

ERTMS DEPLOYMENT IN SWEDEN



The Swedish Transport Administration has always taken a measured but cautious approach to the introduction of ERTMS into the national rail network. The well-operating existing/legacy ATP system was introduced in the 1980s and is expected to last both technically and economically until around 2020. However, the ERTMS timetable was extended following discussions within the industry that essentially highlighted the need for environmental investments also.

Trafikverket, the Swedish infrastructure manager, has approved a two-year extension of the implementation of the introduction of the ERTMS signalling system in southern Sweden. Work will begin now in 2023 but will not now finish until 2029. The original completion date plan had been 2027.

A stakeholder assessment, including the supply industry, concluded that the new ERTMS timetable will allow for the phasing out of old vehicles and the purchase of new or retrofitting of existing units, avoiding the unnecessary conversion of very old rolling stock.

Routes most impacted include:-

- the Stockholm-Hallsberg routes – via Katrineholm and Mjölby to Malmö on to Denmark
- the route from Trelleborg via Helsingborg and Gothenburg to the Norwegian border at Kornsjö.

The Swedish ERTMS Implementation Plan, identified the priorities for ERTMS as :

- 1 New and/or essentially upgraded routes or lines
- 2 Routes or lines without signal plant, centralised traffic control and ATP systems
- 3 Routes or lines with major re-investment needs for existing signal plants
- 4 Routes or lines included in the corridors identified by the EU
- 5 The remaining parts of the routes in the Trans-European Network (TEN) and after that other parts of the railway network

Level 2 ERTMS technology had been chosen for the whole of Sweden, with possible exceptions of a Level 1 solution being deployed at larger stations and railway yards with extensive shunting movements. An ERTMS Regional solution (ETCS Level 3) without a Train Integrity function is implemented on low traffic lines which traffic control takes place manually using telephone communication between local train dispatchers. Sweden's low density lines account for approximately 21% of the total national network. The Västerdal Line is the first ERTMS Regional line selected mainly because it is typical of its type and has no through traffic. A limited number of vehicles are affected and only one traffic control centre is involved. Contracts were signed for the development of ERTMS in 2008, with the majority of Swedish lines expected to be finally equipped for full introduction of ERTMS by 2035.

What is the status of ERTMS deployment in Sweden?

ERTMS Level 2 is in commercial operation on the Bothnia Line, Ådal Line, since 2010 and Haparanda Line since 2013.

The Bothnia Line running between Umeå and Ångerman River north of Kramfors is 190 km long and comprises 25 km of tunnels and 140 bridges. ERTMS Level 2 has been chosen for the Bothnia Line, and the entire line has been open for traffic since August 2010.



The Ådal Line carries both passenger and cargo traffic. It includes over 35 level crossings and runs between Sundsvall and Västerås. The line is 180 km long. 50 km are new (Härnösand – Mörtal). ERTMS Level 2 has been chosen for the implementation and when the line has been completed, the capacity will increase from 8 - 10 trains per day to 50 - 60 trains per day.

The Haparanda Line running between Boden and Haparanda. ERTMS Level 2 has been chosen. The line is 156 km long (42 km of which is new track between Kalix and Haparanda), comprises 17 railway bridges, 40 level crossings and is intended mainly for cargo traffic. The Haparanda Line is part of the NEW corridor (Northern East West Freight Corridor by UIC/Transportutveckling AS).



The City Tunnel is a 17 km long electrified rail connection running through and under the city of Malmö. The section from Malmö C to the Öresunds Line consists of 14 km of double track. 6 km run in parallel tunnels. The remaining 3 km are single track running eastwards towards Trelleborg and Ystad. ERTMS Level 2 has been chosen for this section and will be implemented and commissioned at a later stage, approximately by 2021.



The Västerdal Line running between Malung and Repbäcken is 134 km long. The line has five stations, 33 level crossings and carries 16 trains per day. The maximum speed on the line is 90 km/h. ERTMS Regional was selected and the line went into operation on 21 February 2012. The line is the pilot in a frame agreement with the Swedish Transport Administration



Initial plan of Trafikverket ERTMS route rollout

Which lines will be equipped with ERTMS?

Sweden will gradually introduce ERTMS on the basis of a plan for the period of 2008 to 2030

Implementation plan 2008 - 2015

Level 1 – Large stations

- Malmö C

Level 2 - Lines and medium-sized/small stations

- Bothnia Line
- Ådal Line
- Haparanda Line
- City Tunnel
- Öresund Link
- Malmö-Hässleholm

Level 3 – Low-traffic lines

- Västerdal Line
- 5 - 6 low-traffic lines

Implementation plan 2016 - 2019

Level 1 – Large stations and the Stockholm region

- Hallsberg
- City Line

Level 2 – Lines and medium-sized/small stations

- Iron Ore Line
- Mjölby-Katrineholm
- Hässleholm-Hallsberg
- Hallsberg-Järna-(Stockholm)

Implementation plan 2020 - 2025

Level 2 – Lines and medium-sized/small stations

- Hallsberg-Gothenburg
- East Coast Line
- Arlanda Line
- West Coast Line
- Norway/Vänern Line (Gothenburg-Kornsjö)

Implementation plan 2026 - 2030

Level 2 – Lines and medium-sized/small stations

- According to the TEN network



ETCS and STM on all trains on existing ATC lines

Transition to ERTMS cannot take place overnight. Trains must be able to operate on ERTMS-equipped infrastructure as well as on existing ATC lines. A Specific Transmission Module (STM) is required. The STM unit reads data from the existing trackside equipment and converts it into a format that is readable by the new on-board system. This makes it possible for a train equipped with ERTMS to run on both ATC lines and ERTMS lines, and allows the ERTMS system to be introduced into the infrastructure in a phased manner.

Implementation of the GSM-R has been undertaken based on the EIRENE standard.

On-board equipment with STM are installed in 156 vehicles in commercial operation with different operators. The on-board equipment and STM has full EU certification.

Sweden also constitutes a key section of the Scandinavian-Mediterranean Corridor. This section of line is expected to be fitted by 2030.

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