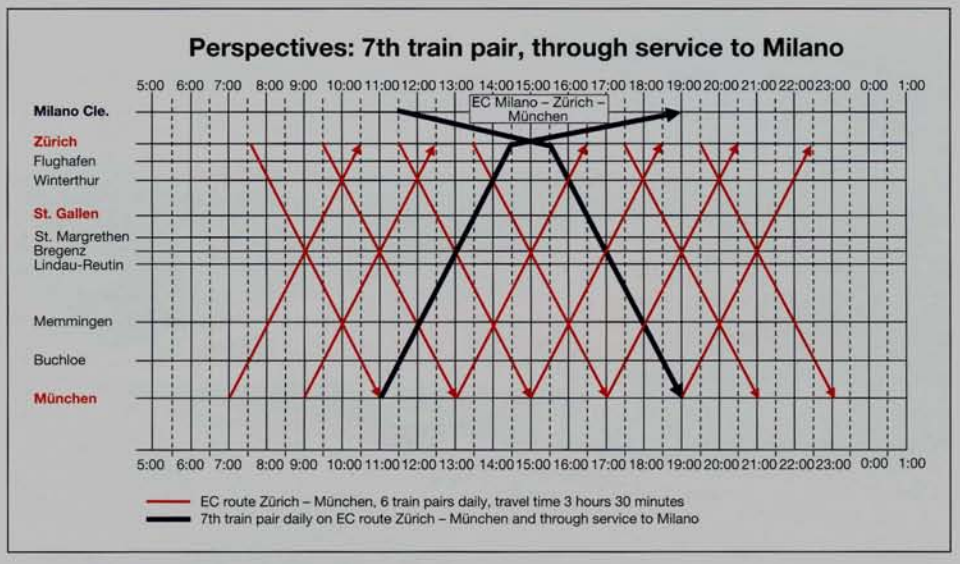


A seventh train pair would supplement the Zürich – München timetable to produce a seamless two-hourly cycle. An absolute must for the envisaged through service to Milano is the new crossover in Zürich that facilitates journeys from Löwenstrasse underground station to the Zimmerberg Base Tunnel; a second prerequisite is stable operation along the entire route (drawing: SBB).

The Astoro trainset will operate only individually, as the stations in the Allgäu do not have any platforms long enough for 374-metre double composition trains (see box on the next page). For the 17.33 connection from Zürich, a double unit is required for commuter traffic services from Zürich to St. Gallen, as outlined above.

For the moment there is no plan to introduce a compulsory seat reservation system in the EC trains. Yet the combination of limited infrastructure in Germany and multiple unit deployment rules out the possibility of flexibly developing the available space on heavily frequented connections. The railways involved are aware of this. They will monitor the development in demand in the years ahead and, if need be, initiate measures to guide passengers or create crossing opportunities for Astoro double units.

Staff deployment

The engine driver services will be provided jointly by DB, SBB and ÖBB. In practice this means that engine drivers are assigned by DB and SBB on their respective national routes and change at Lindau-Reutin (DB) and/or St. Gallen (SBB). ÖBB locomotive drivers take over the services between Lindau-Reutin and St. Gallen as well as on individual trains to München. This enables ÖBB to gain its staff's route knowledge in the Allgäu and, in the event of a closure of the Arlberg Railway, offers the possibility of rerouting trains through the prospective electrified route via Memmingen. This route is operational around the clock owing to the new electronic interlocking system (ESTW). Thoughts of a continuous deployment of engine drivers were discarded on account of the high investment in training.

DB and SBB are responsible for recruiting the on-board personnel; once again, their aim is to have continuously staffed trains between Zürich and München. The exact deployment concept is still in the co-ordination process. Elvetino, SBB's food service subsidiary, is responsible for catering on the train.

Perspectives

Should there be a positive development in passenger numbers and the line becomes sufficiently profitable, the introduction of a seventh daily train pair would be a possibility, because the rolling stock and the train path are available. In principle, linking this additional through train service to Milano is also conceivable, just as it existed in the last century. This, however, would require a new crossover, because at this point in time it is not possible to exit Löwenstrasse station at Zürich HB (on the DML) in the direction of the Zimmerberg Base Tunnel to Thalwil. A tri-national connection would also presuppose stable operation in traffic services coming from Italy, on the Gotthard as well as in the single-track sections in Austria and the Allgäu region, for it to be able to be implemented reliably at all.

An extension of services beyond the full two-hourly cycle and a further increase in speed would necessitate infrastructure upgrades in Germany, for which there are no current plans. Additional crossing points and, in some instances, double-track upgrades as well as capacity expansion in the area of the München S-Bahn network would be essential. Besides the infrastructural measures, the necessary routes are currently also being used by a Regional Express train. This line was awarded to private operator Go-Ahead in 2018 as part of the "E-Netz Allgäu" (Allgäu Electric Network) tendering procedure, which is for a term of twelve years (2021 – 2033). So, before 2034, an extension of EC services beyond the full two-hour cycle is not possible with respect to train paths either.

Platform lengths and heights in Memmingen and Buchloe

station	track	height [cm]	length [m]
Memmingen	1	76	343
	2	76	312
	3	76	312
	4	76	185
	5	76	145
Buchloe	1	55	258
	2	55	275
	3	55	275
	4	76	328
	5	76	328

Source: DB

Luxembourg Protocol: legal certainty for vehicle owners

Railway operators worldwide invest around EUR 55 billion annually in renewing their rolling stock[1]. However, much more money would be needed to meet actual demand. As many railways lack the money, more and more private investors are participating in the financing of rail vehicles. One obstacle is insufficient legal certainty.

Rail vehicles often circulate freely in different countries. An example is a freight car registered in country A and owned by a company in country B, which is transported to country C by various transport agents (rail transport companies, freight forwarders). If the wagon does not return from there, the owner is hardly legally protected as there is no direct contractual relationship between him and the user. Sometimes the owner does not even know without further ado where the wagon is located. If the State of Country C does not recognise the ownership, the owner has little chance of recovering the wagon or its equivalent. There is no international regulation and registration system on which the creditor can rely.

In aviation, there has been a solution since 2001 in the form of the Cape Town Convention, to which 75 countries have acceded. This means that around 110 000 aircraft worth USD 650 billion are currently secured under ownership. In 2007, a diplomatic conference was held in Luxembourg with the aim of drawing up a similar agreement for the railway sector: the Luxembourg Rail Protocol. 42 States and a good dozen international organisations took part, including the "Institut international pour l'unification du droit privé" (Unidroit) based in Rome and the Intergovernmental Organisation for International Carriage by Rail (OTIF) based in Berne.

The Luxembourg Rail Protocol covers all types of rolling stock for railway systems, from high-speed trains to trams, even harbour cranes running on rails. The aim is to create a worldwide, easy-to-use, Internet-based registration system in which all parties can register their security interests. This reduces the risk for investors and facilitates the drafting of contracts and, consequently, financing; borrowing costs are reduced. This makes it possible for some railways to procure rolling stock in the first place.

The Rail Working Group (RWG), an association under Swiss law based in Zug in the office of British lawyer Howard Rosen, is responsible for the adoption and dissemination of the protocol. The register itself is

managed by Regulis SA of Luxembourg, a subsidiary of SITA, a cooperative IT service provider for the aviation and tourism industry based in Belgium. A supervisory authority will have its secretariat at OTIF.

A single 16-digit numbering system, the Unique Rail Vehicle Identification System (URVIS), has been created to manage the vehicles. Each number is assigned uniquely and unchangeably to a single vehicle.

For the Protocol to take effect, it must be ratified by at least four countries. At the beginning of 2019, these included Gabon, Luxembourg and Sweden and – within the scope of their competences – the EU. The signatory states currently include France, Germany, Italy, Mozambique, Switzerland and the United Kingdom. Adoption negotiations are underway with a further 28 countries. At the end of 2020, more than 13 years after the conference in Luxembourg, the Protocol should finally enter into force.

The Rail Working Group estimates that the Protocol paves the way for additional investments of around EUR 35 billion. According to the estimate, approximately EUR 14 billion will be invested in nine countries with broad-gauge networks (1520 mm), 19.5 billion in 20 European countries and 1.3 billion in South Africa. (lüt)

[1] UNIFE / Roland Berger: World Market Railway Study 2018

Unique Rail Vehicle Identification System (URVIS)

The 16-digit URVIS number remains the same throughout the service life of a rail vehicle, which is not always guaranteed with the 12-digit UIC vehicle number. The 16 digits are followed by four more, which are used for checking according to the Luhn algorithm.

Zeros are permitted at any point except the first. The number must be permanently and wear-resistant on both sides of the vehicle and physically legible. In addition, an RFID transponder, for example, can be attached.

In the case of new vehicles, it is preferable for the manufacturer to assign and affix the number. Manufacturers may be allocated whole number blocks, with the option of allocating areas within their blocks for individual vehicle categories. In the case of existing vehicles, the number shall be given in the event of a change of ownership.

There are talks with the European Railway Agency, if and how the future URVIS-number could be linked with the UIC-number. (lüt)

ETCS on the Vienna S-Bahn?

The S-Bahn in Vienna has come up against the limit of its operating capacity. Various parties – not without motives of their own – have talked up the ETCS Level 2 train control system as an allegedly effective improvement option for increasing line capacity. The question arises whether this would actually be possible. What can ETCS offer in comparison with the present PZB control system?

Increasing safety

An argument frequently put forward is the improved safety resulting from ETCS. The present operating procedure with local signalling and PZB train protection only enables intermittent monitoring of the train. After all, the system still in use today is nearly 90 years old and the only modernisation carried out in recent years has been the installation of an on-board computer. ETCS, like LZB, provides a permanent interaction between safety system and train, although in higher development stages (Level 2 and 3) local signalling is replaced by direct display in the traction unit. On the other hand, development stage 1 with balises is merely a replacement for the old PZB system although it could offer an interesting interim solution.

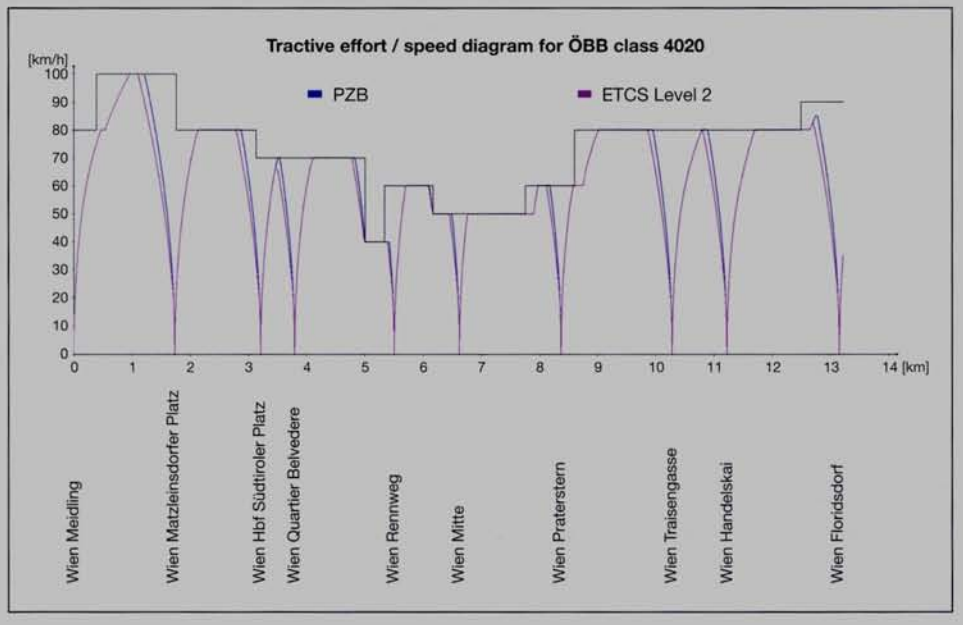
The increase in safety does not, however, have any effect on line capacity. If there is insufficient line capacity, this inevitably results in a shorter train headway time. This usually requires a finer block subdivision which can as a general rule be achieved with conventional block posts or with ETCS. ETCS is cheaper in terms of trackside installations. Since with development stage 2 it is easy to reduce block intervals and as development stage 3 includes operating on "electronic sight", expensive fixed signals are no longer used. However, a line equipped in this way has the disadvantage that it can only be used by traction units fully equipped with ETCS. The effects of this stipulation can be observed on the St. Pölten freight train bypass (GZU) where many freight trains are obliged to continue using the old route as their traction units are not equipped with ETCS. Moreover, the ETCS system has to be taken out of service for maintenance work on the GSM-R network. This maintenance work lasting two and a half hours is currently carried out six times a year.

Increasing line capacity

An increased line capacity would appear to be possible with ETCS Level 2 through the use of shorter block intervals, and in the case of Level 3 by driving on "electronic sight". However, SBB has had to admit that it was unable to achieve this objective between Lausanne and Villeneuve, a line that already had short block intervals. Among other factors, the "flat" braking curves set in the ETCS system have a counterproductive effect there. For this reason no new ETCS projects will be started in Switzerland over the next few years, with activity restricted to completing ongoing projects.

Increasing capacity is also only successful when trains can drive on the line without intermediate stops. If however, there are stops to allow passengers to board or alight, these advantages are lost and a backlog of trains builds up at the stopping points. This is exactly where the problems lie with the Vienna S-Bahn. Due to the slow passenger interchange at stations which every S-Bahn user can see for themselves this results in a backlog of trains in operation and consequently to capacity bottlenecks. When driving on electronic sight, trains are probably somewhat closer behind one another in the event of a backlog than is the case with the classic block interval, but the general capacity problem still remains.

Structural measures and rolling stock enabling a faster passenger interchange, for example adapting the width of door entrances will be required to provide an effective solution for the capacity problems on the Vienna S-Bahn. (6613)



Comparison of the braking curves for PZB and ETCS showing that there are only few differences in terms of actual vehicle motion between the two systems (source: Degree thesis "Investigation into ETCS L2/L3 on the main Vienna S-Bahn line" by Maximilian Wirth, Degree course Railway Technology and Mobility, St. Pölten Technical University).