



## ERTMS DEPLOYMENT IN SWITZERLAND COUNTRYWIDE ERTMS ROLLOUT PROGRAM



Although not a member of the European Union, Switzerland with a considerable number of freight hubs and busy routes is implementing an ambitious ERTMS investment plan. In a country located at the heart of the European railway network, ERTMS has, without compromising the great safety record of Switzerland, significantly helped to increase traffic capacity and facilitated a modal switch and to reduce the life cycle costs of the infrastructure. With a large number of suppliers involved, and the highest number of vehicles equipped with ERTMS in operation in the world, Switzerland is now reaping the benefits of ERTMS at full speed – and as the first country worldwide they started to expand ERTMS into the whole railway network since 2011.

### What is the status of ERTMS deployment in Switzerland?

Switzerland is a leader in terms of ERTMS deployment. As an early investor Switzerland clearly embraced ERTMS as the train control system of choice. As a consequence, the committed ERTMS strategy back from the year 2000, is gradually being implemented in Switzerland. The migration towards a pure ETCS network is successfully under continuous implementation (ETCS L1 LS). The planning for the future deployment of ETCS L2 on the major routes is intensively under way.

More than 1000 trains are currently fitted with ERTMS to operate on the national network, and today ETCS on-board units are required for network access. To travel on lines with a  $V_{max} > 160$  km/h, vehicles must have ETCS Level 2 (driver's cab signalling).

Since 1 July 2014, every newly commissioned vehicle has been required, as a basic principle, to be equipped with an ETCS baseline 3 or at least to be designed to enable such a system to be easily retrofitted.

ETCS L2 operational experience has proved highly satisfactory. The lines are known to be amongst the busiest in the country, which explains why Switzerland has a very high number of trains equipped with ERTMS. At present, the following major lines are running using ERTMS as the only Automatic Train Protection (ATP) system:

- New high-speed line (NBS) between Mattstetten and Rothrist (45km),
- Upgraded high-speed line (ABS) Derendingen – Inkwil

- Lötschberg tunnel (34.6km)
- Gotthard Base tunnel (57,1km) inaugurated in June 2016, starting commercial operation in December 2016

Future planning:

- Ceneri Base Tunnel in December 2019.
  - December 2020: (Bellinzona excl.)–Giubiasco–CBT–Vezia–(Lugano excl.)
  - December 2020: (Taverne excl.)–Vezia–(Lugano excl.)

An implementation concept has been drawn up for the Rhône valley that provides for the fitting and operation of ETCS Level 2 on the following routes:

- April 2017: Lausanne (excl.)–Villeneuve
- October 2018: Sion–Sierre
- 2023/2025: Visp–Brig–Simplon
- 2023/2024: Roche VD–Vernayez

From 2025 during replacement of signal boxes as part of asset maintenance or if installations have to be adapted due to expansion of capacity, as a basic principle ETCS Level 2 will be used.

Switzerland has commenced a phased deployment of ETCS Level 1 Limited Supervision as the operating mode. Once this programme is completed Switzerland can abandon the obsolete SIGNUM or ZUB systems. The aim is to completely equip the Swiss national network by December 2018.

## Why was ERTMS implemented in Switzerland?

Setting up a „ETCS System Authority“, for the whole country, was a very important step towards a successful introduction of ERTMS in Switzerland.

As explained above, ERTMS has been initially implemented on the busiest routes of the Swiss network as the train control system of choice. The reason behind this investment was to significantly increase capacity and therefore increase train speeds on the busiest segments of the Swiss national railway network.

Due to operational and economical benefits of ERTMS, the Swiss network is now on the way to being fully equipped with ERTMS, on mainlines with ERTMS Level 2 and the rest of the network with ERTMS L1 LS.

By the end of 2018 the Swiss Railway Network will have:

- Around 3'000 km tracks fitted with ETCS L1 limited supervision
- Around 417 km track (Single Track Equivalents) fitted with ETCS L2 train control and signalling (today 125 km STE)
- 7 RBCs commissioned and in operation

## What are the benefits brought by ERTMS in terms of capacity increase?

Wherever installed, ERTMS has brought significant benefits in terms of a capacity increase in Switzerland. For instance, the use of ERTMS Level 2 on the Mattstetten – Rothrist line has dramatically improved traffic conditions: an estimated 242 trains – both freight and passengers – pass on the line everyday; headways between trains have been reduced to 110 seconds whilst train speeds have been increased to 200 km/h!

Similar advantages have been brought to the Lötschberg base tunnel - with even higher train speed upon availability of rolling stock performance. The Gotthard Base tunnel, the longest rail tunnel in the world, is now completed. This will bring new exciting opportunities for the entire Swiss network and for all European North-South rail traffic bringing a new opportunity to enhance the modal switch of road traffic to rail traffic. Work is progressing towards the completion of the Ceneri Base Tunnel, with ETCS Level 2 deployed which will further enhance the route capacity from Germany through Switzerland and into Italy.

## Which ERTMS suppliers are involved?

Switzerland is another proven success of ERTMS interoperability and flexibility. Not less than four suppliers are currently involved on the Swiss railway network, with trackside and onboard equipment being delivered by different companies from Switzerland.



## The Lötschberg base tunnel: ERTMS installed on one of the busiest corridors in Europe

The Lötschberg base tunnel, which opened in 2007, was designed to provide a shorter and faster North-South rail link beneath the Alps. During the design phase, it emerged that ERTMS would help to increase rail capacity, particularly for freight, which was needed to absorb the relentless growth in road traffic between Italy, Switzerland and Germany.

To a great extent, the Lötschberg tunnel appears as one of the most challenging rail projects ever built. The tunnel is nearly 35km long, with the Southern entrance located at 654.2 metres above sea level and the Northern portal at 776.5 metres above sea level. Adding to this complexity is the fact that the tunnel is only partially double-track – a challenge in terms of signalling for high speed trains.

ERTMS has greatly contributed to increase the traffic capacity and maximise the success of this Swiss project plan. Indeed, the use of ERTMS level 2 has enabled a reduction of the headway intervals between trains to three minutes; this despite the fact that trains may run as fast as 250 km/h. A “minimal” fall-back system was set up (light signals at the tunnel portal) whilst the high reliability of ERTMS has avoided the need for lineside signals within tunnels, which brings with it a considerable maintenance cost savings.

## SUPPLIERS

ALSTOM

CAF

Ansaldo STS

MERMEC  
AN ANGEL COMPANY

AD  
PRAHA

SIEMENS

BOMBARDIER  
the evolution of mobility

THALES