

# Signal

the European Rail Traffic Management System

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## Denmark's rail network to be fully ETCS-equipped by 2021

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Banedanmark is forging ahead with the renewal of the entire signalling system on the 3240 km of track that makes up the Danish national rail network. A renewal of this scale has never before been attempted in a single programme in Europe.

Banedanmark's signalling equipment has aged to the point where many of the present systems have passed their technical service life. This has led to increasing levels of failure, delays for passenger and freight operations, and a general decline in the quality of train services over the past few years. Signalling problems now cause many delayed trains every year and account for about half of all delays attributable to the infrastructure manager.

The renewal strategy is targeted at a complete replacement of all signalling systems based on optimised delivery and operations. The aim is to achieve reductions in life-cycle costs while improving performance. Banedanmark will have a better basis for future railway development, as well as making substantial savings in both operations and maintenance costs.

Political approval of the strategy was given in mid-2009. The strategy envisages an investment of EUR 2.4 billion over a period of 12 years and total renewal with ETCS Level 2 by 2021 on all main and regional lines. The cost, which is to be met by the Danish government, takes into account on-board and trackside equipment, interface management, stakeholder management, project management, safety approvals, design, testing, implementation, training and change management.

Summer is upon us and the sun is shining on ERTMS – not least in Denmark, which is in the unique position of having decided to equip the entire national state railway infrastructure with GSM-R Voice and ERTMS Level 2 before the end of 2021. All this and more in your latest round-up on all things ERTMS...

*The Signal team*

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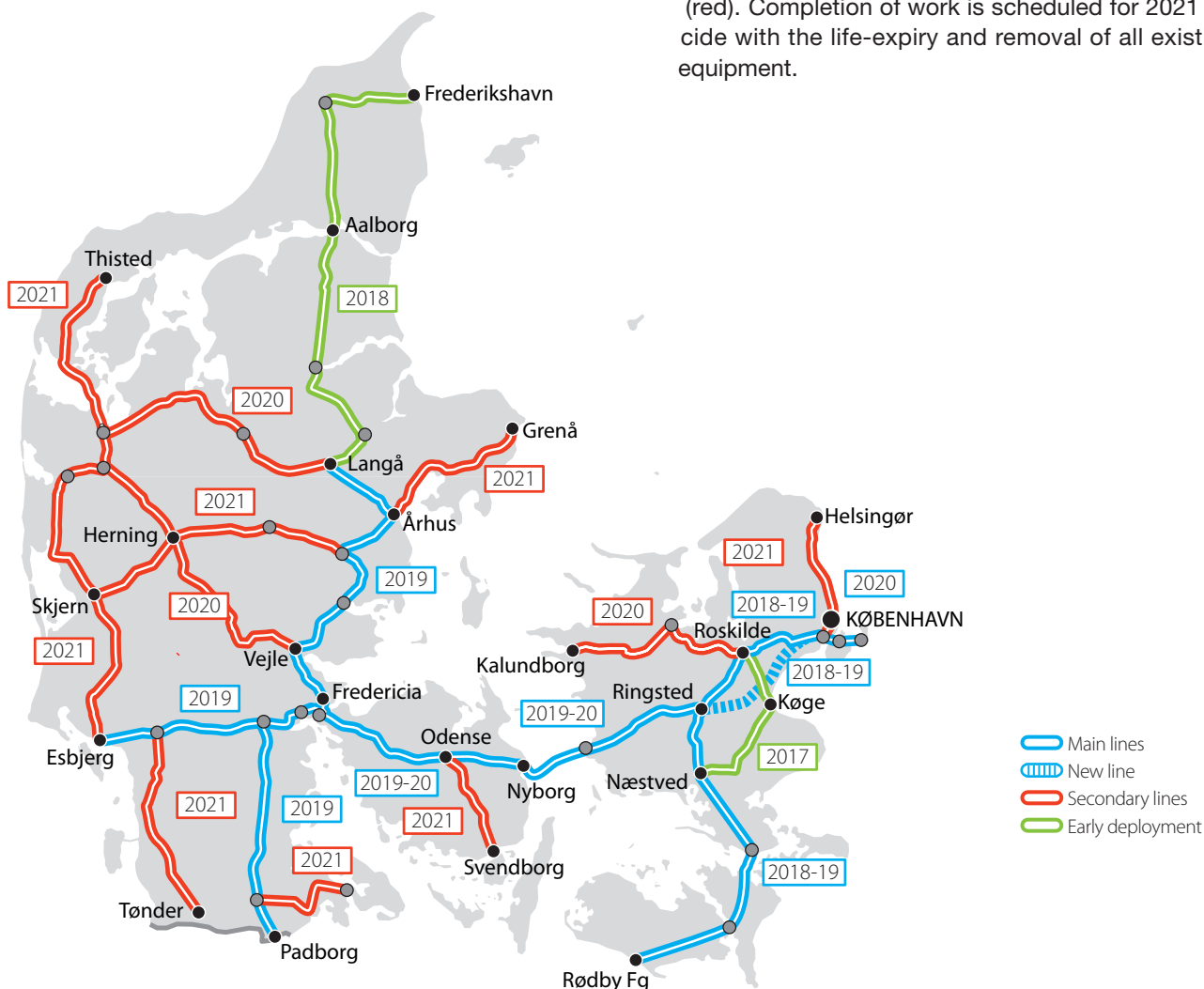


A number of key decisions have been taken on procurement and implementation, including:

- Total replacement means total replacement. All existing equipment is to be replaced (from basic train detection and point machines to the overall traffic-management and on-board systems) no matter what its age or level of technology.
- Procurement will be based on functional requirements, focusing on safety, performance and life-cycle costs for the signalling infrastructure.
- A complete new set of operational rules for the conventional network will be developed, in accordance with the relevant technical specifications for interoperability.

Between now and 2021, other signalling investments will be limited to life-extension of existing equipment and to improving performance on lines with specific punctuality concerns. Most of the attention will be focused on preparing assets for the roll-out of the new signalling and the fitting of on-board equipment. Tenders will then be launched for four main contracts: two main-line infrastructure contracts, one S-bane contract (S-bane being the suburban rail system in Copenhagen) and an ERTMS on-board framework contract.

From 2015 to 2018, the plan is to carry out fitting and testing on early-deployment lines (green) for safety approval and operational maturity. From 2018 a prioritised roll-out of ETCS Level 2 will move along the main lines in both Jylland and Sjaelland (blue). The installation programme will then cover remaining secondary routes (red). Completion of work is scheduled for 2021 to coincide with the life-expiry and removal of all existing ATP equipment.





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## Developments in testing and the importance of independent laboratories

Testing of ERTMS equipment is central to the project's success. One important aspect of the testing concept is to verify interoperability and to check that the specifications are respected. Such tests have a clear European dimension, as they assess the compatibility of lines and trains equipped for different countries. These tests must therefore be framed as precisely as possible and can in fact be carried out more or less in their entirety in a laboratory.

Using laboratories means that it is possible to carry out many more tests than can be performed using trains on real lines, and laboratory tests also produce more readily usable results.

The aim is to make sure that on-board ERTMS equipment that has passed all the tests could be used on all existing and future lines. Much as this may seem to be a basic objective that is already covered by the specifications adopted in 2008, the work must still be pursued so that compatibility is maintained.

To make an extreme simplification, the ERTMS technical specifications can be thought of as a sort of dictionary, featuring a series of words and definitions. On each rail line equipped with ERTMS, the 'words' are assembled on the ground and transmitted into on-board 'phrases' – groups of words organised according to a precise syntax.

Phrases that are common and simple have been understood by all on-board equipment in the same way since the start of the project, but that has not always been the case for more complex 'phrases' used in more unusual circumstances.

The test specifications are for the moment 'generic' – that is, they make it possible to check that each piece of equipment understands the meaning of each word. The idea is to complete the test specifications with tests covering operational scenarios and the 'phrases'.

All these scenarios will be described in a standard compatible format and, under the responsibility of the European Railway Agency (ERA), will be brought together in a database. The database will be accessible to all, including of course manufacturers who will be able to use it to validate their products.

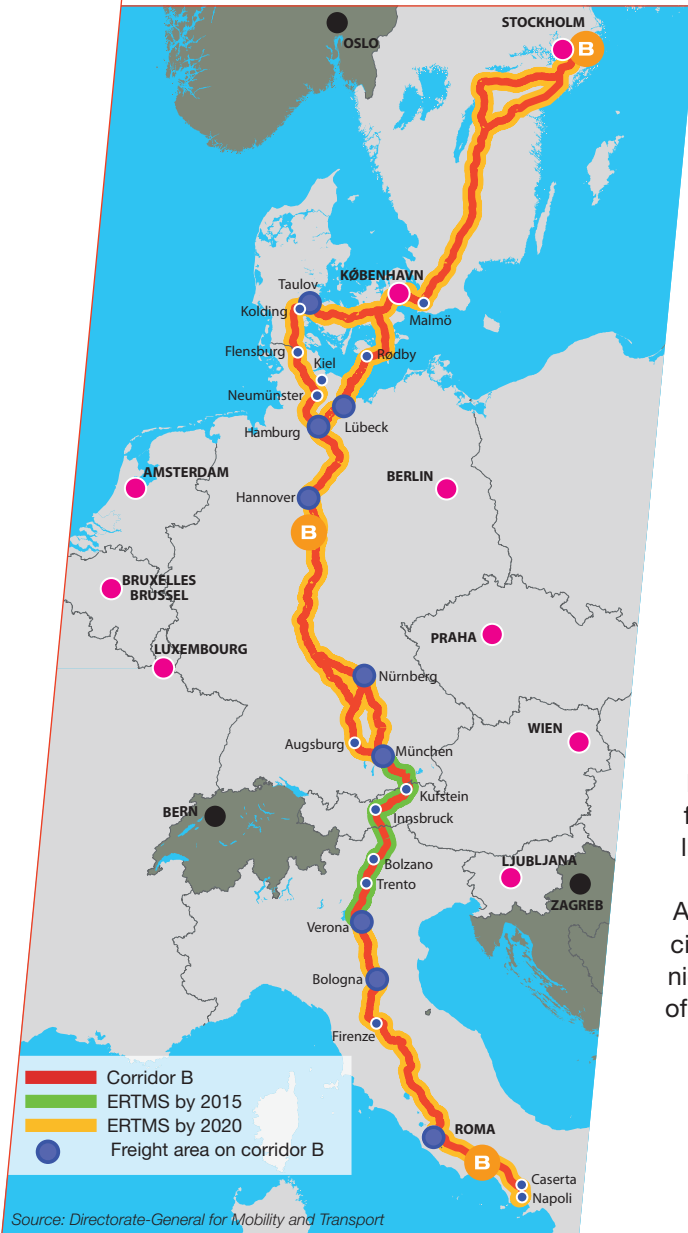
This approach requires laboratories that are independent of manufacturers to see that products are indeed compatible and in total conformity.

While today about 3 000 km of lines are in service, that figure is predicted to rise to 20 000 km by the end of 2015. In order to ensure the compatibility of these lines, it is essential that the operational scenarios (the 'phrases') used in all these new projects are submitted to the ERA and placed in the public domain so that any ambiguity can be detected in advance.

Work is underway, notably with the corridors, the ERTMS Users Group (bringing together infrastructure managers) and independent laboratories to complete the test specifications with tests enabling verification of the proper comprehension of the 'phrases' used in each project. The manufacturers are involved at project level and are also invited to work in collaboration with the ERTMS Users Group.

The European Commission will see to it that this approach, which looks to ensure maximum transparency and a certain control on the equipment of the lines, be implemented in all projects that it co-finances. The rail sector and the EU Member States are currently being consulted on the possibility of establishing this idea in legislation by means of the Technical Specifications for Interoperability.

## Focus shifts to implementation on ERTMS Corridor B



The Corridor B project, which aims to remove bottlenecks in ETCS implementation and to harmonise operational rules along the Stockholm–Hamburg–Munich–Naples route, is moving into a bold new phase. The Executive Board (chaired by Denmark) and the Management Committee (chaired by ÖBB) for the corridor were formed in March–April 2010 and are now preparing themselves to face the challenges posed along what is the longest ERTMS corridor with its 3670 km of track. The implementation plan will form the cornerstone of the future work for the five countries involved, namely Sweden, Denmark, Germany, Austria and Italy.

The corridor will be progressively equipped with ERTMS. The alpine part (Munich–Kufstein–Brenner–Verona) is to be equipped in 2015, while the northern part (Stockholm–Copenhagen–Rødby–Hamburg) together with the remaining parts in Germany (Munich–Hamburg) and Italy (Verona–Naples) shall be progressively deployed by 2020. Coordinated implementation of different versions of baselines (2.3.0d and 3.0.0) has to be ensured. Particular attention will be paid to the large infrastructure hubs of the Brenner axis (Germany–Austria–Italy), of the Fehmarn Belt fixed link (Germany–Denmark), and of the Øresund fixed link (Denmark–Sweden).

Among the overall objectives of the corridor are to connect cities and commercially significant areas, develop technical interoperability, and further encourage a modal shift of freight from road to rail.

### ERTMS diary

- 9-10 June 2010: Brussels Committee on the Interoperability and Safety of the European Railway System (RISC)
- 19 July 2010: Brussels ERTMS Corridor Group
- 28 June 2010: Brussels ERTMS MoU Steering Committee

*Please send us your dates!*

For further information on ERTMS, see: [http://ec.europa.eu/transport/rail/interoperability/ertms/ertms\\_en.htm](http://ec.europa.eu/transport/rail/interoperability/ertms/ertms_en.htm)  
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