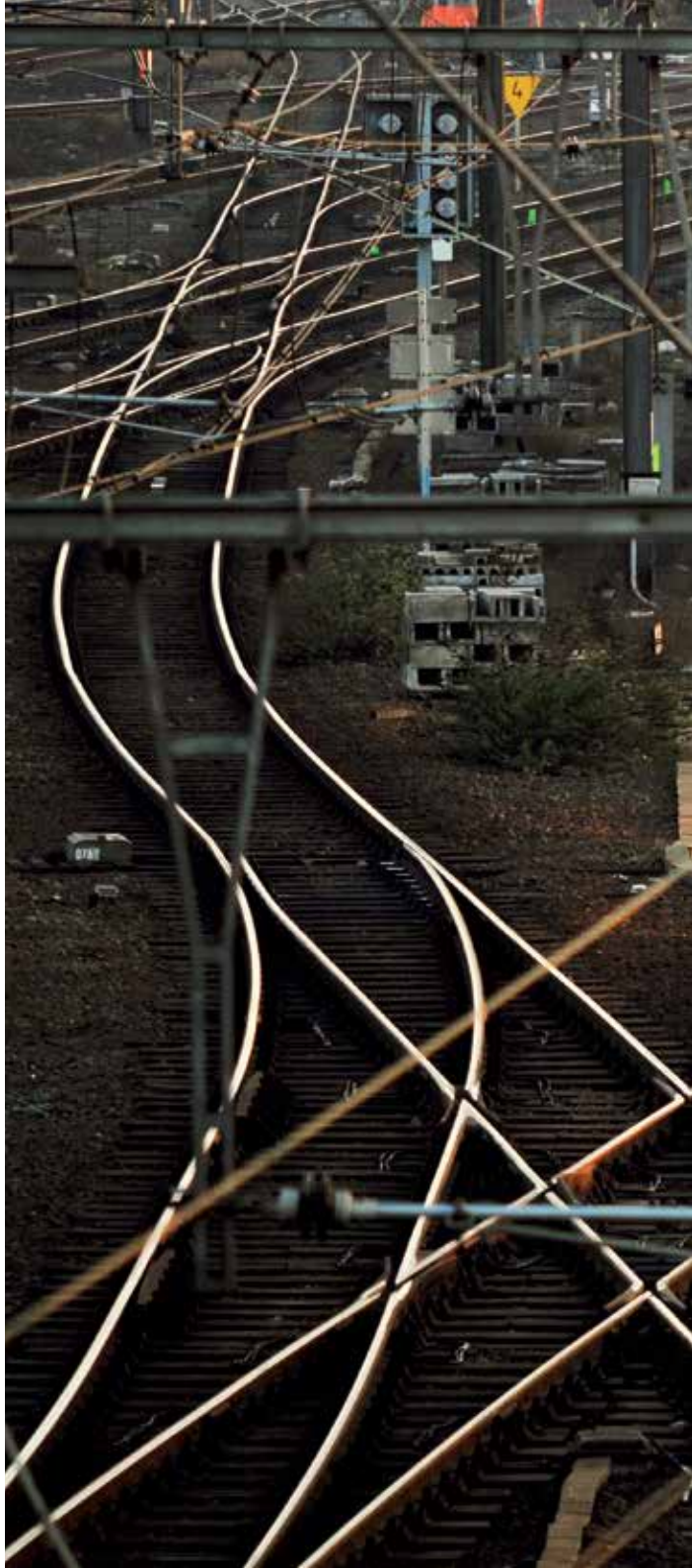
ETCS on the Belgian railway today

From a geographical point of view, Belgium has a strategic position within Europe. Historically, this has always explained the presence of international train connections with our neighbouring countries.

This was also the case in recent history, and as early as 1992, Belgium committed itself to setting up a network of high-speed lines, which would be safe and open to Europe. Thanks to these efforts, Brussels has become a nerve centre for trans-European railway activity in the space of a few years. International high speed connections for passenger services are offered towards all of our neighbouring countries, including the United Kingdom.

The same applies for freight transport. The central location of Belgium, and the presence of two important sea ports, has made Belgium into an important transit country for freight transport. Under European influence, several rail freight corridors were built to make freight transport more attractive. Three of these corridors cross Belgium.

When deciding on a new train control system in 2011, it was important to choose a European and interoperable solution. The choice for ETCS was self-evident.

Since 2012, we have effectively started the roll out of ETCS on the conventional network.

Since then four axes of the "conventional" network have already benefitted from the safety coverage provided by ETCS.

- Lines 36 / 36 N connecting Brussels to Leuven (03/2012).
- A few months later (06/2012), the Diabolo railway link was also commissioned with the ERTMS system. The Diabolo rail tunnels and the aboveground rail line (line 25N) were equipped with the GSM-R communication network.
- The Liefkenshoek rail link which connects the left and right banks of the Port of Antwerp (12/2014)
- The Belgian part of the "ERTMS Corridor C" (which connects Antwerp, Basel and Lyon), one of the key axes of freight transport by rail in Europe. It strengthens its rail capacity while sustaining its growth. (12/2015)
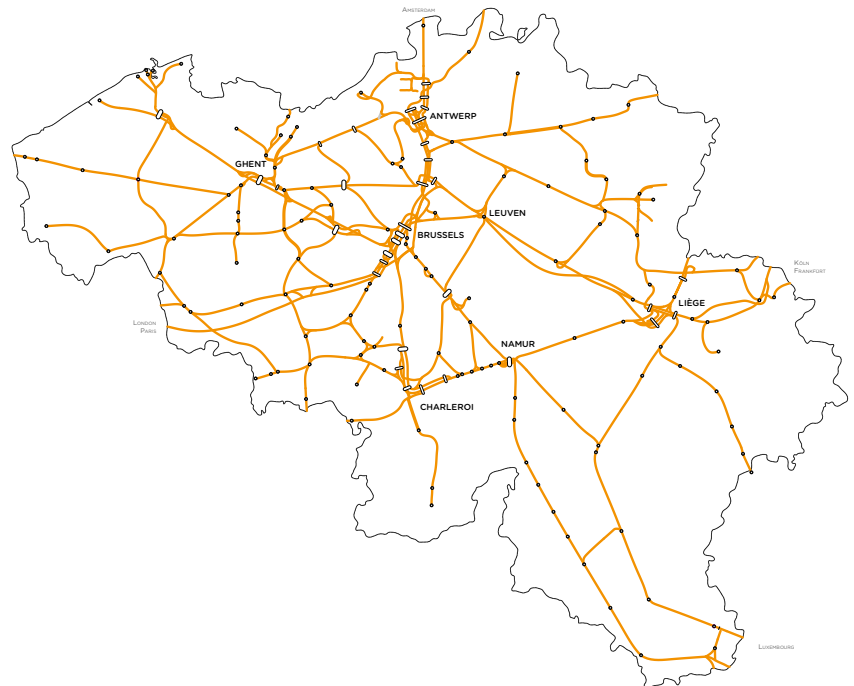
ETCS on the Belgian network (2012-2015)
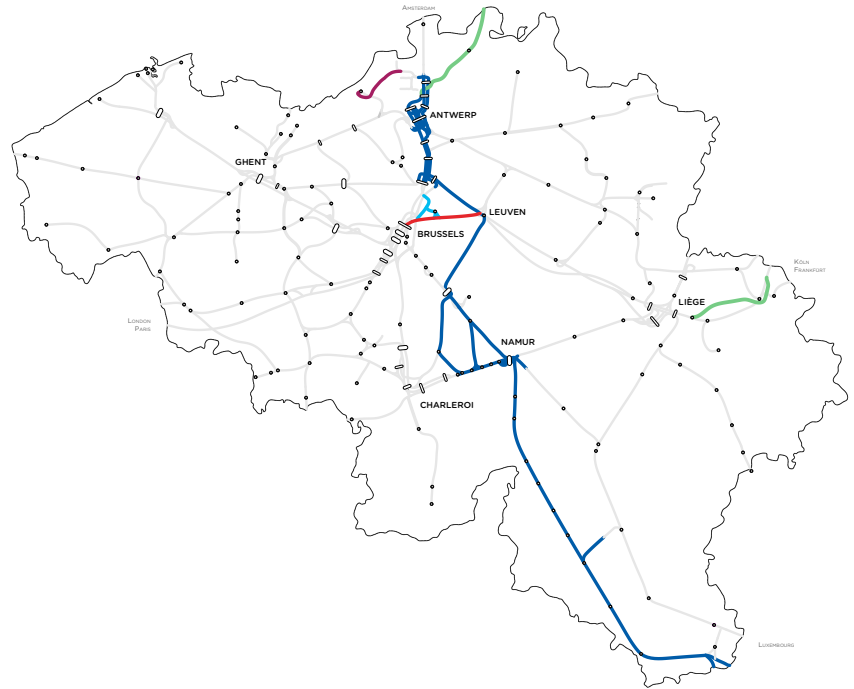
ETCS on the Belgian network (2022)

HSL 3 & 4 - High Speed Lines

Completed in December 2009 - ETCS level 2 and level 1*

Constructed in a star around the 3 axes (London, Paris, Cologne and Amsterdam), the Belgian high-speed network consists of 314 km of railway, of which 200 km of high-speed lines (HSL). ETCS level 2 and level 1 are installed on 2 sections of tracks (Antwerp-Dutch border and Liege-German border).

Lines 36 / 36N

Completed in March 2012 - ETCS level 1

It is the first line on the Belgian railway network (outside the high-speed lines) to be equipped with ETCS along these 28 km between Brussels and Leuven.

Diabolo

Completed in June 2012 - ETCS level 1

Thanks to an underground rail connection from the Brussels National Airport station, it connects Brussels Airport to a new, two-track line (line 25N) between Schaerbeek and Mechelen, built on the central reservation of the E19 motorway.

Liefkenshoek

Completed 2014 - ETCS level 1

This railway complex runs along 16.2 km and ensures a direct freight connection between the facilities on the Left Bank and Right Bank of the Port of Antwerp.

ERTMS Corridor C

Completed in December 2015 - ETCS level 1

This transnational freight corridor connects Antwerp/Basel-Lyon. Its Belgian section consists of 429 km of track equipped with ETCS and connects the Port of Antwerp to the major industrial centres.

Network fully equipped with ETCS

To be Completed 2022 - ETCS**

The ETCS Master Plan aims to implement the 3 distinct levels of the ETCS system (level 1, level 2 and Limited supervision) depending on the needs and specificities of the Belgian network.

*The axes Brussels – Amsterdam and Brussels – Cologne are equipped with ETCS level 2 and level 1 on the sections of the lines between the Liege-German border and the Antwerp-Dutch border. ** And the TBL1+ system*

Focus on Infrabel

04

A vision & a mission

Infrabel is at the crossroads of Europe. To this end we are striving to create a safe and qualitative rail network.

Our ambition is to be a strong link in a sustainable transport system, supporting the socio-economic development of Belgium and Europe.

Infrabel is the public enterprise that develops, maintains and manages the Belgian railway network. Thanks to the professionalism of our employees and our high-performance technology, we offer our customers a service that focuses on both present and future mobility requirements.

5 Priorities

1st

Safety first!

Since Infrabel's establishment in 2005, we have been striving to continuously improve all aspects of safety in the railway environment. The safety of train travellers, our employees and anyone near the tracks is our main priority.

2nd

Trains on time

With a comprehensive maintenance and renewal policy, Infrabel invests in a reliable and punctual railway network.

3rd

A network for all the trains of tomorrow

Infrabel wishes to provide a solution to the mobility issue and aims to offer a competitive railway network for its customers and passengers in order to support the economic and social development of our country.

4th

A financially sound company

We have to carry out our plans in the face of strong pressure on government funding. In order to maintain a constantly sound financial situation, we use the resources available to us efficiently, and we have to find innovative ways to finance investments.

5th

In line with society

Infrabel desires to focus on society and to ensure that our decisions meet the social expectations to the greatest extent possible.

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Key figures*

12,464
employees

16
customers

121 mio €
EBITDA

3,631
kilometres of lines

11,637
engineering structures
(bridges, tunnels, etc.)

4,309
switches and crossings
on main lines

10,932
signals

152
signal boxes

1,818
level crossings

5,832
Kilometres of catenary
on main lines

* Core figures on 31/12/2014

16
Customers*

13

active freight operators on the Belgian network

SNCB Logistics · SNCF · CAPTRAIN · EUROPORTE · RAILTRAX

CROSSRAIL · R→F · DB SCHENKER · ERS Railways · TRAINSPORT

CFL cargo · PKP cargo LOGISTICS · DB SCHENKER Euro Cargo Rail

3

active passenger operators on the Belgian network

SNCB · EUROSTAR · THI FACTORY

Core figures on 31/12/2014