ETCS in Switzerland

Urs Mosele
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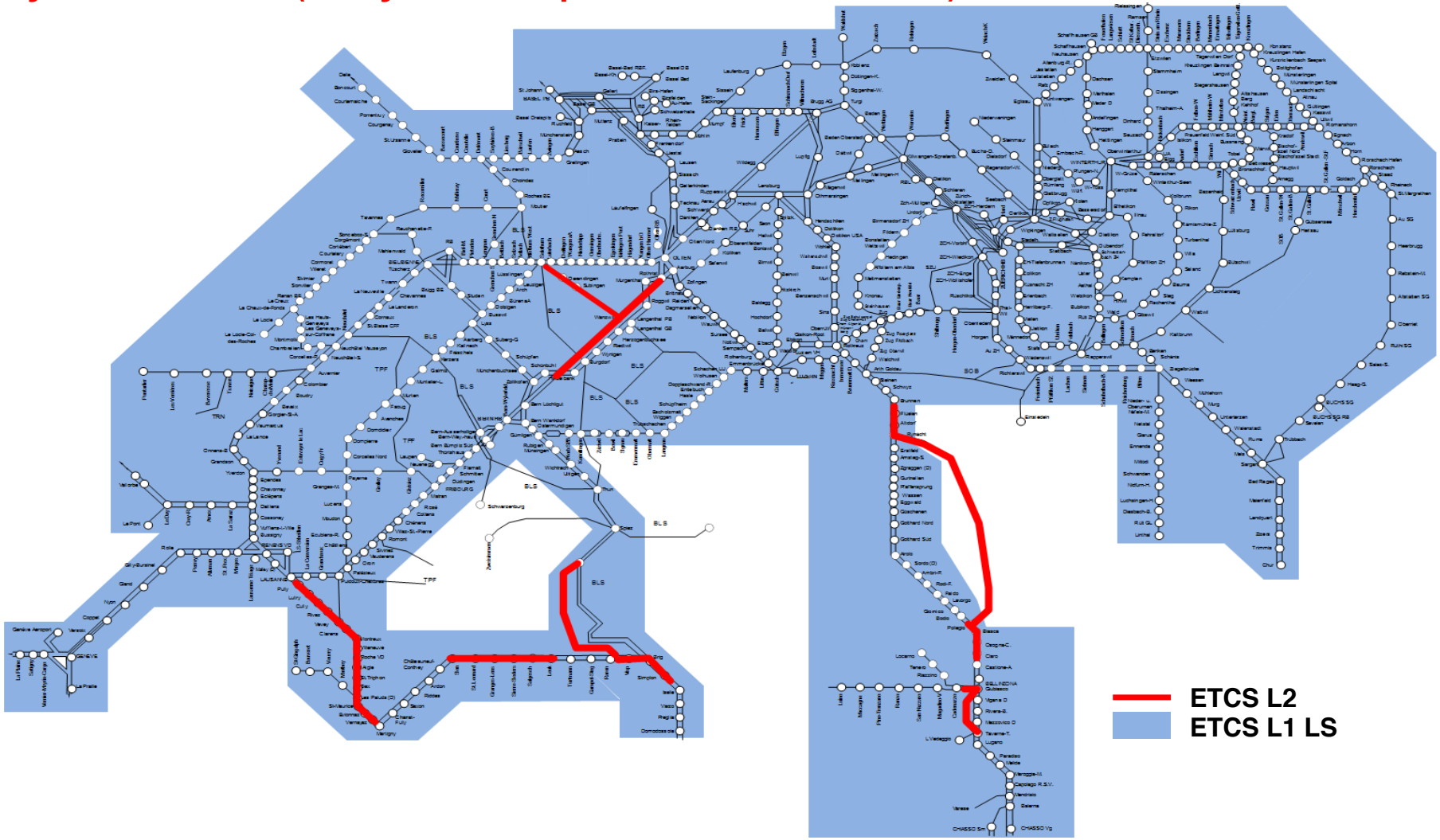
ETCS today in Switzerland

Today situation (fully interoperable network)



Availability

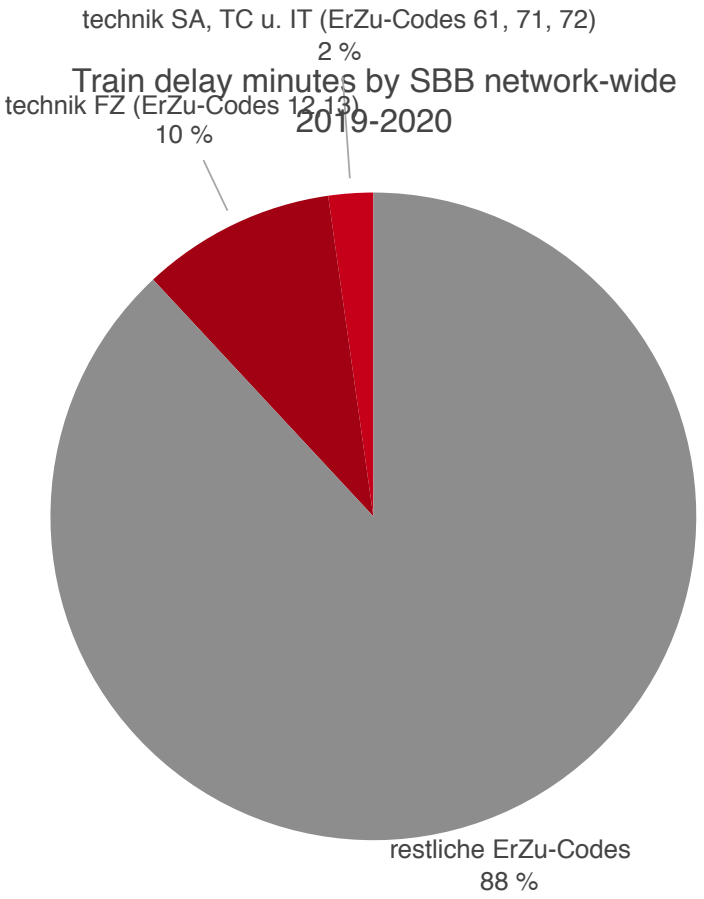
Failures

- In the line site signalling area (on the infrastructure side), there are almost no delay minutes due to failures, since the balises (LEU) are permissively projected. That means that if a balise or LEU is disturbed, the default telegram does not brake the train or warn the engine driver. To minimise the risks, faults are reported via the vehicles to the infrastructure via SMS.

- In the area of cab signalling, there are very few faults on the infrastructure side that affect the ETCS components such as RBC, TC and balises.

Impact on customers

Assuming that there are 23% more minutes of train delays due to vehicle disruptions with FSS than with LSS, and the same number of delays with FSS as with LSS on the infrastructure side. Then, due to technical malfunctions, there are about 2% more train delay minutes with FSS than there would be with LSS.
Note: There may also be more train delay minutes with FSS due to errors in scheduling or locomotive personnel.

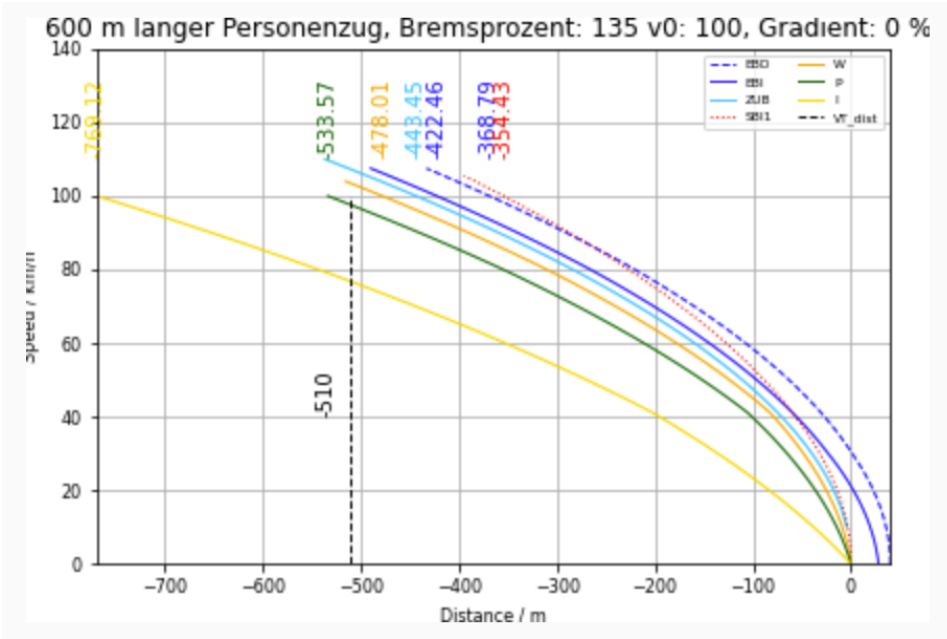


Quelle: ErZu

ETCS L1 LS

ETCS L1 Limited Supervision

- Around the year 2000 SBB was searching for a ERTMS solution without replacement of the existing interlockings.
- In a first approach ETCS L1 Full Supervision was analysed.
- The analysis showed that the braking curves do not fit into the advanced signal distances.
- SBB proposed a new solution to the ERA to use ETCS L1 as a background speed supervision system.
- The mode „Limited Supervision“ was born.



Experiences with ETCS L1 Limited Supervision

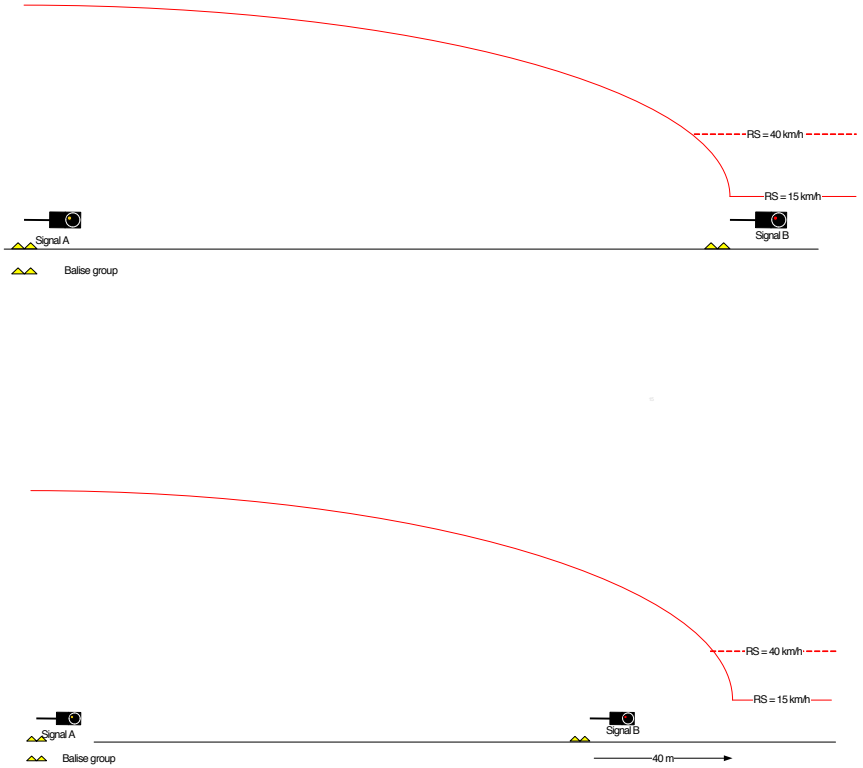
- After 3 years of commercial use the following main problems we discovered:
  - Since the target is also supervised by means of the save front end the engine driver never knows exactly where EoA is. As a result the engine drivers started to drive very carefully!
  - In Switzerland Euoloop is used. Due to interferences trains do not always receive a Euroloop signal. If it happen the trains must continue the ride with “Override”.

ETCS L1 LS optimisation program

Due to the problems mentioned before Swiss railways started an optimisation program. The main optimisations are:

- The supervision of the targets (EoA/LoA and SSP) will be less restrictive. The ETCS Dangerpoint (p12) will be shifted behind the signal.
- The release speed of the Euroloop will be increased from 0 km/h to 5 km/h.
- Other also RAMS relevant measurements (e.g. Paket 41 in each Balise group).

The optimisation program started this summer and will be completed in 2026.



The future of ETCS L1 LS

- L1 LS will be the main train control system in Switzerland since today there is no plan how migrate ETCS L2 on the whole network.
- That means also when we replace interlockings line site signals and ETCS L1 LS will be mainly implemented.

ETCS L2

The future of ETCS L2

- ETCS The ETCS L2 used today is not yet ready for network-wide deployment.
- Since many engineering rules for cab signalling and line site signalling are very different today (e.g. different positions of axle counters), it is only possible to migrate an existing installation with line site signalling to cab signalling at great expense.
- In addition, the ETCS L2 braking curves are much more restrictive than the ETCS L1 LS braking curves. This means that a uniform signalling concept is not possible and the trains in ETCS L2 take too long to enter a station.
- Since the goal is to be able to operate the entire network in cab signalling there are ideas how to uniform the engineering rules and the braking curves in a way that a migration from line site signalling to cab signalling will be technically and financially possible.


SBB CFF FFS
Thank you.