

What is ERTMS?

ERTMS stands for 'European Railway Traffic Management System'. It is a control, command, signalling and communication system for railway management and safe regulation. It was adopted by the European Union as a standard, allowing an interoperable rail frame in Europe. ERTMS is composed of the European Train Control System (ETCS) - an automatic train protection system (ATP) that continuously ensures that the train does not exceed the safe speed and distance and the Global System for Mobile Communications - Railways (GSM-R). GSM-R is a radio communication system for voice and data services.

The ERTMS is composed of two subsystems: trackside and onboard, and in order to make it function, both the infrastructure and the train must be equipped. The ERTMS system installed on trackside and the ERTMS system installed on the vehicles exchange information. This information allows the ERTMS equipment installed onboard the vehicles to continuously supervise the maximum speed allowed for operation and to give the driver all the necessary information to operate with cab signalling. This includes the means to establish voice services.

Why do we need ERTMS?

The number of national signalling systems in Europe is close to 30. This big variety of national systems causes one of the main interoperability problems at the borders, since trains cannot cross them without stopping for technical and operational reasons. ERTMS is the most crucial tool to achieve interoperability in European railway network. The idea of a standard European system was born already more than 20 years ago, since then this software based system has gone through a long development procedure.

Technical maturity of ERTMS is assured by law, Member States and the railway sector has agreed on ERTMS as the unique signalling system in Europe. In order to have a successful and fast migration process from national system to ERTMS, we need a coordinated way of ERTMS deployment.

What are the benefits of ERTMS?

The main benefit of ERTMS is first and most obviously interoperability: trains equipped with ERTMS can cross the borders without interruption along railway lines equipped with ERTMS. In addition to this, ERTMS provides increased capacity and higher level of safety, reliability and punctuality than the most of the existing national signalling systems.

The investment figures in signalling systems equipment can be significantly reduced for any Member State facing a large ERTMS deployment in its network. Since ERTMS is a standard, any supplier can produce equipment and thus the railway signalling manufacture market becomes more competitive. Member States can reach great benefits, in particular if they do not implement ERTMS in a patchy way, but on the basis of a well-founded strategy.

Infrastructure managers would profit from the increased safety level, achieved through continuous supervision of the train speed. Higher capacity can be reached through higher speed (ERTMS allows operation speeds of up to 500km/h) and through reduction of the headway between trains (i.e.: the minimum distance or time between vehicles in commercial service). This latter allows the Infrastructure Managers to manage a greater number of trains, and thus the railway system is able to transport larger volume of passengers or goods. Maintenance costs can be reduced, since ERTMS

might require less trackside signalling. The high safety standards of ERTMS constituents increase punctuality for both freight and passenger services, since failures (and consequent delays) due to this reliable signalling system can be even more unlikely.

Railway undertakings will be able to run everywhere in the ERTMS equipped European network with only one signalling system onboard, opposed to the current situation where several ATP systems onboard are necessary. This would also positively impact driver training expenditures and time losses at borders due to formalities. To illustrate the advantages with an example, it is necessary to install up to seven signalling systems on the high-speed trains between Paris and Brussels, thereby generating additional costs and accentuating the risks of breakdowns, delays, etc.

Thanks to all those benefits, ERTMS allows a more competitive rail sector, and this means that a gradual shift to rail is expected from other transport modes. This will benefit the environment and its decarbonisation.

Why do we need a new ERTMS European Deployment Plan?

The old deployment plan was adopted in 2009 and defined six ERTMS Corridors that were representing the highest freight traffic volume almost ten years ago. The implementation deadlines of this EDP were 2015 and 2020 which means that significant part of those corridors should have been finalised by today. This is unfortunately not the case.

Based on the information received from the affected Member States it was clear already in 2013 that those strict deadlines cannot be kept by many Member States, due to shortage of financing, limited number of available qualified experts (engineers, project managers, drivers with necessary knowledge on ETCS), technical problems during implementation, lack of trust in the ERTMS safety case and initial resistance to change from the national authorities. While significant results had been achieved so far, in 2014 the need became urgent to adapt the implementation deadlines to the reality and propose a realistic and committed deployment plan at European level. Furthermore, the geographical scope of the deployment plan has been aligned with the requirements of the TEN-T Regulation and the originally six ERTMS Corridors have been extended to the nine Core Network Corridors.

Karel Vinck, European ERTMS Coordinator, initiated the review of the old EDP in 2014. In December 2014, the European ERTMS Coordinator started a consultation with Member States by sending out his Work Plan for ERTMS that contained a proposal for the implementation timeline of the Core Network Corridors. This activity launched a close dialogue with the Member States: the Coordinator had numerous bilateral discussions with high-level representatives of the Transport Ministries and Infrastructure Managers in 2015 and 2016 and an extensive exchange of e-mails/letters, phone conversations.

As a parallel exercise to the consultation of Member States, the European Coordinator involved the representatives of the railway sector in this discussion at several occasions (meetings, conferences, bilateral discussions etc.): association of the railway industry (UNIFE), of the infrastructure managers and railway undertakings (EIM, PRIME (platform of infrastructure managers in Europe) CER, UIC), and the European Railway Agency. The representatives of the railway sector were actively participating in the discussions and are supporting the technical adaptation of the current deployment plan.

Why is the new EDP more reliable than the old one?

Karel Vinck followed a two-step approach during the bilateral discussions with Member States about ERTMS implementation on Core Network Corridors: as a first step short term priorities were defined (corridor sections to be implemented by 2023) in 2015 and as second step the long-term priorities were discussed in 2016, however, the definite deadline of 2030 will have to be respected by all

Member States. In number of cases it was impossible to receive concrete dates for this second period, due to financial uncertainties. This close dialogue between the Commission and the member States led to a precise definition of short-term commitments and ensures that this EDP is a realistic plan.

The new EDP is more adapted to the reality and future developments than the old one, since it lays down the dates by when ERTMS will be implemented up until 2023, as these are predictable dates provided by the Member States as part of the bilateral discussions. This implementing regulation foresees a further review procedure to be carried out by 2022 setting the precise implementation dates beyond 2023 for the remaining Corridor sections in the relation to the current legal time horizon laid down in the TEN-T Regulation.

Forerunners of ERTMS implementation in Europe

Several Member States decided to roll-out ERTMS on their entire network.

Denmark has recently updated its national deployment implementation plan and set 2023 as final date of ERTMS implementation on its total national main line network. Denmark is planning to spend about 2.6 billion Euro for the implementation of the most recent set of specification, Baseline 3, on around 3000 km railway line. This is particularly welcomed by the Commission, since Baseline 3 corrects errors and misinterpretations of the previous baseline; it leads to simpler technical solutions and ensures compatibility with Baseline 3 onboard units. Not only the obsolescence of the national Danish signalling system led to the decision to switch completely into ERTMS, but also additional benefits provided by ERTMS: higher safety level, more reliability and punctuality, operation of more trains at the same time and increase of capacity, cost saving in maintenance etc.

Belgium has been deploying ERTMS on its high-speed lines since 2009: from Brussels to the German border (Aachen) and from Antwerp to the Dutch border. ERTMS deployment of cross-border sections can represent a daunting challenge for infrastructure managers, the first one in Europe was implemented at the Belgian – Dutch border in 2009. In 2010, after the accident in Buizingen Belgium decided to roll-out ERTMS on its entire network. Safety has been the main reason for this decision, but next to safety also punctuality and capacity belong to the main drivers to equip ERTMS on more than 3,500 km. Total costs of the infrastructure equipment is about 2 billion Euro.

The Netherlands have recently updated their national deployment implementation plan that foresees ERTMS deployment on international lines and on large sections of the railway network on busy routes by 2030, as a first step. About 2.3 billion Euro will be available for the Netherlands to equip those lines and retrofit their rolling stock. ERTMS is already installed on around 10% of the Dutch railway network (Betuweroute, Havenspoorlijn, HSL-Zuid, Hanzelijn and the route between Amsterdam and Utrecht) and around 20% of trains are already equipped with the system. Main guidelines for their strategy are to ensure interoperability in particular at the cross-border sections and increase capacity on the Dutch network.

Luxembourg took the decision about the national roll-out of infrastructure and rolling stock already in 1999. Safety and obsolescence of the national system were the main drivers to equip almost 300 km railway lines and the rolling-stock by 2017 at the latest. Total costs of track-side and locomotive equipment are estimated at about € 70 million.

Italy is an early investor in ERTMS: heavy investments have been made in high speed lines since the early 2000's and in main national railway lines allowing for mixed traffic as well. Since ERTMS is the only signalling system on some lines, considerable savings in infrastructure and maintenance costs are one of the main benefits of it. Thanks to higher reliability, punctuality and increased capacity, ERTMS has helped gain significant market share for rail freight transport and is expected to bring

considerable further economic and social benefits through increasing number of passengers. This modal shift translates itself in considerable CO2 savings.

Similarly to Italy, also **Spain** has been heavily investing in ERTMS since the early 2000's. Main target of deployment has been the Spanish high-speed network, by now its major part has been deployed. Thanks to its reliability and punctuality, passenger rail transport has grown considerably, at the same time airlines' market shares have been decreased accordingly. ERTMS also has significant environmental benefits: passengers prefer to opt for rail transport instead of the plane when travelling between two cities.

Austria counts as the first mover as well: it spent about €80 million for almost 500 km track-side equipment between 2009 and 2013. Also Cohesion countries have been deploying its network after completing the necessary infrastructure works: **Czech Republic** and **Slovenia** have a very ambitious national migration plan, but also **Hungary, Poland, Romania** and **Slovakia** will equip major part of their Corridors by 2023. **Germany, France** and other countries are working on a strategy how to accelerate ERTMS migration on their territory.

More information: http://ec.europa.eu/transport/modes/rail/ertms_en