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Assessment of railway transport system in the TRITIA area

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From a historical point of view, the infrastructure compatibility can be identified at least between the Slovakia and the Czech Republic, given the common history, reaching as far as the establishment of the Košice - Bohumín railway line.

The railway market is currently open on a European scale, which has a direct effect on the mitigation of the impact of national borders on the development of transport market and the creation of efficient transnational transport chains on Europe wide scale.

1.1. Czech republic

In the Czech Republic, rail transport is divided as follows.

Správa železniční dopravní cesty, státní organizace (SŽDC)

It is a railway operator in the Czech Republic. SŽDC was established on the 1st of January 2003 together with České dráhy, a.s., when the state organization České dráhy, a.s. stopped to exist without liquidation on the 31st of December 2002. This organization falls under the Ministry of Transport.

The main activities of SŽDC are:

- It manages the state property, which consists mainly of the railway infrastructure.
- It serves as the owner of the railway, ensures the operation, operability, modernization and development of the railway infrastructure.
- Allocates the capacity of the transport route and since the 1st of July 2008 it is also the operator of the nationwide railway and regional railways owned by the state.

The other two entities are divided into passenger and freight transport (state sector, private sector).

České dráhy, a.s. was established as a company integrating the transport business activities in the transport of persons and goods with business in the area of operating the railway infrastructure within the scope of national and regional railways owned by the state. The company was established on the 1st of January 2003. This organization falls under the Ministry of Transport.

ČD Cargo, a.s. is a subsidiary company of České dráhy, a.s. and was established on the 1st o December 2007 by separation of freight transport from České dráhy, a.s. The company employs nearly 7,000 people in the Czech Republic and it is the largest Czech rail freight transport carrier.

1.2. Poland

Management, construction, maintenance and access to railway infrastructure in Poland are the responsibility of the licensed infrastructure manager. The largest infrastructure manager is PKP Polskie Linie Kolejowe (PKP PLK) - a company from the Polish State Railways group.

The length of railway lines in operation in 2017 by all infrastructure managers, including standard gauge and broad gauge railways, amounted to 19 291.3 km, which means an increase of 77.3 km compared to 2016. The largest infrastructure manager (PKP PLK) had 18 513 km of active lines. This is 84 km more than in 2016. PKP PLK also had 2 129 km of out-of-service lines. In total, the company managed 20 642 km of lines (51 km less than in 2016). In addition to PKP PLK, the infrastructure manager of Infra SILESIA slightly extended the length of the operated lines (increase by 2.1 km). In the case of managers such as KP Kotlarnia, CTL Maczki-Bór and JSK, excluded from operation in 2017 were respectively 3.6 km, 2.8 km and 2.5 km. The longest network of wide-gauge lines (395 km) was managed by PKP LHS. The length of the network in this case has not changed. The length of electrified railway lines in operation of all infrastructure managers in

Poland amounted to 11 864.3 km compared to 11 883.5 km in 2016, which means a decrease of 19.2 km. In the case of wide-gauge lines, only 14 km were electrified. In this in the Śląskie voivodships 1 964 km (the most in Poland) and Opolskie 780 km. The manager of the majority of railway lines is the PKP Polskie Linie Kolejowe company belonging to the state-owned Polish State Railways, and the main passenger carriers also included in the PKP Group - PKP Intercity and Przewozy Regionalne, owned by the provinces and the Industrial Development Agency. The average density of the railway network in Poland was 6.3 km / 100 km^2. This ratio is higher than the average for all EU countries, amounting to 4.9 km / 100 km^2. In individual voivodships, this density, measured in km / 100 km^2, is respectively: from 3.89 km / 100 km^2 in the Podlasie Voivodship to 17.71 km / 100 km^2 in the Śląskie Voivodship. The voivodships with the highest density of the railway network, next to the Śląskie Voivodeship, include the following voivodeships: Opolskie, Dolnośląskie, Wielkopolskie and Małopolskie. The smallest density of the railway network occurs, in addition to the Podlaskie Voivodeship, also in the following provinces: Lubelskie, Mazowieckie and Warmińsko-Mazurskie. This translates into limited railway accessibility to some regional centers. Currently, there are over 100 railway carriers operating on the railway market in Poland that have a license to transport people, goods and make traction vehicles available. Of these, 14 carriers operate on lines other than standard-gauge lines

Table 1 Railway infrastructure in Poland

Voivodship		Total		Of which		
		Absolute numbers	Per 100 km^2	Electrified	Of total	
					Single track	Double and more trask
		In kilometers				
Poland	2015	19 231	6.2	11 865	10 505	8 726
	2016	19 132	6.1	11 874	10 401	8 731
Opole		780	8.3	429	344	436
Silesia		1 964	15.9	1 655	910	1 054

a The network of PKP and other entities managing railway network. The entities had the total of 275 km of standard gauge railway lines (293 km in 2015), of which 55 km of electrified lines (55 km in 2015).
b Including broad gauge, which length amounted to 537 km (537 km in 2015).

Passenger transport in railway transport is currently carried out on behalf of 18 organizations conducting public service contracts: The Minister of Transportation, Voivodship Marshals and the President of the Capital City of Warsaw. In total, in 2017, operators received funding for the provision of public services in the amount of 131.6 million Eur from the state budget (more by 3 712 000 EUR compared to 2016) and 356 352 000EUR (increased by 21 808 000 EUR compared to 2016.) from local governments. In addition to public transport, carriers may carry out commercial transport as part of open access. These are transports for which the carrier does not receive co-financing in the event of insufficient receipts from tickets. In 2017, open carriers received:

- PKP Intercity - 20 routes;
- Arriva RP - 8 routes;
- Koleje Dolnośląskie - 1 route;
- PKP Cargo - 1 route.

In 2017, there was growth in the passenger transport market, both in the number of transported passengers and in the transport performance. Nearly 303.6 million passengers benefited from the services of carriers, by almost 3.8% more than in the previous year. For the last time, the number of passengers similar to this result benefited from railway services in 2002 (304.1 million), ie 15 years earlier.

At the end of 2017, 35 railway carriers had active licenses for railway passenger transport, of which 15 reported regular passenger transport on a standard-gauge infrastructure.

In 2017, the punctuality of trains at the destination station amounted to 90.2%, which means a decrease in punctuality in comparison to the previous year by 1.0 percentage points (from 91.2%). In 2017, licensed railway carriers launched a total of over 1.7 million trains, about 1.4% more than in the previous year (an increase of 24 thousand). The percentage of all trains delayed on arrival (including those delayed to 5 minutes) was 20.3% (in 2016 – 19.3%). In total, in 2017, trains were delayed by 57 184 hours, ie in total by 2 383 days (an increase of 7090 hours compared to the previous year). The average time of train delays, excluding delays up to 5 minutes, increased by 13 seconds and it was 17 minutes and 47 sec Including trains delayed to 5 minutes, the average delay time was 9 minutes and 33 sec (by 22 seconds more than in 2016).

Table 2 The level of punctuality of passenger carriers in 2016-2017 and in individual quarters of 2017 (delays of more than 5 minutes on arrival)

	1Q	2Q	3Q	4Q	2017	2016
total	**92.10%**	**92.29%**	**89.43%**	**86.90%**	**90.17%**	**91.22%**
PKP Intercity	75.85%	76.64%	70.77%	69.04%	**72.97%**	75.94%
Koleje Śląskie	90.13%	91.09%	83.11%	81.00%	**86.28%**	87.86%
Koleje Dolnośląskie	89.91%	89.97%	86.77%	79.88%	**86.55%**	89.11%
Koleje Wielkopolskie	93.38%	92.72%	93.21%	86.12%	**91.24%**	89.24%
Koleje Mazowieckie	92.38%	92.88%	91.53%	90.64%	**91.85%**	90.76%
Przewozy Regionalne	92.53%	92.40%	89.20%	85.91%	**90.01%**	90.86%
Arriva RP	94.54%	94.60%	91.53%	91.37%	**92.97%**	92.30%
Koleje Małopolskie	89.47%	95.16%	87.24%	68.19%	**85.67%**	94.68%
SKM w Warszawie	94.23%	94.68%	94.49%	93.42%	**94.21%**	94.78%
ŁKA	95.48%	96.38%	95.48%	95.67%	**95.76%**	96.07%
PKP SKM w Trójmieście	98.56%	98.16%	97.60%	97.90%	**98.05%**	98.64%
UBB	99.35%	98.89%	98.13%	97.83%	**98.51%**	98.96%
WKD	99.61%	99.52%	99.41%	99.77%	**99.58%**	99.20%

Since 2010, revenues from sales in all branches of transport have been growing steadily. These revenues include receipts for: transport of cargo, passengers, luggage and mail as well as for transshipment, forwarding, storage and other services related to transportation, e.g. receipts from travel agencies. In 2016, revenues from transport activities increased by EUR 19 billion compared to 2010, while costs resulting from operating activities of carriers increased by EUR 18 billion.

The most important in transport of people by rail in 2016 was Przewozy Regionalne, because they moved over 27 % of all passengers interested in such services, followed by Koleje Mazowieckie with the result of almost 21 % and PKP Intercity, exceeding 14 %. The largest share in the employment structure among Polish passenger carriers in 2016 was held by PKP Intercity - 34.9 %, followed by Przewozy Regionalne – 33 % and Koleje Mazowieckie with a result of over 12 %. The largest share in the mass of transported goods by railway transport in 2016 was held by PKP CARGO with the result of 44.87 %. The result obtained by PKP CARGO significantly differed from the shares of other carriers performing railway cargo transport. The second position with a share of 17.99 % was obtained by DB Cargo Polska, while the third place went to Lotos Kolej (5.70%). PKP CARGO also had the largest share in the employment structure among rail carriers in 2016 amounting to as much as 68.2 %. The next places belonged to DB Cargo Polska – 5 % and Lotos Kolej – 4 %.

In 2017, 72 entities operated on the market, including one broad-gauge carrier - PKP LHS. Taking into account only transports on a standard-gauge network, last year, 75 % belonged to the companies PKP Cargo, DB Cargo Polska, CTL Logistics and Lotos Kolej both in terms of the weight of transported goods and transport work. Freight carriers transported 239.9 million tons of cargo, which was an increase of over 7.9% compared to 2016. Transport performance amounted to 54.8 billion tons-km and was higher than in 2016 by 4.2 billion tons km (8.3 %). The average distance of transport increased from 227.8 km in 2016 to 228.5 km in 2017. Freight carriers performed operational work at the level of 80.1 million train-kilometers - by 6.1 million train-kilometers (8.2%) more than a year earlier.

In 2017, Polish carriers had 4004 locomotives (3 449 items), 1 279 electric traction units, 240 diesel motor vehicles, 7 290 passenger and 9 0849 freight wagons. The average age of rolling stock (including also diesel and electric units) in 2017 was 25.9 years (24.8 in 2016). The average age of wagons excluding the traction units is 29.3 years. The average age of traction units is 25.5 years: 27.5 in the case of EZT (electric single unit train) and 10 in the case of SZT (Diesel single unit train). Passenger locomotives have an average of 35.3 years, including 33.6 and 40.5. For freight carriers, the average age of locomotives at the end of 2017 was 36.9 years. This value increased by 0.8 in year to year comparation. The average age of wagons was 30.3 (the value increased by 0.1 years). The ownership structure of vehicles registered in the NVR indicates the existence of several groups of vehicle owners. According to the declarations of the disposers, the owners of the largest number of vehicles that have valid registration are freight carriers, then passenger carriers, other entities and organizers of public public transport.

The popularity of rail transport in Poland is growing. In 2016, Polish carriers transported the most people. Over 48 % of rail passengers were interested in traveling to Germany, 28.1 % to Belarus and 12.8 % to the Czech Republic. 49 % of people were transported by car to Germany, 13 % to the Czech Republic and almost 8 % to Austria. In freight transport, the railway ranks second after car transport, as in the assessment of passenger movements. In 2016, 222.5 million tons were transported by rail, which is about 5 million tons of goods more than in 2010, and in transport by car there was a 5-million drop in transport in 2016 as compared to 2010.

The highest share of the transported mass was transported by hard coal – 37.7 % (95.3 million tonnes). Due to the situation in the area of energy stocks, its transport was much larger. Last transport of this group was at a similar level in 2013. The demand for aggregates, sand, gravel and clay was noticeable. The reason was start using European funds under the 2014-2020 perspective and good situation on the construction market (as confirmed by data from statistical offices).

At the end of 2017, 91 railway carriers had active licenses authorizing them to run their business activities, of which one had a temporary license. In 2017, 69 entrepreneurs from 91 with licenses carried out transport activity.

PKP Cargo remains the unquestionable leader of the freight transport market. In 2017, the company transported over 106.1 million tonnes, which meant an increase in the transported weight by 8.6 million tonnes (8.9 %). In the case of other carriers, the largest increases in the transported weight occurred in the case of: DB Cargo Polska (2.9 million tonnes), CD Cargo Poland (1.1 million tonnes), PUK Kolper (0.8 million tonnes), Orlen KolTrans (0.8 million tons), Lotos Kolej (0.7 million tons) and PKP Cargo Service (0.6 million tons).

In 2017, freight transport in international transport was performed by thirty-one licensed carriers, who transported almost 74.4 million tons and performed transport work at the level of 23.3 billion tonne-kilometers. The transported weight increased by 10.9 % in comparison with the previous year, with a simultaneous increase in transport performance by 7.2 %. In 2017, an increase in transported freight volume was recorded in imports by 19.3 % and transport performance by 16.2 % year on year. Comparing to export and transit, the largest mass was transported in imports and the largest transport work was carried out – 41.4 million tonnes and 11.6 billion tonno-km respectively. In export, compared to the previous year, the volume of transported mass and transport performance decreased by 4.1 % and 14.5 %, respectively. The

transported mass is 26.7 million tons, and the transport work – 7.9 billion tonno-km. In transit, comparing to 2016, there was an increase in weight of 39.7 % with a simultaneous increase in transport performance by 51.1 %. In transit through Poland, 6.2 million tons of cargo was transported, and transport work amounted to 3.8 billion tonno-km.

Analyzing the structure of transported goods in international transport, as in previous years, a significant share of hard coal transport is noteworthy. In 2017, it was at the level of 18.9 million tons, and in 2016 it amounted to nearly 15.8 million tons. The share of imports in hard coal transport at the end of 2017 was at the level of 58 %, while in the previous year it amounted to 43 %. The increase in coal imports was the result of increased transport of this commodity from eastern directions, especially from Russia. At the same time, in 2017, the share of exports decreased from 55 % in 2016 to 36 % in 2017.

In 2017, Germany, the Czech Republic, Ukraine, Austria, Slovakia, China and Italy were the main partners in the international exchange with Poland. In the case of imports, trade exchange took place mainly with Ukraine, Russia, Belarus, Germany, Australia, China, the Czech Republic and Slovakia. Poland's partners with the largest share in trade, like in 2016, were: Russia, Germany, Ukraine and the Czech Republic. For this reason, also the share of rail transport in these directions was the highest - in total 59.9 % of transported freight. The share in terms of transport performance between Poland and these countries in 2017 reached the level of 52.1 %. According to the place of dispatch and destination of parcels (by waybill), the largest share constituted transport between Poland and Russia – 17.6 % of the total volume of goods (12 million tonnes) and Poland and Germany respectively 17.1 % (11.7 million) . An important partner in trade is also Ukraine. In 2017, the share in transport between Poland and Ukraine was 14.4 % by weight (9.8 million tonnes), and the Czech Republic recorded a 10.7 % weight share (7.3 million tonnes).

Analyzing intermodal transport for TEU (one 20-foot container = 1 TEU) in 2017, 1 667.3 thousand were transported. TEU, which was an increase of 16.1 % compared to the results from 2016. As in 2016, the main players in this segment of the market remain the PKP Group companies. The share of PKP Cargo and PKP LHS at the end of 2017 was: in the mass of transported units – 48.1 % and transport performance – 51.4 %. In 2017, DB Cargo Polska and Lotos Kolej also had a significant position on the intermodal transport market. Their market share, taking into account the transported weight, was 17.7 % and 14.2 %, respectively. In terms of transport performance, the market share of these companies was 21.1 % and 12.4 %, respectively. The growing market share of other companies is also noteworthy. Carrier Captrain Polska at the end of 2017 reached 8.7 % share in the transported weight and 7.3 % in the transport performance. The next two companies, Ecco Rail and LTE Polska, obtained 3.7 % and 2.4 % considering the mass of cargoes and 3.8 % and 2.2 % in terms of transport performance.

The average speed of freight trains in 2017 was: 29.9 km / h in intermodal transport and 25.1 km / h in total transport (average unloading speed 31 km/h). The average speed of 30 km / h is one of the factors hindering the railways competing with road transport when transporting containers.

One of the most important points on the railway map for Poland are border crossings. Among them are the border station Zebrzydowice-Petrovice, the crossing of Brest-Terespol and the neighboring area Małaszewicz.

Border crossing in Zebrzydowice is one of the most important for the implementation of connections on lines belonging to the corridor Baltic Sea - Adriatic Sea.

Among the relations running with the use of this infrastructure are those related to with transport:

- cars from the largest terminal in Koper on the Mediterranean Sea, or car parts from the factory in Zilina to the assembly plant, inter alia, in the Kaliningrad area or from the factory in Mlada Boleslava;
- coal from significant Polish mines (including in Katowice, Mysłowice or Brzeszcze);
- to / from intermodal terminals in Koprze, Ostrava;

- products of the mining, metallurgical and other industries in the field of metal ores (including from / to Trinec, and Velke Opatovice).

In 2017, Zebrzydowice station was the initial station for 13.9 thousand train paths (including all categories together with locomotives in bulk). In the case of Petrovice station, selected carriers launched over 6.2 thousand train paths. A very large number of routes are those implemented exclusively in the Zebrzydowice station to Petrovice and in the opposite direction, which totaled nearly 10 300. In the number of trains traced in domestic traffic from the Zebrzydowice station, nearly 3.6 thousand they were block trains, while the number of intermodal routes amounted to over 630. Within the domestic routes, freight trains were opened both to nearby stations: Zabrzeg Czarnolesie, Czechowice-Dziedzice, but also to distant towns - Korsze (located at a short distance from the border crossing Skandawa - over 400 routes), stations in Krakow (nearly 290 routes - mainly within the framework of relations related to the steel industry in Nowa Huta), Małaszewicz (over 200 routes), Dąbrowa Górnicza and Gdańsk. Trains running in Zebrzydowice at the final station were delayed by an average of 6 hours.

The statistical length of intermodal compositions opened from the Zebrzydowice station was almost 600 meters, while the mass of nearly 950 gross tonnes. According to the carriers to or from the Petrovice / Zebrzydowice station, about 150 trains, known as intermodal ones, arrived / departed monthly. This means that every day these stations served 5 intermodal trains.

1.3. Slovakia

At present, there are three companies established and owned by the Slovak Republic (operated through the Ministry of Transport and Construction of the Slovak Republic – MDV SR), that are covering the requirements of the railway market (infrastructure, passenger transport and freight transport). The first company is the Železnice Slovenskej republiky (Railways of the Slovak Republic - ŽSR) that operate the infrastructure and manage the traffic. Železničná spoločnosť Slovensko (ZSSK) is providing passenger transport at the national level (with majority of transport provided as public service). The third company is Železinčná spoločnosť Cargo Slovakia (ZSSK Cargo) that is providing freight transportation services.

ŽSR were established on 1st January 1993, by the decision of the Slovak government on the establishment of a state railway company following the division of Czechoslovakia and thus also the division of the Czechoslovak state railways into two separate entities. As of 1st January 2002, ŽSR were split into two separate companies, ŽSR and Železničná spoločnosť (ZSSK). In the next phase, as of 1st January 2005, the ZSSK were split into the current form as ZSSK Slovensko (passenger transport) and ZSSK Cargo Slovakia (freight transport).

As of 1st January 2002, the main activities of ŽSR include:

- Management and operation of the railway infrastructure,
- Provision of services related to the operation of railway infrastructure,
- Construction and operation of railway telecommunication and radio networks,
- Construction and maintenance of railway infrastructure,
- Other business activities registered in the commercial register (fuel sale in the stations and other)

In the freight transport market, there are a lot of carriers that operate in Slovakia. This situation is the result of the market liberalization. The main goal of the liberalization was to create a competitive environment, with the in order to optimize transport costs and to increase the competitiveness towards the road transport (mainly transport of small shipments).

In the passenger transport, the market is liberalized, but only if the transportation is carried out at company´s own business risk. Such services are carried out in Slovakia by four railway operators – Arriva

(Nitra/Trenčín – Praha), RegioJet (Bratislava – Praha, Košice – Praha), Leo Express (Košice – Prešov – Praha) and ZSSK (IC trains Košice – Žilina – Bratislava). It is concerning long relations with significant passenger flows that have a high potential to generate profits. Liberalization is partly under way when it comes to the public service, only one line has been successfully procured (Bratislava – Dunajská Streda – Komárno). There are preparations for procurement of another three lines in 2019 (Bratislava – Dunajská Streda – Komárno; Žilina – Rajec; Košice – Moldava nad Bodvou).

Table 3 Rolling stock quantity in years 2010 to 2017 [1]

Rolling stock	2010	2011	2012	2013	2014	2015	2016	2017
Locomotives	967	983	973	984	973	952	940	881
Electric and diesel wagons	234	236	227	228	236	251	237	241
Freight wagons	15 313	15 964	15 867	15 982	14 970	15 533	15 786	15 509
Passenger coaches	1 217	1 259	1 145	1 092	1 055	969	973	948

The table above is showing number of wagons with home depot in Slovakia. This number of rolling stock include all railway operators in Slovakia.

The number of passenger carriages is declining, this trend is the result of the ongoing extensive modernization of rolling stock and is also related to the long-term optimization of the circulation of wagons in order to minimize the number of wagons needed and to increase the utilization of train runs, coaches and train staff. In this way, it is possible to save on the cost of running rolling stock and to increase the competitiveness on the passenger market, which is gradually opening to the private carriers.

The reduction in the number of locomotives is based on the past decline in transport performance, mainly in freight transport. Most locomotives are more than 30 years old and are the remnant of the Czecho-Slovakia befor the year 1989 and currently doesn't meet the requirements for modern railway transportation. Despite the high age, there is only a gradual replacement of the locomotive park due to the high acquisition costs per unit.

The biggest freight carrier ZSSK Cargo Slovensko operate mostly on national level. As a part of restructuralization the company had had shed of non essential business cores. One of the main consolidation was in selling the majority of its wagons and to start leasing the rolling stock that is needed for the usual operation. Thus the company have right now somewhat young pool of wagons.

Table 4 Structure of owned freight wagons of ZSSK Cargo

Year	2017	2016	2015	2014	2013	2012
Covered wagons	126	204	206	1 963	1 964	1 952
Open wagons	89	71	73	6 524	6 694	6 808
Deck wagons	1 115	1 075	727	3 306	3 311	3 076
Other freight wagons	4	11	11	1 773	1 473	1 473
Freight wagons, total	1 334	1 361	1 017	13 266	13 442	13 309

In structure of the owned wagons we can see, that the company is concentrating on acquisition of deck wagons that can be used on intermodal transportation as the market is shifting from wagon consignment to the container considnment.

[1] Source: Database of Statistical office of the Slovak republic

Table 5 Structure of leased freight wagons of ZSSK Cargo

Year	2017	2016	2015	2014	2013	2012
Covered wagons	150	150	150	150	150	150
Open wagons	300	356	356	356	356	356
Deck wagons	200	247	598	598	598	848
Other freight wagons	0	0	0	0	0	0
Freight wagons, total	650	754	1 104	1 104	1 104	1 354

The leasing is not concentrating on one type of wagon and is aimed on acquisition of all types of useful wagons that can be used in day to day operation, as only the operated wagon is generating revenue.

Table 6 The age of ZSSK Cargo owned freight wagons

Age	0-5	6-10	11-15	16-20	21-25	26-30	30+	Total
Covered wagons	0	0	0	1	2	6	117	126
Open wagons	0	56	0	0	0	32	1	89
Deck wagons	0	550	299	139	86	0	41	1 118
Other freight wagons	0	0	0	0	0	0	4	4
Freight wagons, total	0	606	299	140	88	38	163	1 334

The age structure of owned wagons in healthy and the carrier can provide good service with minimal probability of break down of the rolling stock.

Table 7 The age of ZSSK Cargo owned locomotives

Type of locomotive	Under 15 years	16 - 30 years	31+ years	Total
Electric locomotives	5	28	231	264
Diesel locomotives	56	13	186	255
Diesel wagon	0	0	0	1
Total	61	41	418	520

ZSSK Cargo used locomotives are mostly really old and need to by replaced to ensure reliable and economical service in the future.

1.4. Summary of the railway market in TRITIA area

The market in Tritia area is quite diverse with couple of companies with majority of the transported goods. This is the image of the ongoing opening of the market and the result of market demand for more reliable services that could be provided more dependable by small carriers as this companies are more flexible and adaptive to the customer demands.

Table 8 Railway market stakeholders

Country	Railway infrastructure managers	Railway freight transport operators	Railway passenger transport operators
Czech Republic[2]	Správa železniční dopravní cesty, státní organizace, (SŽDC)	State-owned: - ČD Cargo, a.s. - České dráhy, a.s. - DB Cargo Czechia s.r.o. - PKP CARGO SPÓŁKA AKCYJNA - Správa železniční dopravní cesty, státní organizace - Slovenská železničná dopravná spoločnosť, a.s. Private-owned: - Advanced World Transport a.s. - AŽD Praha s.r.o. - BULK TRANSSHIPMENT SLOVAKIA, a. s. - Carbo Rail, s. r. o. - Cargo Motion s.r.o. - CER Slovakia a. s. - CityRail, a.s. - CZ Logistics, s.r.o. - EUROVIA CS, a.s. - Express Group, a. s. - GW Train Regio a.s. - Hroší stavby Morava a.s. - LOKO TRANS s.r.o. - LokoTrain s.r.o. - LOKOTRANS SERVIS s.r.o. - LTE Logistik a Transport Czechia s.r.o. - LTE Logistik a Transport Slovakia s.r.o. - METRANS Rail s.r.o. - METRANS, a.s. - OHL ŽS, a.s. - OLOMOUCKÁ DOPRAVNÍ s.r.o. - Ostravská dopravní společnost - Cargo, a.s. - PDV RAILWAY a.s. - PEDASTA dopravní stavby, s.r.o. - Petrolsped Slovakia s.r.o. - Prvá Slovenská železničná, akciová spoločnosť - PRZEDSIEBIORSTWO USŁUG KOLEJOWYCH KOLPREM SPÓŁKA Z OGRANICZONA ODPOWIEDZIALNOSCIA - Rail Cargo Carrier - Czech Republic s.r.o.	State-owned: - České dráhy, a.s. - Správa železniční dopravní cesty, státní organizace Private-owned: - Advanced World Transport a.s. - GW Train Regio a.s. - Leo Express Global a.s. - Leo Express s.r.o. - Puš s.r.o. - RegioJet a.s. - Slezské zemské dráhy, o.p.s. - Výzkumný Ústav Železniční, a.s. - ZABABA, s.r.o.

[2] https://www.szdc.cz/provozovani-drahy/dopravci.html

Country	Railway infrastructure managers	Railway freight transport operators	Railway passenger transport operators
		- RegioJet a.s. - SART-stavby a rekonstrukce a.s. - SD - Kolejová doprava, a.s. - SEŽEV-REKO, a.s. - Skanska a.s. - Slezské zemské dráhy, o.p.s. - SLEZSKOMORAVSKÁ DRÁHA a.s. - STRABAG Rail a.s. - Transport line Cargo s.r.o. - Traťová strojní společnost, a.s. - TSS Cargo a.s. - UNIPETROL DOPRAVA, s.r.o. - VÍTKOVICKÁ DOPRAVA a.s. - Výzkumný Ústav Železniční, a.s. - ZABABA, s.r.o.	
Slovakia[3]	Železnice Slovenskej republiky, "ŽSR"	State-owned: - ZSSK Cargo Slovakia, a.s., - ZSSK Cargo Intermodal, a.s. - PKP Cargo S.A. - ČD Cargo, a.s. Private-owned: - Railtrans International, s.r.o. - METRANS /Danubia/ a.s. - LTE Logistik a Transport Slovakia s.r.o. - Petrolsped Slovakia s.r.o. - Rail Services Slovakia, s. r. o. - Prvá Slovenská železničná, a.s. - AWT Rail SK, a.s - LOKORAIL, a.s. - SŽDS, BA - GJW Praha spol.s r.o. - Advanced World Transport, a.s. - Rail Cargo Carrier - Slovakia s.r.o. - IDS CARGO a.s. - CER Slovakia, a.s. - Express Group, a.s. - ARRIVA vlaky s. r. o. - CARBO RAIL, s.r.o. - VÍTKOVICKÁ DOPRAVA, a. s.(Vítkovice Doprava, a. s.) - RM LINES, a.s. - OFZ,a.s. - CityRail, a. s. - Železničné stavby, a.s. Košice - TSS GRADE, a.s. (TRSS) - ELTRA s.r.o. Košice	State-owned: - Železničná spoločnosť Slovensko, a.s. Private-owned: - RegioJet, a.s., - LEO Express Slovensko, s.r.o.,

[3] Source: GR ŽSR traffic section (O410) – Department of traffic performance analysis

Country	Railway infrastructure managers	Railway freight transport operators	Railway passenger transport operators
Poland[4]	Polskie Koleje Państwowe (PKP) Polskie Linie Kolejowe (PLK)	- PKP Cargo, - DB Schenker, - CTL Logistics sp. z o.o. - CTL Rail sp. z o.o. - DB Cargo Polska S.A. - DB Cargo Spedkol sp. z o.o. - ECCO Rail sp. z o.o. - Inter Cargo sp. z o.o. - PROTOR S.A. - Infra SILESIA - KP Kotlarnia, - CTL Maczki-Bór - JSK - Lotos Kolej - PKP LHS - CD Cargo Poland - PUK Kolper - Orlen KolTrans	- PKP Regional carriers, for example: Koleje Śląskie (Silesian Railways) - PKP Intercity - Arriva RP

Czech republic - Moravian-Silesian region

In the Moravian-Silesian Region, four railway passenger transport operators operate on the railway market. Three carriers provide long distance services (RegioJet, Leo Express, České dráhy a.s.). This is a session (SK, Bohumín) Ostrava hl. n. - Praha hl. n. Two carriers also provide regional transport in the public interest. Apart from České dráhy, a.s., GW Train Regio a.s. provides passenger transport on the Milotice nad Opavou - Vrbno pod Pradědem line. According to the new GVD 2019/2020, RegioJet a.s. will serve the express train Bohumín– Brno hl. n..

Freight rail transport has a long tradition in the Moravian-Silesian region due to the extensive mining, metallurgical and engineering industries. The largest carriers in Trans Tritia area are state-owned carriers, i.e. ČD Cargo, a.s. and foreign carriers of neighboring states, ZSSK Cargo, PKP. Furthermore, a large part of the goods transport is involved in the private sector, headed by the carriers Advanced World Transport a.s. and METRANS Rail s.r.o.. The competition on the railway market is still bigger and the state carrier ČD Cargo, a.s. is already transporting only 60.99% of hrtkm and 62.34% in kilometers over the entire SŽDC network.

Poland – Silesian and Opole voivodship

Passenger transport in rail transport is currently carried out on behalf of 18 organizers concluding public service contracts: the minister responsible for transport, voivodship marshals and the President of the Capital City of Warsaw. The scope and duration of contracts is determined individually by individual organizers. For example, the Masovia Province has one long-term contract with the operator of Koleje Mazowieckie and WKD. Both agreements are valid until 2024. However, the Wielkopolskie voivodship has three agreements with Regional Transports until 2020 and with Wielkopolska Railways until 2025. Another example is the Lesser Poland voivodship, which had annual agreements concluded with three operators: Regional Transport, Małopolskie Railways and Silesian Railways. The range differs from the model used by individual organizers. In total, in 2017, operators received funding for the provision of public services in the amount of 131 312 000 EUR from the state budget (more by 3 712 000 EUR compared to 2016) and 356 352 000 EUR (more by 21 808 000 EUR compared to 2016) from local governments.

[4] Source: http://drahy.nsat.sk/wp-content/uploads/sites/3/2014/07/zoznam-licenci%C3%AD_23.11.2018.pdf

In 2017, three carriers performed cross-border transport:

- Przewozy Regionalne to Germany in relations with Lübeck, Berlin Lichtenberg, Forst and Görlitz, Slovakia to Medzilaborców, to Belarus in relation to Terespol to Brest and Lithuania via Trakiszki to Kaunas;
- Koleje Dolnośląskie to the Czech Republic: from Szklarska Poręba to Liberec and from Sędzisław to Trutnov and from Wrocław to Lichkov;
- Koleje Śląskie to Bohumin in the Czech Republic;

In 2017, 72 entities operated on the market, including one broad-gauge carrier - PKP LHS. Taking into account only transports on a standard-gauge network, last year, 75% belonged to the companies PKP Cargo, DB Cargo Polska, CTL Logistics and Lotos Kolej both in terms of the weight of transported goods and transport work. At the end of 2017, 91 railway carriers had active licenses authorizing them to run their business activities, of which one had a temporary license. In 2017, 69 entrepreneurs from 91 with licenses carried out transport activity. PKP Cargo remains the unquestionable leader of the freight transport market. In 2017, the company transported over 106.1 million tonnes, which meant an increase in the transported weight by 8.6 million tonnes (8.9 %). In the case of other carriers, the largest increases in the transported weight occurred in the case of: DB Cargo Polska (2.9 million tonnes), CD Cargo Poland (1.1 million tonnes), PUK Kolper (0.8 million tonnes), Orlen KolTrans (0.8 million tons), Lotos Kolej (0.7 million tons) and PKP Cargo Service (0.6 million tons).

Table 9 Structure of the freight transport market by weight in Poland in 2013-2017 (data for carriers over 0.5 % at the end of 2017)

	2013	2014	2015	2016	2017
PKP Cargo	48.64 %	47.94 %	47.48 %	43.87 %	44.24 %
DB Cargo Polska	19.20 %	18.55 %	17.71 %	17.99 %	17.88 %
Lotos Kolej	4.04 %	4.65 %	5.61 %	5.70 %	5.56 %
PKP LHS	4.32 %	4.66 %	4.30 %	4.48 %	4.20 %
CTL Logistics	3.19 %	3.11 %	3,58 %	4.31 %	3.84 %
PUK Kolprem	2.30 %	2.44 %	2.23 %	2.73 %	2.87 %
Freightliner PL	2.09 %	2.92 %	2.52 %	2.27 %	2.27 %
Pol-Miedź	2.36 %	2.34 %	2.33 %	2.26 %	2.20 %
Orlen KolTrans	1.16 %	1.24 %	1.45 %	1.61 %	1.81 %
Rail Polska	1.72 %	1.28 %	1.39 %	1.61 %	1.68 %
CD Cargo Poland	-	-	0.15 %	0.95 %	1.33 %
Ciech Cargo	0.57 %	0.65 %	1.02 %	1.23 %	1.26 %
KP Kotlarnia	1.32 %	1.21 %	1.36 %	1.13 %	1.12 %
STK	1.31 %	0.94 %	0.75 %	0.90 %	1.03 %
Inter Cargo	-	-	0.23 %	0.63 %	0.78 %
Captrain Polska	0.28 %	0.34 %	0.42 %	0.64 %	0.77 %
Ecco Rail	0.17 %	0.37 %	0.36 %	0.60 %	0.65 %
ZPiS „SPEDKOKS”	0.17 %	0.25 %	0.41 %	0.66 %	0.63 %
PKP Cargo Service	0.44 %	0.43 %	0.20 %	0.30 %	0.54 %
Rest	6.72 %	6.68 %	6.50 %	6.13 %	5.35 %

Slovakia – Žilina self-governing region

In the Žilina region the passenger railway transportation is provided by three operators that operate on long distances (RegioJet, Leo Express, ZSSK). Privately owned carriers (RJ and LEO) operate the service at their own risk (without state funding). The state owned ZSSK is operating IC trains at its own risk in section Košice – Žilina – Bratislava. All other services of ZSSK are provided as the public service and are co-funded from state budget. The table doesn't include České dráhy operating in Slovakia because their service are provided within cooperation with ZSSK and theire trains runs under the ZSSK brand as a public service.

In the freight transport, there are three national operators (ZSSK Cargo, ČD Cargo, PKP) with major share resulting from transport of bulk cargo (iron ore and coal), this is a natural state of dominance of established carriers. A smaller share of other carriers is due to the transport of other non-bulk commodities, but in this category they can benefit from their higher flexibility within ad hoc transport.The position of Žilina region predicts its railways for transit of bulk goods on the east – west axis, for the heavy industry in Czech Republic and Poland.

Freight transport in the countries of TRITIA area

Table 10 Share of freight transport modes (%) – country 2017

Country	Railway transport	Inland waterway transport	Road transport	Intermodal transport
Slovakia[5]	47 790 000 t (21.112 %)	1 780 000 t (0.786 %)	176 790 000 t (78.101 %)	5 000 332 gross tons
Czech Republic	96 516 000 t (17.005 %)	1 568 000 t (0.276 %)	459 433 000 t (80.947 %)	13 323 000 gross tons (1.772 %)
Poland	222 523 000 t* (11.264 %)	5 778 000 t (0.292 %)	1 747 266 000 t (88.444 %)	Table 11

*without shunting
**These figures are from the annual combined transport report

The share of individual transport branches in Poland indicates the dominant importance of road transport, much higher than in the Czech Republic and Slovakia. With a significantly smaller share of rail transport, twice less than in the Czech Republic and Slovakia. The inland waterway transport is also marginal.

The transport performance reflects the general trend in the freight transport, with domination of railway transport of bulk cargo and the road transport in smaller consignments. Such modal split presents a challenge and a great potential for the railway transport, because it is possible to ensure a significant growth based on the development of intermodal terminals (their radius of operation) and subsequent growth in medium and long-distance railway transport.

Performance of the intermodal transport in Slovakia is included in both road and railway performance, so there is no way to exactly determinate its share from presented numbers. Also there is no way to exactly determinate the weight of transported goods, because the transport performance data is collected in gross tonnes (weight of goods plus intermodal unit) or the data is collected as number of intermodal units (TEU).

Table 11 Transhipment of containers at Polish intermodal terminals in 2017

Transport mode	Transhiped containers
Rail	11 002 978 t
Road	11 975 979 t
Maritime	37 848 637 t
Total	60 827 594 t

[5] Source: Statistical Office of the Slovak Republic, 2017

In 2017, 60 827 594 tons of cargo was recorded in container transshipment operations at intermodal terminals.

Table 12 Share of freight transport modes (%) - region 2017

Region	Railway transport	Inland waterway transport	Road transport	Intermodal transport
Žilina region	not available	not available	not available	not available
Moravian-Silesian region	Export to other regions – 2 418 600 t Import into other regions - 2 013 500 t Within the M-S region - 8 006 800 t	-	Export to other regions - 4 787 600 t Import to other regions - 5 166 000 t Within the M-S region – 39 777 300 t	-
Silesian voivodship	not available	139 300 t	Table 13	1 242 512 t*
Opole voivodship	not available	1 500 t	Table 13	45 055 t*

* Transport of goods in containers by national intermodal road transport by the voivodship in 2017

In general, in 2010, Polish airports handled 1.05 million TEU, and in 2017 it was already over 2 million TEU.

In the number of trains traced in domestic traffic from the Zebrzydowice station, nearly 3.6 thousand they were mass trains, and the number of intermodal routes amounted to over 630. The average length of intermodal trains opened from the Zebrzydowice station was almost 600 meters, and the mass of nearly 950 gross tonnes. According to the carriers to or from the Petrovice / Zebrzydowice station, about 150 trains, known as intermodal ones, arrived / departed monthly. This means that every day these stations served 5 intermodal trains. An important part of international connections made by international carriers are intermodal transport. Routes in this segment are mainly related to the reports from seaports to terminals and whether they are launched as part of the "New Silk Road".

In 2017, 18 intermodal transport services were provided by 18 entities. In 2017, goods with a weight of nearly 14 million tonnes were transported. This means an increase of 1.9 million tonnes compared to 2016 (around 14.5 %). The share of intermodal transport in the railway transport market measured by the mass of transported loads reached the level of over 6.1 % and was slightly higher than in 2016. In 2017, the share of intermodal transport in the rail transport market measured by transport performance reached the level of 9.9 % and was 1.1 percentage points higher than in 2016. In 2017, railway carriers also transported a record number of loading units - nearly 1 081 thousand units, including almost 1 053 thousand containers. In comparison with 2016, the number of transported units increased by 13.6 %. Analyzing intermodal transport for TEU (1 20-foot container = 1 TEU) in 2017, 1 667.3 thousand were transported. TEU, which was an increase of 16.1 % compared to the results from 2016.

Intermodal transport is mainly carried out using containers, whose share in the total number of units at the end of 2017 amounted to 97.4 %. Transportation of 20- and 40-foot units predominated, accounting for 43.8 % and 47.7 %, respectively. The share of the remaining containers was respectively: 25-foot – 0.6 %, 30-foot – 2.8 %, 35-foot – 0.7 % and 45-foot – 1.9 %. Semi-trailers and car trailers accounted for 1.4 % of the units used, and replaceable car bodies 0.8 %. In Poland, intermodal transport mainly uses land transport, which according to transport performance accounted for 75 %. Transport by sea in 2017 amounted to 25 %.

Table 13 Voivodship balance of goods road transport in 2017 (thousand tones)

Region	Delivered				Received				Transport balance
	Total	Within the vovivodship	To other voivodships	Abroad	Total	Within the vovivodship	To other voivodships	Abroad	
Silesian v.	149 113	95 282	41 782	12 049	146 341	95 282	39 939	11 120	+2 772
Opole v.	42 098	21 293	17 502	3 303	37 926	21 293	14 534	2 098	+4 172

In road transport in 2017 in the Silesia and Opole region, a total of 191 211 thousand tons of cargo were delivered, the vast majority of which are transports within the region. International transport amounted to 15 352 thousand tons of cargo, which is about 8% of the proportion in delivered. In total, 184,267 thousand tons of cargo were transported, the vast majority of which are transports within the region. International transport amounted to 13 218 thousand tons of cargo, which is about 7% of share in received.

Passenger transport in the countries of TRITIA area

Table 14 Share of public transport modes (%) - country (without urban transport, in thousand passengers)

Country	Railway transport	Inland waterway transport	Road transport
Slovakia[6]	75 370 (23.324 %)	121 (0.037 %)	247 656 (76.639 %)
Czech republic	183 024 (35.638 %), 9 497.6 mil.passkm	800 (0.157 %), 12.5 mil.passkm	*329 733 (64.205 %), 11 177.8 mil.passkm
Poland (2017) – passengers (GUS)	303 001 (43.5 %)	1 262[7] (0.2 %)	378 610[8] (54.4 %)

* It is a bus service (without urban transport).

Therefore, air transport and urban transport + individual transport are not mentioned.

The Moravian-Silesian Region is equipped with a dense railway network. This network is therefore used extensively not only for freight and passenger transport over long and medium distances but also for regional and suburban passenger transport. The third largest city in the Czech Republic (Ostrava) which lies on the II and III corridors (2nd transit railway corridor: Břeclav - Přerov - Ostrava - Bohumín - Petrovice u Karviné, 3rd transit railway corridor: Mosty u Jablunkova - Bohumín - Olomouc - Česká Třebová - Prague – Plzeň - Cheb) offers many occasional train services. The railway in the Moravian-Silesian Region offers a great opportunity for fast and high-quality connection of freight and passenger transport from western countries and Prague (or southern countries) to eastern states both in Slovakia and Poland.

In Poland the total number of passengers transported by public transport (rail, road and water) in 2017 amounted to 682 873 thousand passengers. The share of passengers traveling by rail is about 10 % lower than the road transport, which is a positive trend.

Performance of passenger railway transport reflects the density of railway network in Slovakia. Railway transport is relevant mostly for long distance trips (over 100 km), where it provides the opportunity for higher number of passengers, while avoiding road network congestions. There is a great potential for the railway transport in the shift from individual car transport, given the high number of transported passengers (1 933 147 thousand passengers).

Table 15 Share of passenger transport modes (%) – region - (without urban transport and individual automobile transport)

Region	Railway transport	Inland waterway transport	Road transport
Žilina region	not available	not available	not available
Moravian-Silesian region	* Exit to other regions – 3 342 600 passangers	-	29 735 700 passangers

[6] Source: Statistical Office of the Slovak Republic, 2017

[7] Including coastal shipping

[8] Enterprises employing more than 9 persons; excluding urban transport

Region	Railway transport	Inland waterway transport	Road transport
	Arrival in other regions – 3 347 600 passangers Within the M-S region - 12 495 200 passangers		
Silesian voivodship (2017)	6.7 % share of voivodship in railway transport in the country 9	not available	27 858 (7.36 %10) – transport by bus between cities11
Opole voivodship (2017)	1.7 % share of voivodship in railway transport in the country12	not available	11 189 (2.96 %13) – transport by bus between cities14

* Foreign transport is not considered.

Modernization of the railway infrastructure in the countries of the TRITIA area

For the determination of the unified concept and technical solution of the railway infrastructure, the "Principles of Modernization and Optimization of the Selected Railway Network of the Czech Republic" were elaborated. Than it was amended by Director General´s Regulation no. 16/2005, at where are the legislative changes which influence concept and technical solution of railway infrastructure.

Main principles of modernization and optimization of selected railway network in the Czech Republic:

- introduction of higher line speed on sufficiently long sections so that increased speed can be used effectively
- achievement of track load class D4 UIC for en-route speed of 120 km / h including (i.e. 22.5 t / axle and 8 t / m of vehicle length)
- introduction of spatial throughput for the UIC GC loading gauge and wider vehicles according to ČSN 73 6320, i.e. the basic Z-GC cross-section with the influence of wider vehicles
- ensuring the required capacity of the railway while determining the optimized range of the railway infrastructure
- equipment of the line with such technological equipment that ensures full safety of operation at line speed up to 160 km / h
- equipment of railway stations in accordance with Decree no. 177/1995 and no. 369/2001 as amended
- achieving sufficient useful length of rails at the railway stations
- improvement of level crossings of roads with roads

Furthermore, Regulation no. 32/2007 issued the "Principles of Regional Railroad Reconstruction".

The basic objectives of the reconstruction of regional railways are:

- increas traffic safety

[9] On the basis of the number of departures passengers.

[10] Share of the voivodship in road transport in the country

[11] Enterprises employing more than 9 persons (excluding urban transport services); data were divided into voivodships by entities location.

[12] On the basis of the number of departures passengers.

[13] Share of the voivodship in road transport in the country

[14] Enterprises employing more than 9 persons (excluding urban transport services); data were divided into voivodships by entities location.

- increas the safety of passenger of railway transportation
- ensuring the technical condition of the infrastructure according to the requirements of applicable laws, regulations and standards
- minimizing the costs of ensuring the operability of the railway infrastructure
- minimizing the costs of operating the railway infrastructure
- increase cruising speed

Currently, only minor modifications to the railway infrastructure have taken place in the Moravian-Silesian Region. Recently, the ETCS system for corridors was introduced in the Přerov - Bohumín section. A large planned modification of the infrastructure is not considered until the Modernization of the Ostrava railway junction. Furthermore, the reconstruction of the 322-325 regional lines is being considered. Furthermore, the traction system is changed from 3kV to 25kV.

For several years, the railway network in Poland has been modernized in accordance with the National Railway Program. Owing to the ongoing investment works, not only are the operational parameters of the railway lines raised, such as the maximum speed or axle load permissible, but also to a large extent ensuring compliance with the essential interoperability requirements specified in the TSI for a given subsystem.

The purpose of the investments announced in 2017 was to significantly improve railway traffic in agglomerations, increase the standard of travel on regional routes and improve the conditions for the transport of goods. In 2017, many tenders were resolved, contracts were signed and contractors were selected. A number of key tenders for multi-billion EUR investments have also been announced. The value of contracts signed by PKP PLK until 2017 amounted to approx. 4.4 billion EUR. At the end of 2017, the implementation of the National Railway Program (NCP) was at the level of around 7 billion EUR - almost half of its value. In 2017, contracts were signed, among others for investments:

- Linia obwodowa Warszawa Zachodnia / Gołąbki - Warsaw Gdańsk;
- Railway line E30 Kraków Główny Towarowy - Rudzice;
- Kędzierzyn-Koźle - Opole;
- Działdowo - Olsztyn Line;
- Line E75 RAIL BALTICA: Sadowne - Czyżew;
- Line C-E 65 on the section Zduńska Wola Karsznice - Bydgoszcz - Tczew.

The implementation of the European Rail Traffic Management System (ERTMS), consisting of: the European Train Control System (ETCS) and the Global Mobile Radiocommunications Rail System (GSM-R) will increase the safety of railway transport and train speeds above 160 km / h. As part of investment projects co-financed from the EU budget 2014-2020, the process of implementing the ERTMS system on the Polish rail network is planned to continue. The improvement of safety may also be caused by the liquidation of level crossings, the construction of animal crossings or the adaptation of existing engineering structures, as well as the installation of devices that repel animals by means of acoustic or light signals (reflective).

In 2017, more than 200 investment projects were accepted for implementation, of which 66 projects were tasks for which the first significant capital expenditures were in 2017. The largest project in terms of outlays was the modernization project E75 Sadowne-Czyżew implemented under the CEF 2014- 2020, for which the total value of outlays for 2017 amounted to approximately 86.4 million EUR. Agreements were signed for projects included in the NCP with a total net value of 4.4 billion EUR. Among the signed agreements, the most important group were investment agreements for the implementation of EU projects. The vast majority

of procedures announced in 2017 constituted contracts for construction works - 83%. Over 56% were contracts financed under the OPI & E 2014-2020 program.

To achieve the EU strategic goals, funds are allocated in Slovakia, broken down by regions and specific intervention objectives. The main objectives of the Operational Programme Integrated Infrastructure (OPII) in railway transport are:

- Supporting the multimodal single European transport area by investing in TEN-T through the:
    - elimination of key bottlenecks on railway infrastructure, modernization and development of major railways and nodes, important for international and domestic transportation,
    - improvement of technical conditions for the operation of international railway transport, through the implementation of selected TSI components on the most important lines with international transport (TEN-T CORE),
    - improvement of the attractiveness and quality of public passenger transport services through the renewal of rolling stock.
- Development and improvement of environmentally friendly transport systems through:
    - increase in attractiveness of public passenger transport, modernization and reconstruction of infrastructure for Integrated Transport Systems and urban rail transport,
    - improvement in the attractiveness and accessibility of public passenger transport through the renewal of the rolling stock of the urban transport.
- Development and upgrade of complex, intermodal high-quality railway systems and support for noise reduction measures through the:
    - removing of key bottlenecks on railway infrastructure, modernization and development of railway lines relevant in terms of international and national transport,
    - improvement of technical conditions for the operation of international railway transport, through implementation of selected TSI components on the most important international railway lines.

In Žilina region, there are two railway sections and one marshalling yard that are already modernized. The first section is Žilina - Krásno nad Kysucou (Žilina – Čadca line) and the second section is Považská Teplá – Žilina (on the main line Bratislava – Žilina). On both of these sections athere is installed ETCS 2 with GSM-R and is in aligment with European TSI for railway safety and transportation. In Žilina node the marshalling yard for freight transport was transferred to new freight station in Teplička nad Váhom (build from finances from European funds), located between stations Žilina and Varin. Because of this relocation, the Žilina node (mainly station) can be modernized to higher speeds, as there are no obstacles in form of marshalling yard to guide modernized line id direction of Považská Teplá. Currently, the project of the Žilina railway node is in an advanced state of project preparation and the public procurement process is being prepared. This project will have a major effect on the railway transport in the node (shorter times and traction changed from 3kV DC to 25kV AC).

All modernized sections are significant at the corridor level and are aimed to meet the objectives at both national and international level, with an emphasis on increasing the competitiveness of railway transport and to modernize the infrastructure in line with TSI norms.

2. Legislative framework of railway sector in the TRITIA area

Legislation is a groundwork for implementation of safe and reliable railway infrastructure and transporatation. The goal is same for all the countries, but the implementation may by different as the standards implementation was based on local needs and those may differ in case of country to country. This is the main reason why it is necesery to analyse the differences in legislation in all three countries of Tritia region.

By analyzing the legislative differences in the Tritia region, it's possible to identify the differences of approache and in which parts the legislation is moving in the same direction. The main documents that are same for all the countries are the international conventions for the carriage of passengers and goods, as all three countries are part of the UIC and OSJD.

2.1. Business in railway transport at Czech republic

SŽDC provides access to the railway route to all carriers that meet the conditions set out by the Statute of Railway. The conditions for access comply with European standards and are the same for all carriers. SŽDC will conclude a rail transport operation contract with the carrier who has met the conditions for access to the railway route.

Details are in the National and Regional Railroad Statement issued by SŽDC.

Basic conditions for access to the railway infrastructure:

- be registered in the Commercial Register
- hold a valid rail transport license
- hold a valid carrier certificate
- arrange liability insurance for railway transport damage
- to conclude a contract on rail transport operation with the infrastructure manager
- have the capacity of the transport route

Details are contained in Act No. 266/1994 Coll., On Railways, as amended, and in the National and Regional Railroad Statement issued by SŽDC.

General access requirements

Requirements for applicants for capacity of railway

An application for allocation of railway capacity may be filed with SŽDC by a legal or individual person holding a valid license, or by a person who does not hold a valid license and has fulfilled the conditions stipulated by law. A person who is not established in the Czech Republic and intends to submit an application for the allocation of railway capacity for the purpose of operating cross-border passenger transport shall notify the Office for Access to Transport Infrastructure no later than 2 months before submitting a proper application for allocation of capacity to the annual timetable. A person intending to submit a request for allocation of railway capacity for the purpose of operating a passenger rail transport without a public passenger transport service contract shall notify this fact no later than 2 months before the request to the Office for Access to Transport Infrastructure.

Infrastructure

The entire functional and technical railway infrastructure is owned by the Czech Republic.

SŽDC negotiates its terms and conditions with the carrier before starting the operation of rail transport by concluding a bilateral agreement. The subject of the contract is the regulation of the mutual rights and obligations of the parties at:

- allocation of railway capacity on the national railway and regional railways, on which SŽDC is the Allocator according to the Act on Railways
- operation of rail transport on the national rail system and regional railways operated by SŽDC
- the use of equipment provided by SŽDC and the use of services directly related to the operation of rail transport on a national or regional route

Pathway intercourse

The points of contact of the national and regional railways with railways in the territory of neighboring Slovakia and Poland in the Trans Tritia region:

- Mosty u Jablunkova st. hr. (km 286,534) Železnice Slovenské republiky (ŽSR)
- Jindřichov ve Slezsku st. hr. (km 25,694) PKP Polskie Linie Kolejowe S.A. (PKP-PLK)
- Bohumin-Vrbice st. hr. (km 4,275) PKP Polskie Linie Kolejowe S.A. (PKP-PLK)
- Bohumin st. hr. (km 279,628) PKP Polskie Linie Kolejowe S.A. (PKP-PLK)
- Petrovice u Karviné st. hr. (km 292,602) PKP Polskie Linie Kolejowe S.A. (PKP-PLK)
- Český Těšín st. hr. (km 139,112) PKP Polskie Linie Kolejowe S.A. (PKP-PLK)

Infrastructure development

On the 1st of May, 2004, the Czech Republic became a member of the European Union, whose European Parliament and Council adopted directives on the interoperability of the trans-European high-speed and conventional rail system to improve the interconnection of national rail networks. The selected railway network of the Czech Republic forming part of this European rail system must meet the requirements for interoperability (pursuant to Decree No. 352/2004 Coll., On the operational and technical interconnection of the European rail system, the Government Regulation on technical requirements for the operational and technical interconnection of the European rail system no. 133/2005 Coll., and related technical specifications for interoperability).

Reconstruction of lines of selected railway network is usually realized in the following ways:

- modernization of the line - summary of measures that allow the given line to increase the highest line speed up to and including 160 km / h (with possible construction readiness for higher speed if the investment costs do not increase disproportionately), achieve the required load class, achieve the required throughput and operation tilting unit units;
- putting the track in an optimized state - a summary of measures that usually allow the existing ground body to reach the required load class, achieve the required throughput, eliminate local track speed limitations and, if necessary, operate the tilting box units;
- revitalization of the track - a set of measures to ensure the renewal of the infrastructure in relation to passenger and freight requirements. Above all, it is aimed at improving the conditions of access for passengers, improving the safety of rail transport, reducing travel times and improving the operational and technical condition.

The modernization of the line includes time-linked construction measures such as reconstructions, relocations and new buildings on a continuous section of the line.

As part of the modernization and optimization of the lines, the main tracks (continuous track and main station tracks) are reconstructed. In addition to the main station tracks, in the railway branching stations:

- reconstructing tracks overtaking
- establish new transport (or handling) tracks solely upon their proven necessity;
- make adjustments to the configuration of other station tracks resulting from the new location of the main tracks;
- overtaking and from a new location of platforms or other expensive engineering objects or resulting from changes in train path requirements
- replace tracks of foreign owners removed due to changes in track configuration
- reduces unnecessary parts of the yard when there is a collision with the new yard configuration, or when it makes it possible to significantly reduce the investment demands of the yard.

Main objectives of modernization and optimization of the selected railway network in the Czech Republic:

- introduction of a higher line speed on sufficiently long sections so that it can be increased
- use it effectively
- achievement of the D4 UIC load class for en-route speed of 120 km / h including
- (i.e. 22.5 t / axle and at the same time 8 t / meter of vehicle length)
- introduction of spatial throughput for UIC GC loading gauge according to CSN 73 6320, i.e. basic cross-section Z-GC
- ensuring the required capacity of the railway, or ensuring the required time positions of trains at
- the simultaneous establishment of an optimized range of railway infrastructure,
- equipping the line with such technological equipment that ensures full safety of operation
- track speeds up to 160 km / h.

The construction of new lines or the upgrading of existing lines for speeds above 160 km / h is considered to be a higher level upgrade. The new line sections, which will be part of the high-speed line network in the future, are designed taking into account the relevant technical specifications for interoperability of the trans-European high-speed rail system.

Allocation of railway capacity

The capacity of the railway, i.e. the ability to insert train paths required for certain sections of the runway over a certain period of time, is expressed by the number of train paths that can be constructed over a certain period of time with the technical, operational and personnel equipment and with the necessary transport quality. The track capacity of the multi-track section of the track is determined by SŽDC for each track separately according to the specified train transport organization.

In accordance with paragraph 32 of the Act on Railways, SŽDC allocates rail capacity on the nationwide and regional railways owned by the state. The maximum time frame (time between departure from the first point and arrival to the last point on the SŽDC network) allocated to the railway capacity is 20 hours. Exceptions may be granted by the capacity allocator only if a single application is submitted for one day only. Corridor OSS (C-OSS) may also allocate track capacity on lines that are included in the European Railway Network for Competitive Freight Transport (ERNCF) under Regulation 913/2010 (see Chapter 1.9). The conditions and procedures for allocating the C-OSS rail capacity are published by individual corridors in the Corridor Information Document (CID). More information on the pages of individual corridors or on the RIA website in the section on ERNCF.

Description of the process of allocating runway capacity

SŽDC will allocate railway capacity if:

- the applicant has submitted and documented his / her application in accordance with the Statement of railway,
- the applicant has a valid license or has met all legislative requirements for the applicant without a valid license,
- track capacity allows,
- the applicant entered into a contract with SŽDC for the operation of rail transport
- the carrier has contracted itself to a financial sanction and incentive pay system
- for interstate routes the capacity allocation condition has been met

License

License to operate railway transport granted by the authority of a Member State of the European Union is valid in the Czech Republic. In the Czech Republic, Train Office issues a license for rail transport operation on the nationwide railroad and regional railways. It resides at Wilsonova 300/8, 121 06 Prague 2. The license can be granted under the conditions laid down by the Statute of railway, i.e. if the applicant:

a) is over 18 years of age and fully competent in the case of a natural person;

b) is blameless,

c) is competent,

d) is financially eligible;

e) has not seriously infringed labor law;

f) did not seriously violate the customs regulations in the case of authorization to operate freight rail transport,

g) is insured on the day of commencement of operation of rail transport in case of obligation to compensate for damage caused by this operation,

h) is established in the Czech Republic.

Safety certificate - carrier certificate

The carrier must have, on the date of commencement of rail transport on the national or railway track, a regional certificate of the carrier indicating the type of transport and the scope of services to which it relates. The certificate is issued by the Rail Authority with its registered office at Wilsonova 300/8, 121 06 Praha 2, upon request of the carrier. The carrier's certificate consists of:

a) parts certifying the measures taken by the carrier to meet the requirements for the internal organizational structure and management system for the provision of rail transport and the establishment of a system for ensuring the safety of rail transport operation, which means a set of organizational and technological measures for safe operation of rail transport,

b) parts certifying the measures taken by the carrier to meet the conditions of professional competence of persons providing rail transport operation, conditions stipulated by the Railways Act for the operation of rail vehicles and specified technical equipment for issuing internal regulations for rail transport operation, operation of rail vehicles, operation of specified technical equipment , on requirements for professional competence and knowledge of persons providing rail transport operation and on the method of their verification, including a system of regular training. If a carrier certified by a carrier of another Member State of the European Union is certified, the Rail Authority

will only issue a part of the carrier's certificate referred to in paragraph (b) above after the legislative conditions have been met.

Covering operational risks

The carrier, which operates the rail transport on the national or regional railroad, is obliged to comply with the requirements of the Railways Act in relation to financial fitness and insurance:

a) financially ensure proper operation of rail transport for the entire period of validity of the license,

b) on the date of commencement of railway transport, arrange for liability insurance for damage caused by railway transport operations and pay premiums and have agreed on this insurance and premiums paid for the whole period of rail transport operation, while the minimum amount of indemnity in the amount of 1 940 000 €.

Principles of price policy

Capacity Allocators and Infrastructure Managers charge applicants the following prices for the use of the national and regional rail infrastructure owned by the Czech Republic:

a) the price of the allocation for the capacity allocation

b) the price of the rail system operator using the runway by train

c) the price of the rail system operator for access to service facilities by rail;

d) prices for other services provided under this Statement of Railway.

The prices listed under letters a) to c) are prices for regulated services and are subject to material regulation, the scope of which is defined by the valid Ministry of Finance's notice published in the Price Bulletin (Use of Railway Infrastructure of National and Regional Railways and publicly accessible sidings). They are set out for the duration of the timetable and are published in the Network Statement. Prices for regulated services are equivalent and non-discriminatory to all applicants who are provided with services of the same type on the same or similar part of the railway infrastructure. Price regulation applies to national and regional railways according to § 3 par. a) and b) of the Statute of Railway. The prices mentioned under letter d) are not prices for regulated services and are not subject to material regulation in the sense of the aforementioned MF assessment.

General information and pricing conditions for use of the railway by train

1. Riding of all trains on the RIA's network is subject to the price for using the runway by train.

2. All pricing model parameters for calculating the cost of using a runway by train shall be in accordance with applicable pricing regulations.

3. The cost of using the runway by train includes costs that meet the conditions of direct expense to ensure the runway's serviceability (maintenance and repair of the wear and tear of the train induced by the train). In addition, the cost of using the runway by passenger train takes into account the cost of maintaining and repairing wear and tear on the access roads for passengers.

4. The subject of the calculation of the declared price for the use of the runway by train is not the cost of maintaining and repairing the fixed traction equipment.

5. For the purpose of determining the price for use of the national and regional railways, a train ride means the journey of one or more rolling stock, including special tractive vehicles, if it is organized as a train ride in the sense of transport regulations.

6. The parameters and application conditions of the pricing model for calculating the prices for the use of the runway by train are binding for the railway operator (hereinafter referred to as SŽDC) and for all legal

entities with which a contract for the operation of rail transport has been concluded on the railway network owned by the Czech Republic operated by SŽDC (hereinafter referred to as "carriers").

7. In the context of this Annex 'C', prices are those excluding VAT.

Pricing model

1. The resulting price for using a runway by train for a particular train on a given category track shall be calculated according to the following calculation formula:

Cv = Cs + CPK

Cs = L x Z x K x Px x S1 x S2

where: Cv = train usage price by train [€]

Cs = cost of using the railway by driving one sub-train [€]

L = sub-train travel length (see Article A)

Z = base price (see article B)

K = track category coefficient (see Article C)

Px = product factor P1 to P5 (see Article D)

S1 and S2 = specific factors (see Article E)

CPK = price for the use of access roads for passengers on the passenger train (see Chapter F) [€]

Cs - Subtrain is the object of information output from IS KAPO, which is created by every new combination of train number, track category coefficient, product factor and one or more specific factors. The sub-pressure is the only object whose parameters can be inserted into the formula for calculating the cost of using a runway train. The subpressure does not serve to record the number of train stops and to calculate the cost of using access roads for passengers on a passenger train.

A) For the purposes of calculating the railway price by train travel, the L [km] sub-train length is determined relative to the traffic points topology data whose position on the track is within the decimal place in the KANGO network. For verification, carriers can use the DYPOD application available on the Rail Operation Portal (http://provoz.szdc.cz/dypod).

B) Basic price Z [€ / vlkm] means the price per train kilometer calculated in accordance with the principles set out in Chapter I. The basic price is the same for all trains. For the period of validity of this Network Statement, it is € 0.84 / vlkm.

C) The category K coefficient represents a combination of factors that influence the quality of services provided by the carriers on the given line section during the validity of the annual timetable, partly taking into account the demand for capacity allocation in the given section, the costs incurred for the maintenance of the lines of the relevant category in the previous statistical period, or the infrastructure manager's intention to support the maintenance or increase of the capacity ordered on the lines of that category. The classification of tracks into individual categories is the result of an assessment of their current technical condition, equipment and technical requirements, taking into account the demand for capacity allocation on the TEN-T lines and other lines. The coefficient value for each line category is shown in the following table.

Table 16 Coefficients for individual categories of lines in the Czech Republic

Track category	Railway transport
1	1.15
2	1.12

Track category	Railway transport
3	1.00
4	0.88
5	0.71

In the table, the categories of tracks and their corresponding coefficients are used solely to calculate the prices for the use of the runway by the train and there is no direct dependence on the categorization of the tracks according to the map data M01, M02 and M03. The affiliation of individual lines to categories 1 to 5 for the purpose of calculating the runway pricing is given in Table B of Annex "B" of the Network Statement.

D) Product Factor Px is a factor that takes into account market segmentation for services with different price levels. The reason for the differentiation is either the direct costs of the given service or the support of the relevant market segment using the co-financing from the state budget. The following product factors are introduced in the pricing model:

P1 - Passenger transport

P2 - Non-specific freight transport

P3 - Freight transport within the collection and delivery system of individual wagon loads

P4 - Combined freight transport

P5 - Freight Transport - Nonstandard Trains

The conditions for the use of the corresponding product factor in the calculation of the price for a particular sub-contract are the subject of Chapter III. A single product factor is assigned to each sub-pressure, a combination is excluded.

Individual product factors take the following values:

Table 17 Product factors in the Czech Republic

Track category	Railway transport
P_1	1.00
P_2	1.00
P_3	0.30
P_4	0.65
P_5	2.00

E) Specific factor Sx is a factor intended to take into account the composition of the sub-beam or its effects on track wear. Corresponding values of both established specific factors are assigned to each sub-pressure in the calculation formula. The conditions for assigning values of specific factors to individual sub-levies are the subject of Chapter III. The following specific factors are introduced in the pricing model.

S1 - Track wear factor based on total train weight

This specific factor reflects the different track wear by running trains of different weight. Total train mass [t] means the sum of the masses of all the vehicles of the train, including the mass of passengers or cargo, rounded to the nearest tonne. Specific factor values are determined for given ranges of total train weight.

Table 18 Track wear coefficient depending on total train weight

Train weight (t)	Coefficient	Tain weight	Coefficient
49 or less	0.42	1000 to 1199	2.77
50 to 99	0.49	1200 to 1399	3.36
100 to 199	0.59	1400 to 1599	3.88

Train weight (t)	Coefficient	Tain weight	Coefficient
200 to 299	0.76	1600 to 1799	4.36
300 to 399	0.94	1800 to 1999	4.89
400 to 499	1.14	2000 to 2199	5.37
500 to 599	1.34	2200 to 2399	5.92
600 to 699	1.50	2400 to 2599	6.39
700 to 799	1.76	2600 to 2799	6.88
800 to 899	2.03	2800 to 2999	7.30
900 to 999	2.31	3000 and more	8.35

S2 - ETCS (Level 2 or higher) on-train active traction coefficient

Given the fact that this is to support the deployment of the signaling equipment to the widest possible extent, trains with active propulsion vehicles equipped with this equipment are also advantageously priced when traveling on track sections without the stationary part of ETCS. The price advantage does not apply to driving cars. The benefit of the pricing model takes into account the fact that, in accordance with Directive 2012/34 / EU, proprietary vehicles with ETCS are provided with additional support from the state budget. The specific factor S2 values are shown below. An equipped vehicle value is assigned to each train in which at least one active ETCS powered vehicle is Level 2 or higher and does not vary with the number of vehicles so equipped. For the award of the value S2 belonging to vehicles with ETCS, Level 2 or higher, the entry in the IS REVOZ (ticked status "ETCS Price for the use of the runway by train" in the "Vehicles" tab), based on the application submitted by the carrier or the owner of the vehicle, is decisive. The new S2 value is taken into account from the date of entry of the information into the IS REVOZ. The retrospective effect of the information is not permitted. The carrier who operates the vehicle of another owner is obliged to verify whether the vehicle of the inventory number in question has the information on ETCS equipment in the IS REVOZ for claiming a more advantageous S2 value. Replacing this information by simply referring to the equipment of other vehicles of the same series is not permitted.

Table 19 ETCS traction equipment

ETCS Level 2 and higher traction equipment	Specific Factor S2
Unsealed traction vehicle	1.00
Equipped driving vehicle	0.95

F) Price for using access roads for passengers on the passenger train

The cost of using access roads for passengers on a passenger train is calculated using the following calculation formula:

Cpk = Nz x Zpk x mpk x kpk

where: **Cpk** = the cost of using access roads for passengers on the passenger train [€]

Nz = planned number of passenger train stoppages for passenger entry and exit (see Article F 1.)

Zpk = base cost for scheduled passenger train stop for passenger boarding and departure [€ / stop] (see Article F 2.)

mpk = train mass for the calculation of the use of access roads for passengers on the passenger train [t] (see Article F 3.)

kpk = weight conversion factor (see Article F 4.)

F 1. The planned number of train stoppages for passenger boarding and decisive for calculating the cost of using access roads for passengers on the passenger train corresponds to the parameters of the allocated train path.

F 2. Basic Cost Zpk [€ / Stop] means the cost per passenger stop of a passenger train for boarding and disembarking passengers calculated in accordance with the principles set out in Chapter I. For the period of validity of this Runway Declaration, 0.16 € / stop.

F 3. The train mass for calculating the cost of using access roads for passengers on the passenger train mpk [t] is the total mass of the train (see Article II.6.1) reduced by the mass of active traction units without passenger transport according to REVOZ and rounded to the nearest tonne up. The source of the information is data acquired by the carrier in IS ComposT in accordance with the rules stated in the SŽDC Is 10 regulation. The train weight serves as a benchmark for differentiating the charging of each scheduled passenger train stop according to its occupancy.

F 4. The mass conversion coefficient kpk is a statistically determined factor which takes into account the proportion of passenger transport trains with different masses resulting in costs directly incurred for the maintenance and repair of wear and tear on passenger access roads. A coefficient value of 0.008223 was determined for the period of validity of this Track Statement.

International organizations and agreements

COTIF Convention

From 01.07. 2006 revised Convention on International Carriage by Rail (COTIF), as amended by the Amendment Protocol signed at the General Assembly of the Intergovernmental Organization for International Carriage by Rail (OTIF) in Vilnius in April 1999 (COTIF 99).

The COTIF 99 Convention on International Carriage by Rail, including all 7 connections (A-G), is under the responsibility of the Ministry of Transport of the Czech Republic and is listed on their website.

Published in the Collection of International Treaties No. 49/2006, Volume 26.

Documents containing conditions for international transportation:

- Uniform Rules for International Carriage of Persons by Rail - CIV (Attachment A to the Convention)
- Uniform Rules for the International Carriage of Goods by Rail Agreement - CIM (Appendix B to the Convention)
- Regulations concerning the International Carriage of Dangerous Goods by Rail - RID (Attachment C to the Convention) / no annexes /
- Uniform Rules for Contracts for the Use of Wagons in International Rail Transport - CUV (Appendix D to the Convention)
- Uniform Rules for the Contract for the Use of Infrastructure for International Carriage by Rail - CUI (Attachment E to the Convention)
- Uniform legislation for the declaration of technical standards to be binding and for the adoption of uniform technical regulations for railway material intended for use in international transport - APTU (Attachment F to the Convention)
- Uniform legislation for the technical admission of railway material for use in international traffic - ATMF (Appendix G to the Convention)

CER

Community of European Railways and Infrastructure Managers - CER (Community of European Railway and Infrastructure Companies) is based in Brussels and defends the interests of rail carriers towards the European Union institutions. In total, it brings together more than 80 railway carriers and infrastructure companies. The main areas of interest for CERs include supporting the development of railways as a sustainable, efficient and environmentally friendly transport system. The organization's activities cover all areas of

European transport policy - infrastructure, passenger and freight transport, ensuring public service obligations, environment, science and research.

UIC

The International Union of Railways is a global organization for international cooperation between railways and for the promotion of rail transport in general.

Established in 1922, Paris is home to nearly 200 members from five continents. In 2005, a "New UIC" was created to meet new challenges, in particular the liberalization of railways, the high competitiveness of other modes of transport and the growing economic constraints in conjunction with the globalization of transport markets.

OSŽD

The Railway Cooperation Organization is an international organization that brings together the Ministries of Transport and the central state railway authorities of 27 states. Its main objective is to promote international rail transport between Europe and Asia. In particular, it seeks to unify transport transport policy, international transport law and increase the competitiveness of rail transport.

Other agreements:

- Agreement between the Government of the Czech Republic and the Government of the Slovak Republic on Rail Transport across state borders.
- Agreement between the Government of the Czech Republic and the Government of the Republic of Poland on rail transport across state borders.
- CIM / SMGS Waybill Guide (GLV CIM / SMGS).

Act No. 266/1994 Coll., On railways

This law incorporates the relevant European Union regulations, while building on the directly applicable European Union law and modifying

- conditions for the construction of railways, tramways, trolleybuses and cableways and construction on these railways,
- conditions for the operation of railways, for the operation of rail transport on these railways, as well as the rights and obligations of natural and legal persons related thereto,
- performance of state administration and state supervision in railway, tramway, trolleybus and cableway railways.

The law does not apply to mining, industrial and portable railways.

Act No. 77/2002 Coll., On Stocks company České dráhy, state organization Správa železniční dopravní cesty

This Act regulates:

- the method of establishment and operation of České dráhy, a.s.,
- establishment and operation of the SŽDC, state organization, as the legal successor of the České dráhy, a.s..

The Commercial Code applies to the establishment, formation, activity, status of the bodies and legal relationships of the České dráhy, a.s., unless otherwise provided by this act.

Act No. 1/2000 Coll., Rail transport order

The Government Regulation on the Transport Regulations for Public Rail Freight Transport (hereinafter referred to as "the Rail Transport Code") lays down the conditions for the transport of goods or live animals as wagon consignments or as express expressions, conditions for the liability of the carrier from the contract of carriage of goods or live animals, including conditions for the performance of one transport contract by several carriers on the national and regional railways, and regulates the relations between the carrier and the consignor of the consignment, between the carrier and the consignee of the consignment and between the carriers with each other in the performance of one transport contract.

For the loading or unloading and transport of wagon consignments on a siding, which is followed or preceded by the conclusion of a contract of carriage for national or regional rail transport, the provisions of the Rail Transport Regulations apply accordingly.

This rail transport regulations apply to the national transport of wagon consignments or express services in public rail freight transport. For the international carriage of wagon consignments in public rail freight transport, the provisions of the Rail Transport Regulations shall apply only if provided for in an international treaty binding the Czech Republic1) and published in the Collection of Laws.

Act No. 320/2016 Coll., On the Office for Access to Transport Infrastructure

This act incorporates the relevant European Union provisions1) and regulates the status, competence and organization of the Office for Access to Transport Infrastructure (hereinafter referred to as “the Office”) and the legal conditions for the employment of certain natural persons included in the Office.

This act does not affect the legal regulations governing the protection of economic competition and the competence of the Office for the Protection of Competition, which is exclusively entitled to protect competition in the Czech Republic.

Decree No:

- 177/1995 Coll. - Decree issuing the construction and technical regulations of railways
- 173/1995 Coll. - The decree issuing the railway timetables
- 175/2000 Coll. - Decree on transport regulations for public railway and road passenger transport
- 376/2006 Coll. - Decree on the safety system of railways and rail transport operation and procedures for emergencies on railways
- 101/1995 Coll. - Decree of the Ministry of Transport issuing the Regulations for Health and Professional Competence of Persons in Operation of Railways and Rail Transport

Individual methodological instructions of the Rail Authority:

- Railway vehicles
- Operation of railways and rail transport
- Control of railway vehicles
- Specified technical devices
- RID
- CSM
- Interoperability
- ETCS

2.2. Business in railway transport at Poland

In 2017, there was an increase in the passenger transport market, both in the number of transported passengers and in the transport performance. Nearly 303.6 million passengers benefited from the services of carriers, by almost 3.8 % more than in the previous year. For the last time, the number of passengers similar to this result benefited from railway services in 2002 (304.1 million), ie 15 years earlier.

At the end of 2017, 35 railway carriers had active licenses for rail passenger transport, of which 15 reported regular passenger transport on a standard-gauge infrastructure.

The average network rate for the minimum access to the infrastructure of the PKP PLK manager dropped from 2.12 EUR / train km in the 2015/16 timetable to 2.02 EUR /train km in the 2016/17 timetable and remained unchanged in the timetable 2017 / 18. Larger declines occurred in the train schedule 2013/2014, as a result of the manager accepting for the calculation of unit rates of the basic payment only in part of the costs of maintenance, train maintenance and depreciation, which are directly related to train crossings. The average network rate for the minimum access to the PKP PLK infrastructure for all trains has been reduced. Starting from the timetable of trains 2013/2014, average network rates have been lowered and stabilized.

On December 30, 2016, the regulations regarding the administrator setting fees for access to the infrastructure and approving the price list design changed. The President of UTK has not approved the PKP PLK price list design for the 2017/18 train schedule, therefore the manager announced the use of the price list valid in the previous train timetable in the timetable for trains 2017/18. It applies to the extent to which its use does not conflict with applicable regulations.

Since 2010, revenues from sales in all branches of transport have been growing steadily. These revenues include receipts for: transport of cargo, passengers, luggage and mail as well as for transshipment, forwarding, storage and storage of goods and other services related to transport services, e.g. receipts from travel agencies. In 2016, revenues from transport activities increased by 19 billion EUR compared to 2010, while costs resulting from operating activities of carriers increased by 18 billion EUR.

In 2017, 72 entities operated on the market, including one broad-gauge carrier - PKP LHS. Taking into account only transports on a standard-gauge network, last year, 75 % belonged to the companies PKP Cargo, DB Cargo Polska, CTL Logistics and Lotos Kolej both in terms of the weight of transported goods and transport work.

At the end of 2017, 91 railway carriers had active licenses authorizing them to run their business activities, of which one had a temporary license. In 2017, 69 entrepreneurs from 91 with licenses carried out transport activity.

PKP Cargo remains the unquestionable leader of the freight transport market. In 2017, the company transported over 106.1 million tonnes, which meant an increase in the transported weight by 8.6 million tonnes (8.9 %). In the case of other carriers, the largest increases in the transported weight occurred in the case of: DB Cargo Polska (2.9 million tonnes), CD Cargo Poland (1.1 million tonnes), PUK Kolper (0.8 million tonnes), Orlen KolTrans (0.8 million tons), Lotos Kolej (0.7 million tons) and PKP Cargo Service (0.6 million tons).

In 2017, freight transport in international transport was performed by thirty-one licensed carriers, who transported almost 74.4 million tons and performed transport work at the level of 23.3 billion tonne-kilometers.

In 2017, Germany, the Czech Republic, Ukraine, Austria, Slovakia, China and Italy were the main partners in the international exchange with Poland. In the case of imports, trade exchange took place mainly with Ukraine, Russia, Belarus, Germany, Australia, China, the Czech Republic and Slovakia. Poland's partners with the largest share in trade, like in 2016, were: Russia, Germany, Ukraine and the Czech Republic. For

this reason, also the share of rail transport in these directions was the highest - in total 59.9 % of transported freight. The share in terms of transport performance between Poland and these countries in 2017 reached the level of 52.1 %.

Passenger carriers closed 2017 with revenues at the level of 1 345 600 000 000 EUR. At that time, costs increased to 1 306 160 000 000 EUR, which means that the carriers generated operating profit of approx. 39 440 000 EUR. The main element of carrier revenues was ticket sales. Revenues from the state budget and from local governments, designated for the provision of public services and to cover the deficit for granting statutory concessions were added to the revenues. Among the carriers' costs are among other the costs of access to railway infrastructure (including fees for minimum access to infrastructure) and expenses related to energy and fuel consumption. In 2017, the average fee for the minimum access to infrastructure for one train-km was 1.49 EUR and was almost the same as in the previous year. In addition, the carriers incurred costs in the amount of over 20 137 600 EUR as part of other fees for infrastructure managers. The costs of access to the infrastructure totaled 262 160 000 000 EUR, constituting 20 % of operating costs of passenger carriers.

In 2017, for the first time since 2013, an increase in revenues and expenses from operating activities of freight carriers was observed. A clear recovery observed in the recorded increase in transport translated into almost two and a half times the income of the entire industry from 41.86 million EUR in 2016 to 102.32 million EUR in 2017. In the case of carriers of goods, the level of purchase costs for routes from managers was close to 1,464 million EUR, which accounted for 16.4 % of the total costs. The average fee for the minimum access to the infrastructure for 1 train-km of the shared route was 3.2 EUR, which gave the amount of 255 200 million EUR. Other fees amounted to over 20.93 million EUR. The higher cost of route fees for freight carriers is mainly associated with a much higher mass of freight trains. This is more than 2.8 times the gross value of tonne-kilometers compared to passenger transport.

The average speed of 30 km / h is one of the factors hindering the railways competing with road transport when transporting containers.

Railway infrastructure managers are required to develop a uniform system of charging for the duration of one yearly train timetable for all. The administrator may charge the following fees from applicants and railway carriers:

FROM THE APPLICANT:

- payment for handling the application for the allocation of capacity - the fee is determined as the ratio of the costs incurred by the manager to service requests for capacity and the number of applications submitted in the last completed year,
- reservation fee for not using the allocated capacity - the fee is determined as a percentage of the fee a railway undertaking would pay for the use of the capacity allocated to the applicant.

The manager does not charge a fee if the railway undertaking has applied to the President of UTK for a decision on the use of capacity.

FROM THE CARRIER:

- basic fee for services performed within the minimum access to railway infrastructure related to the train run - the fee is the product of the train's run and the unit rate determined for the passage of a train for a distance of one kilometer.

Unit rates for this fee are set by the manager at the direct costs that the manager incurs as a result of the train journey. In order to recover all the costs incurred, the manager may, if it proves that the market condition allows it, increase the rates.

- maneuvering fee for services provided as part of the minimum access to railway infrastructure related to the maneuvers carried out.

Unit rates for this fee are set by the manager at the direct costs that the manager incurs as a result of the train journey.

- the charge for the allocated capacity for the needs of train stays.
- reservation fee for not using the allocated capacity.
- fees for additional and auxiliary services specified in point 3 of Annex No. 2 to the Act.
- other fees for services specified in the network regulations provided by the manager when the carrier requests their performance in the application.

The current list of rates is available at: https://www.utk.gov.pl/pl/dostep-do-infrastruktur/oplaty-za-dostep-do-in/zatwierdzanie-stawek-o/pkp-polskie-linie- kole / 7412, PKP-Polskie-Linie-Kolejowe-SA.html in this e.g.., file:///C:/Users/user/Downloads/DRRK-WKL_730_5_2016_RK.pdf

The average network rate for the minimum access to the infrastructure of the PKP PLK manager dropped from 2.11 EUR / train-km in the 2015/16 timetable to 2.01 EUR / train-km in the 2016/17 timetable and remained unchanged in the timetable 2017 / 18. Larger declines occurred in the train schedule 2013/2014, as a result of the manager accepting for the calculation of unit rates of the basic payment only in part of the costs of maintenance, train maintenance and depreciation, which are directly related to train crossings. The average network rate for the minimum access to the PKP PLK infrastructure for all trains has been reduced. Starting from the timetable of trains 2013/2014, average network rates have been lowered and stabilized.

Applicants may submit requests for infrastructure capacity to infrastructure managers. An applicant within the meaning of the Act on railway transport is a railway carrier, an international grouping of economic interests including railway carriers or another entity interested in acquiring capacity, in particular an organizer of public rail transport, a forwarder, a sender or a combined transport operator.

The administrator allocates capacity on the basis of the applications received. In the event that the manager refuses to process the application for the allocation of capacity or refuses to allocate capacity, the applicant may file a complaint to the President of UTK. The President of UTK then states by decision that the refusal does not require any changes, requires modification or withdrawal. The administrator modifies the refusal or withdraws the refusal in accordance with the guidelines set out by the President of UTK in this decision. The administrator may specify in the contract the requirements regarding financial guarantees for securing payments. These requirements must be appropriate, transparent and non-discriminatory. In the scope of rail transport of persons other than occasional transport, the manager concludes a contract for the allocation of capacity in the scope in which the applicant has entered into a public service contract, presented a statement by the organizer of public rail transport about the intention to take trains for the provision of public services or received a decision to grant open access.

The President of UTK, in the field of railway transport regulation, supervises the conclusion of contracts for the allocation of capacity. If the applicant and manager fail to agree on the provisions of the capacity allocation agreement, the President of UTK issues a decision on the allocation of capacity, which replaces the contract for the allocation of capacity.

At the justified application of the applicant, the manager may conclude an agreement with the applicant for the booking of capacity in the period beyond the duration of the annual timetable. The framework contract shall specify in particular approximate capacity parameters within which the train route will be allocated to the applicant. The framework contract does not specify train paths. The administrator provides the applicant, at his request, with the provisions of the framework agreement, while maintaining the business secret.

The framework contract may be concluded:

- for a period not longer than 5 years and may be extended for subsequent 5-year periods.

- for a period longer than 5 years and requires detailed justification by the applicant of existing, long-term trade agreements or incurred or planned investments,
- for a period of 15 years in exceptional, justified cases, in the case of services provided using the railway infrastructure that requires long-term investments,
- for a period longer than 15 years only in exceptional cases, in particular when services are provided with the use of rail infrastructure requiring long-term large-scale investments and where such investments are covered by
- In the scope of concluding framework agreements, the President of UTK has the competence to approve them.

Rail operators from other European Union Member States have the minimum access to the railway infrastructure only for the purpose of:

1. international passenger transport;
2. transport of goods.

In order to gain access to the railway infrastructure of the manager in the Republic of Poland, it is necessary to obtain from the President of UTK the decision on granting open access on a given international route.

Road transport

In 2019, the following types of permits will be available for international road transport:

Bilateral permission (ex-post)

- entitles you to carry out the carriage (one and one back ride) between Poland and the country issuing the permit.

Transit authorization

- entitles you to carry out the carriage (1 ride back and forth) through the territory of your country. The authorization does not give the right to be loaded and / or unloaded in the transit country, unless bilateral regulations provide otherwise.

General permit - gives the right to perform either two-way or transit transport.

2.3. Business in railway transport at Slovakia

In Slovakia, business activities in railway transport are currently regulated by two legislative norms. In relation to railway infrastructure it is the Act No. 513/2009 Coll. on railway infrastructure (last amendment under No. 288/2018 Coll.), which in its third part “Operation of railway infrastructure” ((section 34 – 61a) regulates the operation of railway infrastructure, capacity allocation and determinates the charges for the use of infrastructure.

The second legal norm relevant for the railway transport business is the Act No. 514/2019 on railway transport addressing the conditions for providing transport services by railway freight operators, as well as obligations and rights of all participants in freight transport.

Public freight and passenger transport (national and international) is being performed on the network of railway infrastructure (of national and regional significance) with total length of 3 580 km, that is owned by the Slovak Republic. This infrastructure is operated by the company “Železnice Slovenskej republiky (Railways of the Slovak Republic)”, which was established by the Act No. 258/1993 on Railways of the Slovak Republic. In particular, ŽSR provides activities related to the railway operation, traffic management and infrastructure operability.

Access to the railway infrastructure is provided to all carriers in a non-discriminatory manner. In 2017, services were provided to 42 transport operators (6 passenger, 36 freight), of which the most important were ZSSK Slovakia in the passenger transport and ZSSK Cargo concerning the freight transport.

Railway transport operation

Operation of railway infrastructure

Based on the Act on railway infrastructure, the infrastructure manager is a legal entity - entrepreneur, which operates the railway infrastructure, while meeting following five conditions:

- The entity has a valid permit issued by the regulatory body based on sec. 29,
- The entity has a contract for the operation of railway infrastructure with its owner, if it's not concerning the owner itself, or if it manages the infrastructure under the law,
- The entity has a valid security clearance issued by the safety authority based on sec. 87,
- Relevant employees of the entity are competent in terms of professional, health and psychological aspects in order to perform work pursuant to sec. 31,
- The entity is financially solvent.

As the manager of the infrastructure doesn't have to be the owner, law also imposes obligations for the infrastructure owner. These include, for example an obligation to maintain the railway infrastructure functionality after accident or emergency, to take care of the maintenance of infrastructure according to the design and to develop infrastructure in accordance with technical progress and with the requirements for safety and fluency of the railway transport. In case of necessity, the infrastructure owner is obliged to carry out the modernization or renewal of the track or its parts.

Infrastructure manager shall conclude a contract with the infrastructure owner for a time period of at least 5 years, for which he receives the financial support from the state budget.

Contract for the railway infrastructure operation for years 2017 - 2021

The owner of the railway infrastructure is the state represented by the Ministry of Transport and Construction of the Slovak Republic (MDV SR) and ŽSR is the infrastructure manager. Based on this contract, ŽSR have received 250 million EUR in the year 2017 and 270 million EUR in 2018 from the state budget.

In addition to above-mentioned funds, the infrastructure manager can be compensated for the financial impacts of the reduction in railway access charges from freight transport operators. The compensation was limited to 24.1 million EUR in 2017 and 26.5 million EUR in 2018.

Access to railway infrastructure (capacity allocation)

The infrastructure manager is providing the access to the entire operated railway infrastructure to all railway operators based in Slovakia or another member state that have a valid license to provide transport services and valid safety certificate.

An important responsibility of the infrastructure manager is to allocate infrastructure capacity to operators in a transparent, fair and non-discriminatory manner until it is exhausted and to conclude a contract with all carriers under the same and non-discriminatory conditions.

In the case of international freight transport, railway undertaking based in another member state shall have the right to use the railway infrastructure connecting the inland ports and/or service facilities listed in the Annex 13, Part B, Article 2, and the railway infrastructure serving more than one railway undertaking.

Within the allocation of the infrastructure capacity, there is a cooperation established with infrastructure managers of other railway networks, which manage international train paths, in particular on RFC corridor lines and determine the procedures for provision of these paths.

The infrastructure capacity in the form of a train path shall be allocated to the carrier for the period of validity of one train timetable or shorter. The law also allows for framework agreements between the infrastructure manager and the operator on rights and obligations relating to the allocated infrastructure capacity and on charges and prices for a period longer than the period of validity of one timetable. Such a framework agreement should normally be signed for a period of five years with the possibility of extending it to the same period as it was signed for. In the case of the use of a special dedicated infrastructure, the framework agreement may be concluded for up to 15 years. At present, ŽSR do not have any framework agreement for 15 years and do not operate infrastructure that is eligible for such contract.

Based on "Conditions for access to railway infrastructure" the train path is assigned to an operator, having valid contract on the:

- Access to railway infrastructure (for railway undertakings that are planning to provide services on assigned train line),
- Or an infrastructure capacity allocation agreement (for applicants that are not a railway undertaking, or for railway undertakings, which are planning to entrust another railway undertaking with the provision of transport services on the allocated train path).

License or other permit to provide transport services

The provision of transport services carrier requires a license under the railway transport act, issued by the licensing authority ((sec. 37 and 38). Operators that operate freight transport on regional level or on private infrastructure that serves only for the needs of infrastructure owner need not to be licensed unless it is not concerning transportation of dangerous goods and live animals. However, they must have a safety certificate and adequately comply with the obligations relating to the railway undertaking.

A license for railway services issued by a licensing authority of another member state is valid in the Slovak Republic as a license issued by a licensing authority under this Act. The license does not entitle its holder to access the railway infrastructure, but it entitles the holder to request the allocation of capacity from the infrastructure manager in Slovakia.

Licensing

Licensing authority shall issue license for applicant that:

- Is a company based in a member state,
- Will demonstrate the compliance with the requirement for its integrity and integrity of members of its statutory body and relevant representative, if appointed,
- Will demonstrate the professional competence to provide transport service applied for,
- Will prove that it is insured to the date of commencement of transport services to cover liability for damage caused by transport services provided on the network.

The time limit for the licensing authority's decision is three months from the date, on which the request for the opening of the proceedings was complete. An applicant qualifying for a license is eligible for the license. The license is valid for the entire period, in which the holder meets all the requirements of the law.

The license shall expire on the day:

- Of the period, for which it was granted, expires,
- Of the license holder ceases to exist or on the day of the death of the licensee,
- Of valid decision of the licensing body to withdraw the license.

Without any delay, the licensing authority shall inform the European Railway Agency of any activity regarding granting, changing, suspending or withdrawing of a license.

The provision of transport services also requires a safety certificate issued by the railway safety authority (in Slovakia it is the Transport Authority, which also carries out the function of the licensing and regulatory body).

Infrastructure charges (overview of rates, average charges per 1 km)

For infrastructure charges, the railway operators are entitled to a minimum access package and access rights, including track access to service facilities. The provision of railway services, access to facilities and services must be ensured in a non-discriminatory manner.

The Infrastructure Manager proposes charges for the use of the railway infrastructure and service facilities in accordance with the regulatory framework wrought by the Transport Authority.

Regulatory framework is currently represented by:

- Regulation No. 1/2017 of the Transport Authority of 8 February 2017 on the regulatory framework for the determination of charges for access and usage of railway infrastructure and service facilities, effective from 1 March 2017,
- Regulation No. 2/2018 of the Transport Authority of 7 September 2018, determining the charges for access to railway infrastructure and service facilities, effective from 1 January 2019.

The charging system is based on the same principles for the whole railway network operated by the regulated entity (ŽSR) and ensures that the charges for the same use of railway infrastructure are equal and non-discriminatory for all transport operators and that regulated services of the same kind are charged equally.

The charges are divided to charges for the minimum access package and access charges including track access to service facilities and services provided at these facilities, which are operated by ŽSR.

For the purpose of regulation, railway lines and service facilities ((sec. 37 of the Act) are classified as follows:

- Line categories by relevance (1 to 5)
- Service facilities are divided into:
    - Passenger stations, their buildings and facilities, including travel information devices, which are broken down into categories according to the technical and technological aspects, taking into account the facilities and services provided for passengers on the basis of the parameters of buildings, platforms, sheds, safety, information devices and equipment for disabled passengers,
    - Ticket sale points in passenger stations, which are categorized from a technical and technological point of view,
    - Marshalling yards and facilities for train assembly, including shunting devices and freight terminals, the sole operator of which are the ŽSR, that are categorized as transport points based on parameters of the facilities, technical equipment, technological procedures and the range of provided services,
    - Side tracks, specifically allocated for temporary storage of rolling stock between tasks.

Minimum access package charges will be determined for specific categories of railway lines in the same amount, independent of the type of transport services provided.

The minimum access package charging scheme consists of charges for ordering and allocating capacity, traffic management and organization, ensuring the operation of the railway infrastructure and the use of the electrical supply equipment for the catenary system.

The charge for the minimum access packet (U_{mp}) is determined by the formula $U_{mp} = U_1 + U_2 + U_3 + U_4$,where:

U_1 – Charge for ordering and allocating of the capacity, calculated on the basis of the variable costs of regulated services, calculated based on sec. 3 par. 7 and 8, related to the ordering and allocation of capacity and planned performance for year "t"; expressed in EUR for train kilometres,,

U_2 – Charge for traffic management and organization, calculated on the basis of the variable costs of the regulated services, calculated based on sec. 3 par. 7 and 8 related to the management and organization of traffic and planned performance in the year "t"; expressed in EUR for train kilometres,

U_3 – Charge for the provision of railway infrastructure capacity, calculated on the basis of the variable costs of the regulated services, calculated in accordance with sec. 3 par. 7 and 8 related to the provision of railway infrastructure capacity and planned operations of year "t"; expressed in EUR per thousand gross tonne-kilometres,

U_4 – Charge for the use of an electrical supply device for supply of traction current, calculated on the basis of the variable costs of the regulated services, calculated according with sec. § 3 par. 7 and 8, relating to the use of the electrical supply device for catenary system and planned outputs of year "t"; expressed in EUR per thousand gross tonne-kilometres.

The charges shall be determined on the basis of the economically justifiable costs spent for the operation of the train on the railway infrastructure. For the purpose of charging, the economically eligible costs are concerning variable costs, incurred directly from the operation of the train on the railway infrastructure for the purpose of providing regulated services.

The minimum access package is calculated based on the formula:

$U_{mp} \leq VN_{Ump}$, while:

$$U_{mp} = \sum_{i=1}^{n} U_{1i} * V_i + \sum_{i=1}^{n} U_{2i} * V_i + \sum_{i=1}^{n} \frac{U_{3i} * V_i * Q_i * k_e}{1000} + \frac{U_e * V_e * Q_e}{1000}$$

VN_{Ump} - are the total variable costs of regulated services for the minimum access package for year t,

U_{1i}, U_{2i}, U_{3i} - The charge for a scheme component on the i-th track category,

V_i - Planned performance on the i-th track category in the year "t" expressed in train kilometres,

Q_i - Planned performance in the i-th track category in the year "t", expressed in gross train tonnes,

i - The first to the fifth track category,

k_e - Coefficient that reflects train operation with diesel locomotive on electrified lines,,

U_e - The charge for usage of power supply network to provide the traction current,

V_e - Planned performance in year t realized by trains with active electric locomotive on lines witch catenary system, expressed in train kilometres,

Q_e – Planned performance in the year "t" performed by trains with active electric locomotive on electrified lines, expressed in gross train tonnes.

Access charges, including track access to service facilities and services provided in these facilities, which are solely operated by ŽSR, may be differentiated for a defined category of service equipment based on the type of service provided. The charges are broken down as follows:

- U_{sz1} is the charge for access to service facilities and is expressed in EUR for stopping of a train in a transport point (passenger transport),
- U_{sz2} is the charge for the provision of service equipment and is expressed in euros per square area of ticket sales points (passenger transport),

- U_{sz3} is the charge for access to marshalling yards and related service facilities and is expressed in EUR for freight train access to marshalling yard,
- U_{sz4} is the charge for access to service facilities and is expressed in EUR per unit of time, when the rolling stock is stored on a side track.

The charges for the service facilities shall be determined by categorization or specific allocation of service facilities so that the aggregate level of charges for the year "t", calculated on the basis of the projected performances of all carriers and proposed charges for each category, does not exceed the amount of variable costs of the regulated service for respective service facility.

Due to the description of the conditions of the freight transport, we refer here only to the relations for calculation of the 3rd and 4th component:

The charges for the use of service equipment according to paragraph 3 (b) of the third point shall be determined by the categorization of the transport points in accordance with paragraph 3. The sum of these Usz3 charges is calculated on the basis of the proposed charges and the foreseen number of accesses, shall not exceed the estimated total amount of variable costs of regulated services (VNsz3) related to their use, calculated accor ding to sec. 3 par. 7 and 8. Usz3 is calculated in based on the following formula.

$U_{sz3} \leq VN_{sz3}$, while

$U_{sz3} = \Sigma (U_{nj} * P_j)$, where

U_{nj} - is the charge for the use of service facilities in accordance with paragraph 3 (b) of the third point according to the category of the transport point,

P_j - is the planned number of train accesses to service facilities in accordance with paragraph 3 (b) of the third point in the year t in accordance with the category of the transport point,

j - is transport point category for freight trains.

Charges for the use of service equipment in accordance with paragraph 3 (b) of the fourth point shall be determined by their separate allocation by the regulated entity referred to in paragraph 3. The sum of the Usz4 charges for their use, calculated on the basis of the proposed charges, estimated time of storage and the number of wagons on the side track, shall not exceed in the year "t" the total amount of variable costs of regulated services (VNsz4) related to their use and calculated according to sec. 3 par. 7 and 8. The Usz4 is calculated based on following formula.

$U_{sz4} \leq VN_{sz4}$, while

$U_{sz4} = U_{ok} * T * V$, where

U_{ok} - charges for the use of service equipment in accordance to paragraph 3 b) of the fourth point,,

T - planned total time-scale of wagons storage at service facilities in accordance with the paragraph 3 (b) of the fourth point in year "t",

V - planned number of wagons stored at service facilities in accordance with the paragraph 3 (b) of the fourth point in year t.

The charge U_1 is for ordering and allocating capacity on the i-th category of the line (applied regardless of the actual use of the ordered and allocated capacity).

The charge U_2 is for managing and organizing traffic on i-th category of the line.

The charge U_3 is for the provision if serviceability of railway infrastructure on i-th category of the line (the value of the coefficient k_e, which is used in the calculation of the U_3 charge is 1.2 – in case of using diesel locomotive on electrified railway lines).

The charge U_4 is for the use of the power supply for traction electricity is € 0.228 per 1000 gross tonne kilometres.

Table 20 Overview of infrastructure charges by category of railway line

Line category (i)	U_1 in EUR per train kilometres, without VAT		U_2 in EUR per train kilometres, without VAT	U_3 in EUR per 1000 gross tonne kilometres, without VAT
	Trains in accordance with time table	Ad hoc trains		
1.	0.0691	0.1890	0.997	1.102
2.	0.0566	0.1575	0.927	1.048
3.	0.0487	0.1207	0.884	0.945
4.	0.0319	0.1112	0.774	0.779
5.	0.0272	0.0981	0.588	0.670

The line category reflects the significance across the entire network, where the category 1 is the highest and 5 is the lowest. Trains of the highest category are of international importance and are all included in TEN-T core passenger corridors.

In the freight transport, there are some specific charges (access to marshalling yards and for transport point by category):

Charge U_{sz3} for access to marshalling yards and facilities, including shunting and access to freight terminals, the only operator of which is the infrastructure manager and which are included in the transport point category for freight trains

Table 21 Charges in freight transport based on the transport point category.

Transport points for freight trains	U_{sz3} in EUR for train access, without VAT
A_{ND}	49.631
B_{ND}	20.987
C_{ND}	13.424
D_{ND}	0.000

The number of train accesses also includes the origin and the destination traffic point.

The U_{sz4} charges for the use of side track allocated for rolling stock deposition between two assignments is 0.195 EUR for each piece of rolling stock for every started 24-hour period (without VAT).

Access of railway operators to railway infrastructure

The freight transport operator under the Act on railway transport is a company that concludes a freight contract with the sender/shipper. The operator provides his services under the General Conditions of Carriage (Transport rules)

The railway transport operator may provide transport services on the ŽSR railway network after meeting following conditions:

- The company holds a valid license to provide railway transport services, issued by the licensing authority of a Member State,
- The company holds a valid safety certificate,
- The company has an insurance policy throughout the transport operation to cover liability for damage caused by the provision of transport services on the railway,
- The company has concluded an Agreement on the Access to Railway Infrastructure with the ŽSR,

- The company has concluded a contract with the ŽSR - Railway energetics if the railway operator will operate electric locomotives or will use electrical pre-heating equipment for the heating / air conditioning of rolling stock,
- The company has concluded with ŽSR the "Contract for provision of activities within the pumping of fuel to locomotives of the railway operator on the ŽSR network" in case that the railway operator will carry out the pumping operations at the premises of ŽSR facilities that are not designated for this purpose,
- The company has agreed with respective Regional Directorates of ŽSR on the technology of its starting and / or ending trains at the relevant railway stations,
- The company has an assigned train path or provides transport for an applicant with assigned infrastructure capacity.

International railway transport

International railway freight transport is a service to ensure the shipment of goods, during which the train crosses the state border of the Slovak Republic. The train may be supplemented or split and its different parts may have different places of origin and destination, if all the carriages cross at least one national border of a Member State.

The Member State under this Act is:

- Member State of the European Union with the exception of the Republic of Cyprus and the Republic of Malta,
- State that is a party to the European Economic Area agreement except the Republic of Iceland,
- Swiss Confederation

When performing the international railway transport, the procedures are similar to those for the domestic railway transport. The railway undertaking, meeting the conditions for access to the railway infrastructure, will request for the access to railway infrastructure from the infrastructure manager. Subsequently, the capacity of the infrastructure (Access Contract and Contract on the Allocation of Capacity) will be assigned and the transport will be carried out under a transport contract (Consignment Note) under the COTIF Convention on International Transport of Goods by Rail or the Agreement on the International Transport of Goods - SMGS.

The provisions on the international railway transport shall be applied, if the international agreement, by which the Slovak Republic is bound (COTIF, SMGS) does not state otherwise.

International agreements on railway transport

COTIF

The basic agreement on international railway transport is the Convention concerning International Carriage by Rail, as amended by the Vilnius Protocol (1 June 2006), with most recent revision in force of 1 May 2016 (COTIF).

The Parties to this Convention are the Member States of the Intergovernmental Organization for International Carriage by Rail (OTIF) based in Bern. The Slovak Republic, Czech Republic and Republic of Poland are also Member States of OTIF.

The Convention includes also:

- Uniform Rules concerning the Contract of International Carriage of Passengers by Rail (CIV – Appendix A to the Convention),

- Uniform Rules Concerning the Contract of International Carriage of Goods by Rail (CIM - Appendix B to the Convention),
- Regulation concerning the International Carriage of Dangerous Goods by Rail (RID – Appendix C to the Convention),
- Uniform Rules concerning Contracts of Use of Vehicles in International Rail Traffic (CUV – Appendix D to the Convention),
- Uniform Rules concerning the Contract of Use of Infrastructure in International Rail Traffic (CUI – Appendix E of the Convention).

JPP – CIM shall apply to:

- Every contract of carriage of goods by rail for reward when the place of taking over of the goods and the place designated for delivery are situated in two different Member States, irrespective of the place of business and the nationality of the parties to the contract of carriage;
- Contracts of carriage of goods by rail for reward, when the place of taking over of the goods and the place designated for delivery are situated in two different States, of which at least one is a Member State and the parties to the contract agree that the contract is subject to these Uniform Rules;
- International carriage being the subject of a single contract and including carriage by road or inland waterway in internal traffic of a Member State as a supplement to transfrontier carriage by rail;
- International carriage being the subject of a single contract of carriage and including carriage by sea or transfrontier carriage by inland waterway as a supplement to carriage by rail, if the carriage by sea or inland waterway is performed on services included in the list of services provided for in the Convention.

Freight transport is carried out on the basis of a transport contract concluded by the carrier and the consignor in the consignment note (CN) in accordance with a uniform template. The CN thus becomes a document confirming the conclusion of a transport contract, which obliges the operator to transport the goods to destination and deliver it to the recipient. The principle is that each shipment shall have a consignment note. Unless the operator and the consignor agreed otherwise, only goods in one wagon may be the subject of the consignment note.

Uniform consignment forms are established by international federations of transport operators with the consent of the international client federations and the competent authorities of the Member States for the customs matters of the Member States, as well as any intergovernmental organization, which exists in the regional economic community having legislative competence in the field of customs.

Organisation for Co-operation between Railways (OSJD)

The OSJD was established in 1956 as an equivalent of the UIC and COTIF, to improve international railway transport between the Europe and Asia. The OSJD members are predominantly countries that were a part of the Eastern Block and selected Asian countries. From the perspective of regional cross-border cooperation of Tritia, all three countries are involved in this organization.

Agreement on International Goods Transport by Rail - SMGS

Applicable from 1 November 1951, with amendments and supplements as of 01.07.2018, signed by 25 States (today including Slovakia and Poland). The Agreement establishes uniform rules for direct international railway transport and for direct international railway-ferry transport.

If the Parties are at the same time parties to other international agreements establishing the legal norms for the contract of carriage of goods by rail, traffic between stations of the railways of these Parties may be performed under the terms of those agreements.

If the station of departure and the station of destination of the goods are located on the railways of different gauges, carriage may, depending on the technical possibilities available, be effected by the following means:

- Transhipment of goods from wagons of the one gauge to wagons of the other gauge,
- Changing over the wagons onto bogies of the other gauge or,
- Using the wheelsets of adjustable gauge.

The goods can be transported with the CIM/SMGS Consignment note.

Agreement between České dráhy (ČD), Železničná spoločnosť Cargo Slovakia, a.s. (ZSSK CARGO), Rail Cargo Austria (RCA), MÁV Cargo, PKP Cargo S.A., Railion Nederland R.V. , B - Cargo, CFL Cargo and Railion Deutschland AG on using one consignment note for transportation of block trains and groups of carriages

The agreement serves to simplify the transport at the border between the railway undertakings that have signed this Agreement. The participating railways agree, by way of derogation from the International Carriage of Goods by Rail Agreement (CIM), to allow the usage of one consignment note for block trains and groups of carriages.

Agreement 1520

The Agreement regulates the direct international railway transport of goods between the participants in the Agreement between the Ministry of Transport, Posts and Telecommunications of the Slovak Republic, the Ministry of Railways of the Russian Federation and the Ministry of Transport of Ukraine on International Railway Transport of Goods between the Slovak Republic, the Russian Federation and Ukraine and on transit on railways in these States ".

Bilateral agreements

Under this Agreement, the Parties shall take the necessary measures to facilitate and accelerate rail transport across national borders. The interconnection and transit service on the border lines of the States of the contracting parties shall be carried out in border stations, which is usually one of the stations with the customs. The agreement obliges the contracting parties to take all measures for the operability of the railway network. Upon agreement, it is allowed to send, workers of one railway undertaker to the territory of the other Contracting Party for the necessary time, to provide them with assistance and protection as a railway worker established in a member state, to establish at their own expense their representation in the exchange stations. Railways can provide, by mutual agreement, service spaces and facilities to provide connection and transit services, establish the necessary telecommunication connections etc. The duration of the stay of the trains at the exchange or border stations will be determined taking into account the need for border requisitions. The competent authorities will create conditions to minimize the idle time of trains at the exchange and border stations. The Contracting Parties shall create conditions for intermodal transport between the Contracting Parties.

The Slovak Republic has ratified:

- Agreement between the government of the Slovak Republic and the Czech Republic on railway transport across the state border, signed on 22 February 1996 in Bratislava.
- Agreement between the government of the Slovak Republic and the Republic of Poland on railway transport across the state border, signed on 18. August 1994 in Warsaw.

- Local Convention for traffic management and traffic organization on the border and at border stations of Čadca (SR) - Mosty u Jablunkova (CZ) (effective from 1 January 2015).
- Local Convention for traffic management and traffic organization on the border and at border stations Skalité (SR) - Zwardoň (PR) (effective from 1 January 2010)

2.4. Summary of the legislative framework in the countries of TRITIA

In the table below is the legislation for all three countries. This table is just for the comparision of the scale of legislation as there is no eazy way to compare the content of all the mentioned documents.

Table 22 International railway transport – legislation

Country	International convention	National legislation
Slovakia	1. Organization for International Carriage by Rail (OTIF) 2. Organization for Co-Operation between Railways (OSZD) 3. Agreement between Slovak and Czech government on railway transport through the border 4. Agreement between Slovak and Polish government on railway transport through the border 5. Local convention for the management of operation and organization of border railway line and boarder stations Čadca (SR) – Mosty u Jablunkova (CZ) 6. Local convention for the management of operation and organization of border railway line and border stations Skalité (SR) – Zwardoň (PL) 7. Agreement 1520 between Slovak, Ukraine and Russian ministry of transportation on International carriage of Goods by Rail	1. Act No. 513/2009 on railways 2. Act No. 514/2009 on railway transportation 3. Act No. 258/1993 on Železnice Slovenskej republiky From 1. January 2019: 4. Measure No. 1/2017 of the Transport authority on regulatory framework for the determination of revenues for access and use of railway infrastructure and service equipment 5. Measure No. 2/2018 of the Transport authority determining the reimbursement for access to railway infrastructure and service facilities
Czech Republic	1. COTIF Convention 2. Community of European Railway and Infrastructure Companies (CER) 3. International Union of Railways (UIC) 4. Organization for Cooperation between Railways (OSŽD) 5. Agreement between the Government of the Czech Republic and the Government of the Slovak Republic on Rail Transport across state borders. 6. Agreement between the Government of the Czech Republic and the Government of the Republic of Poland on Rail Transport across state borders. 7. CIM / SMGS Waybill Guide (GLV CIM / SMGS)	1. Act No. 266/1994 Coll., On Railways 2. Act No. 77/2002 Coll., Stocks company České dráhy, state organization Správa železniční dopravní cesty 3. Act No. 1/2000 Coll. Rail transport order 4. Act No. 320/2016 Coll., On the Office for Access to Transport Infrastructure 5. Decree No. 177/1995 Coll., 173/1995 Coll. 175/2000 Coll. 376/2006 Coll. 101/1995 Coll. 6. Individual methodological instructions of the Rail Authority
Poland	1. The issue of the carrier's liability for the international carriage of goods is subject to the provisions of Annex B (CIM) to the	1. Act of 6 September 2001 on road transport (Journal of Laws of 2017, item 2200 and 2018, items 12, 79, 138, 650 and 1039)

Country	International convention	National legislation
	Convention on International Carriage by Rail (COTIF) of 9 May 1980. 2. For the international carriage of goods by road, the Convention on the Contract for the International Carriage of Goods by Road of 19 May 1956 (CMR) will apply 3. On international transport by inland waterway, Poland has so far only ratified the Geneva Convention of 15 March 1960. 4. Legal conditions regarding the carrier's liability for the carriage of cargo by sea were defined in the International Convention on the Unification of Certain Principles Concerning the Bode of Ladders of 25 August 1924, ratified by Poland on February 20, 1936. amended by the Protocols of 1968 and 1979 (the so-called "Hasko-Visbian Rules"). It should be pointed out that its provisions have been incorporated into the Act of 18 September 2001, the Maritime Code. 5. Convention on the Unification of Certain Rules for International Carriage by Air, signed in Warsaw on October 12, 1929, amended by the Hague Protocol in 1955, and then by the Guatemalan Protocol of 1971, and the Convention on the Unification of Certain Rules for International Carriage by Air 8 May 1999 from Montreal.	2. The Act of June 20, 1997 - Road Traffic Law (Journal of Laws of 2017, item 1260, as amended) 3. Act of 19 August 2011 on the transport of dangerous goods (Journal of Laws of 2018, item 169 and 650) 4. ACT of 5 July 2018 amending the Road Transport Act and certain other acts 5. National legislation on the transport of goods performed for consideration on the basis of contracts was included in the Act of 15 November 1984 on transport law. 6. The Act of 18 September 2001 the Maritime Code 7. Air Traffic Law of July 3, 2002 8. Act of 28 March 2003 on railway transport (consolidated text: Journal of Laws of 2016, item 1297, as amended) 9. The Act of 21 December 2000 on inland waterway transport, Ordinance of Infrastrukture Ministry / 1 / 10. of 28 April 2003 on sailing regulations on inland waterways (Journal of Laws No. 212, item 2072)

The legislative complexity of the railway market results from the requirement for a clear definition of all conditions of operation of the railway infrastructure and transport. This condition stems from the basic characteristics of railway transport as a closed transport system and the need to ensure safe and smooth transportation.

Table 23 Summary of the railway freight transport conditions

Country	Slovakia	Czech Republic	Poland
Railway infrastructure operation	100% owned by state represented by the Ministry of Transport	Majority owned by state represented by the Ministry of Transport	state ownership and administration
Infrastructure charges	Basic access package + services according to the needs of railway operators	Basic access package + services according to the needs of railway operators	Railway infrastructure operators are required to develop a uniform system of charging for the duration of one yearly train timetable for all.
Access of the operators to the infrastructure	The market is liberalized	The market is liberalized	The market is liberalized
Network statement for the access to the infrastructure	Yes	Yes	Yes – statement on granting open access
Railway operators	28	49 (*104)	111

* The whole CZ network

In Czech Republic the number of railway carriers is increasing every year and in 2018 there were 103 subjects on the SŽDC network. On the transport network with a total length of 9,406 km, ČD Cargo is the rail freight operator with highest market share with 65 %. The Advanced World Transport, a. a. market share of 7.6% and METRANS Rail, with 7.5% are also significant carriers with potential with future growth in terms of freight transprotation. The increasing trend of intermodal transport is based on the shift of goods transportation from road to railway transportation. This also implies an increase of market share of Advanced World Transport, a. s. and METRANS Rail. Also the construction of planned container terminal in Mošnov, will shift proportion of transportation in the Moravian-Silesian Region to railway transportation. The situation on the roads in the Czech Republic contributes to the development of railway transport on regional and national level.

In Poland the length of the operated railway lines is 19 291.3 km, the largest infrastructure manager (PKP PLK) has 18 513 km of active lines. In 2017, Polish carriers had 4004 locomotives (3449 freight), 1279 electric multiple units, 240 diesel motor vehicles, 7290 passenger cars and 90849 freight wagons. In 2017, 72 entities in freight transport functioned on the market. In terms of the weight of transported goods and transport work, 75% belong to the companies of PKP Cargo, DB Cargo Polska, CTL Logistics and Lotos Kolej. The number of active licenses is about 90 railway carriers. In 2017, 69 entrepreneurs from 91 with licenses carried out transport activity. In 2017, freight transport in international transport was performed by thirty-one licensed carriers, who transported almost 74.4 million tons and performed transport work at the level of 23.3 billion tonne-kilometers. Passenger carriers closed 2017 with revenues at the level of 1.35 billion EUR. At that time, costs increased to 1.31 billion EUR, which means that the carriers generated operating profit of approx. 39.54 million EUR. In 2017, an increase in revenues and expenses from operating activities of freight carriers was observed. The profits of the whole industry in 2017 amounted to 102.33 million EUR. In the case of carriers of goods, the level of purchase costs of routes from managers was nearly 279 million EUR, which constituted 16.4% of the total costs. Analyzing intermodal transport for TEU (1 20-foot container = 1 TEU) in 2017, 1 667.3 thousand TEU were transported. Passenger transport in rail transport is currently carried out on behalf of 18 organizers. At the end of 2017, 35 railway carriers had active licenses for rail passenger transport, of which 15 reported regular passenger transport on a standard-gauge infrastructure. The current state of market liberalization provides good conditions for free business activities within the railway transport. This state supports the modal split in favour of railway transport in view of the emerging congestions on the roads, mainly due to the high share of HGV on the main road corridors.

In Slovakia the level of liberalization can be expressed by the number of freight operators, even though there are more than 30 of them, total transport performance is primarily generated by state owned operators (ZSSK Cargo has 35 million tonnes of transported goods and the overall rail freight volume is 45 million tonnes of goods). This development can be influenced in the future by changing the mode from road to rail, mainly in the segment of small-wagon size consignments and container transport. In this segment, smaller carriers have a higher degree of flexibility and can efficiently adapt to the requirements of shippers. To support the transport of container shipments, an intermodal terminal (road – rail) was built in Žilina, which has the potential to become a significant transhipment centre for a wider range than the Žilina region due to its favourable location on the transport infrastructure.

3. Railway infrastructure in the TRITIA area

Two corridors of European importance pass through the Tritia area. It is concerning the Baltic – Adriatic corridor (dark blue colour on the map) and Rhine - Danube corridor (light blue colour on the map). In the case of the Baltic - Adriatic Corridor, the route linking the northern part of Europe (ports in Poland) with Mediterranean ports is the shortest distance possible and therefore it ends in the ports in Slovenia and Northern Italy. The Rhine-Danube Corridor connects major ports from West Germany to Black Sea ports and in Slovakia it ends on the eastern border with Ukraine (Čierna nad Tisou), where it continuously passes into the OSJD corridor, which runs to the east coasts of Russia and China. In addition to the corridors, the map

below includes intermodal terminals that are important in the international transport. In the case of Žilina, there are two international terminals (one is operational and the other is due to start its operation in Q1 / Q2 2019).

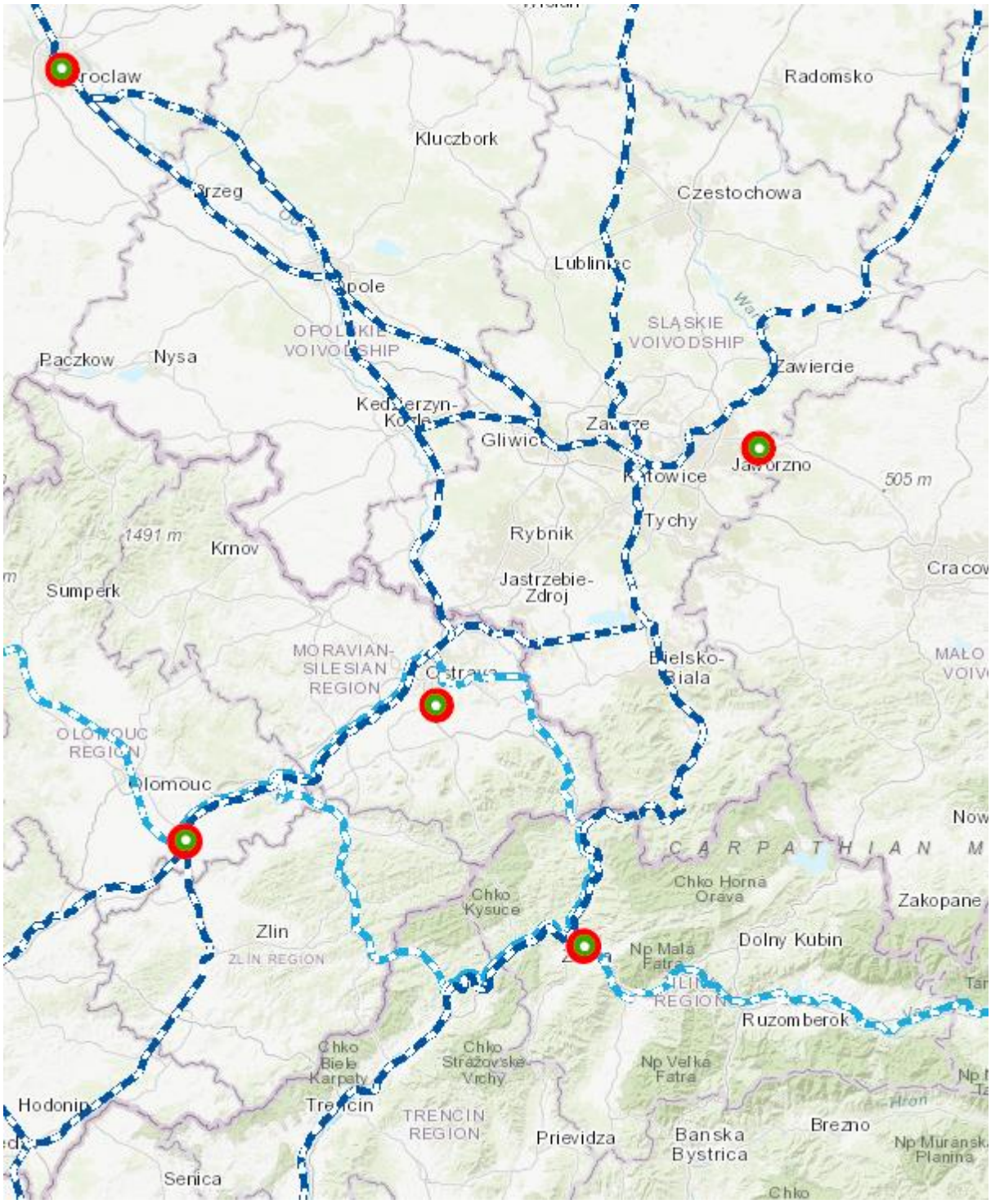


Figure 1 TRITIA area with TEN-T corridors.[15]

[15] Source: http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html

The railway infrastructure in the TRITIA area covers all major production centres, along with major settlements. These parameters provide the potential of railway transport for freight and passenger transport.

The current largest intermodal terminal is the Paskov terminal (AWT). The current capacity of the Paskov International Terminal is 2400 TEU. After building another part of the terminal (which should take place in the first half of 2018), the capacity should increase to 4000 TEU (in operation since the second half of 2018). The expansion of the terminal includes large paved areas (20000 m2) and the construction of two new tracks for handling of conatainers.

In the years to come (about 2025), AWT intends to extend the terminal further eastwards from the siding station (at the same time standing technology and coal cleaning). Here, the prospective capacity after 2025 can only be estimated at about 6 to 8 thousand TEUs (but these are rather estimates).

Work is currently underway to build an intermodal transport terminal and a logistics center in the Mošnov industrial zone.

3.1. Czech republic

Table 24 National categorization of railway tracks in Moravian-Silesian region[16]

Track	Track category	Total length (km)	Description
301A (SK) Mosty u Jabl.st.hr. – Bohumín	1. category	69.075 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h or 160 km/h - Number of tracks 2
301B (PL) Petrovice u K.st.hr. – Dětmarovice	1. category	8.242 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h or 120 km/h - Number of tracks 2
301C Odb. Koukolná – Odb. Závada	1. category	5.123 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 40 km/h - Number of tracks 1
301D Č. Těšín – Polanka n.O.výh.	1. category	39.764 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 80 km/h or 100 km/h - Number of tracks 2
301E Odra – Ostrava-Svinov	1. category	3.871 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 80 km/h - Number of tracks 1
301F Ostrava-Svinov – Opava východ – (Krnov)	2. category	28.27 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h - Number of tracks 2

[16] Source: TTP ŽSR (https://www.zsr.sk/dopravcovia/infrastruktura/tabulky-tratovych-pomerov/) and ŽSR map application (https://aplikacie.zsr.sk/infomapainternet5/)

Track	Track category	Total length (km)	Description
301G Ostrava hl. n. – Ostrava-Kunčice	1. category	7.805 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h - Number of tracks 2
302A Ostrava-Kunčice – border of the Moravian-Silesian region (Valašské Meziříčí)	3. category	64.378 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 70 km/h or 100 km/h - Number of tracks 1 (Ostrava-Kunčice – Vratimov Number of tracks 2)
302B Frýdek Místek – Č.Těšín	3. category	26.508 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 70 km/h, - Number of tracks 1
302C Frýdlant nad Ostravicí – Ostravice	3. category	5.990 km	- Gauge 1435 mm; - No traction - Axle load category B2 - Max speed 50 km/h, - Number of tracks 1
302E Č.Těšín – Český Těšín st. hr. (PL)	3. category	1.021 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category C3 - Max speed 40 km/h, - Number of tracks 1
305A Bohumín st. hr. (PL) – Bohumín	1. category	3.744 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h, - Number of tracks 1
305B Bohumín – Přerov	1. category	54.143 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 130 km/h or 160 km/h (40 km/h Bohumín – Bohumín-Vrbice) - Number of tracks 2
305C Bohumín-Vrbice st. hr. (PL) – Bohumín-Vrbice	1. category	4.279 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h, - Number of tracks 1
306H Sedlnice předj. kol. – Mošnov, Ostrava Airport	3. category	2.903 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 90 km/h, - Number of tracks 1
306A Studénka – Veřovice	3. category	26.191 km	- Gauge 1435 mm; - No traction - Axle load category C3-D4 - Max speed 80 km/h or 100 km/h (40 km/h Veřovice – Štramberk) - Number of tracks 1

Track	Track category	Total length (km)	Description
306B Studénka – Bílovec	3. category	7.591 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 60 km/h, - Number of tracks 1
306C Suchdol n. O. – Budišov n. Budišovkou	3. category	39.233 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 50 km/h or 60 km/h - Number of tracks 1
306D Suchdol n. O. – Fulnek	3. category	9.740 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 60 km/h - Number of tracks 1
306E Suchdol n. O. – N.Jičín	3. category	8.382 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 40 km/h - Number of tracks 1
307B Hlučín – Opava východ	3. category	22.972 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 60 km/h or 70 km/h - Number of tracks 1
307C Chuchelná – Kravaře ve Sl.	3. category	10.161 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 50 km/h - Number of tracks 1
307D Moravice – Svobodné Heřmanice	3. category	22.608 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 50 km/h - Number of tracks 1
307E Opava východ – Hradec n. Moravicí	3. category	8.211 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 50 km/h or 60 km/h - Number of tracks 1
310A Opava východ – Moravský Beroun border of the Moravian-Silesian region (Olomouc)	2. category	79.971 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 70 km/h or 120 km/h - Number of tracks 1
310C Bruntál – Malá Morávka	3. category	17.266 km	- Gauge 1435 mm; - No traction - Axle load category C3-A3 - Max speed 40 km/h or 50 km/h - Number of tracks 1
310D Valšov – Rýmařov	3. category	14.828 km	- Gauge 1435 mm; - No traction - Axle load category D4 - Max speed 50 km/h

Track	Track category	Total length (km)	Description
			- Number of tracks 1
311A Krnov – Jindřichov ve Sl. St-hr (PL) Glucholazy, (CZ) Olomouc	2. category	25.694 km	- Gauge 1435 mm; - No traction - Axle load category D4 - Max speed 50 km/h - Number of tracks 1
312G Třemešná ve Slezsku - Osoblaha	3. category	20.218 km	- Gauge 760 mm; - No traction - no category of axle - Max speed 50 km/h - Number of tracks 1
313 Milotice n. O. – Vrbno pod Pradědem	3. category	20.5 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 50 km/h - Number of tracks 1 AWT

The above table lists all the relevant railway lines in the MSK area, which are used both in passenger and freight transport (with the exception of the Polanecká spojka, the branch Koukolná - the Závada Bohumín-Vrbice state enterprise (PL) - Bohumín -Vrbice used only for freight transport). The Třemešná ve Slezsku - Osoblaha line serves exclusively for passenger transport.

The categorization of tracks is based on the designation of SŽDC and expresses the importance of the track from the perspective of the entire national railway network. The first category links are of international importance and all are included in the TEN-T core network. The second category is of national importance and the third line is of regional importance.

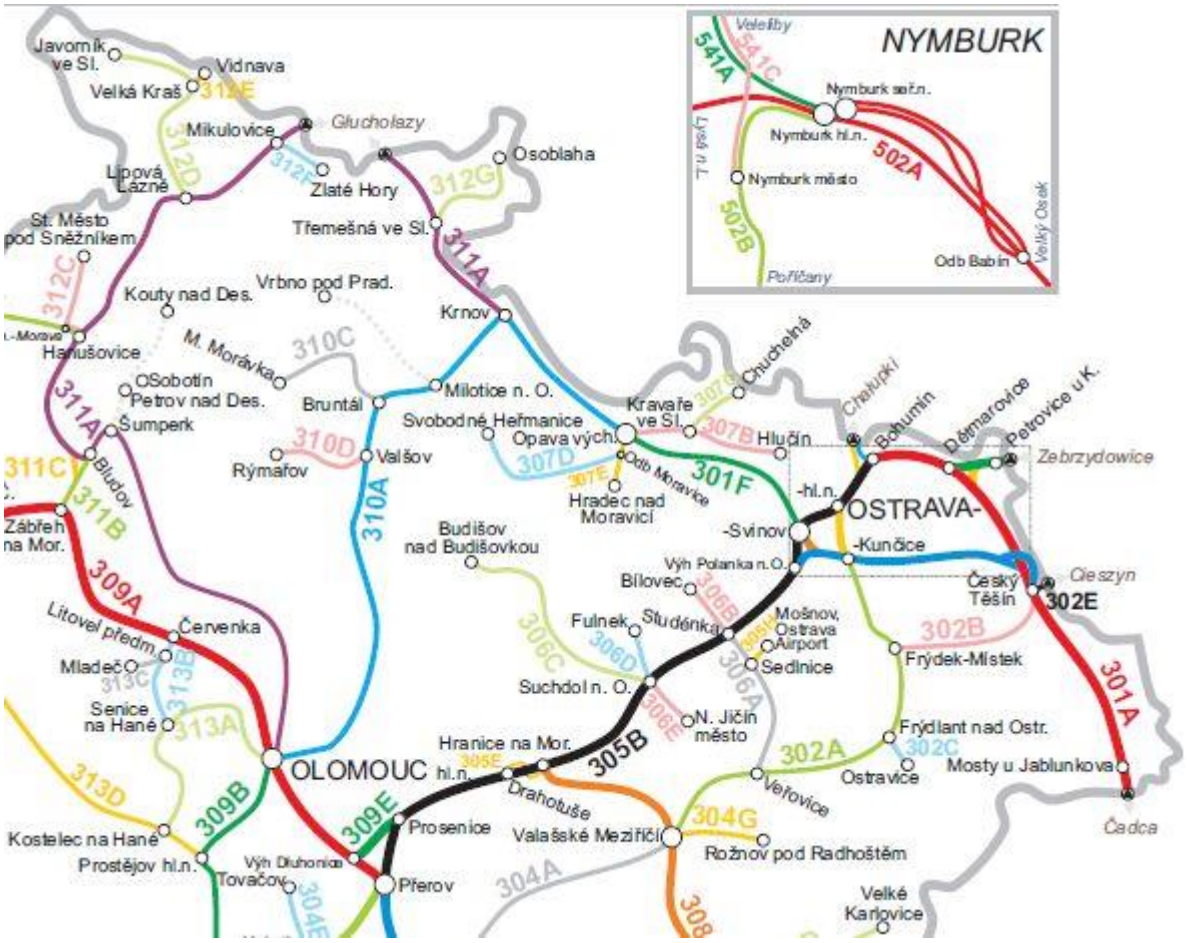


Figure 2 Railway network of the Moravian-Silesian region

The rail network covers most of the Moravian-Silesian Region. The dense network is noticeable in industrial locations and large cities with the demand for both passenger and freight.

Table 25 International categorization of railway tracks in Moravian-Silesian region

Track	Corridors	Total length (km)	Description
301A (SK) Mosty u Jabl.st.hr. – Bohumín	TEN-T Core (BALTIC-ADRIATIC, RHINE-DANUBE), AGTC, RFC 5, RFC 9,	69.075 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h or 160 km/h - Number of tracks 2
301B (PL) Petrovice u K.st.hr. – Dětmarovice	TEN-T Core (BALTIC-ADRIATIC), AGTC, RFC 5,	8.242 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h or 120 km/h - Number of tracks 2
301C Odb. Koukolná – Odb. Závada	TEN-T Core (BALTIC-ADRIATIC), AGTC, RFC 5,	5.123 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 40 km/h - Number of tracks 1
301D Č. Těšín – Polanka n.O.výh.	TEN-T Core (RHINE-DANUBE), AGTC, RFC 5, RFC 9,	39.764 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 80 km/h or 100 km/h

Track	Corridors	Total length (km)	Description
			- Number of tracks 2
301E Odra – Ostrava-Svinov	TEN-T Core (RHINE-DANUBE), AGTC, RFC 5, RFC 9,	3.871 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 80 km/h - Number of tracks 1
301G Ostrava hl. n. – Ostrava-Kunčice	TEN-T Core (RHINE-DANUBE), AGTC,	7.805 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h - Number of tracks 2
305A Bohumín st. hr. (PL) – Bohumín	TEN-T Core (BALTIC-ADRIATIC), AGTC, RFC 5,	3.744 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h, - Number of tracks 1
305B Bohumín – Přerov	TEN-T Core (BALTIC-ADRIATIC, RHINE-DANUBE), AGTC, RFC 5, RFC 9,	54.143 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 130 km/h or 160 km/h (40 km/h Bohumín – Bohumín-Vrbice) - Number of tracks 2
305C Bohumín-Vrbice st. hr. (PL) – Bohumín-Vrbice	TEN-T Core (BALTIC-ADRIATIC), AGTC, RFC 5,	4.279 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 km/h, - Number of tracks 1

Lines of international importance in the Moravian-Silesian Region are part of the TEN-T core network. The backbone route consists of the main line in the direction of Přerov, where the directions from the west (Prague - Germany) and from the south (Břeclav - Austria) converge. On the Ostrava region, the international routes run through two arms, through Bohumín - Karvina and through Havířov. Furthermore, there are international links to Poland from Bohumín and from Dětmarovice. Another important international route is in the direction of Slovakia where the directions from east (Košice - Ukraine) and south (Bratislava - Hungary) converge in Žilina.

All international lines have recently been also important for passenger transport. Connection Ostrava - Prague or Ostrava - Brno is an important national connection of passenger transport. The number of connections has recently risen to such an extent that a problem with track throughput is created in certain sections. The Kritycký section is located in the Ostrava-Svinov - Bohumín section, but in the future it is planned to increase the capacity of the line.

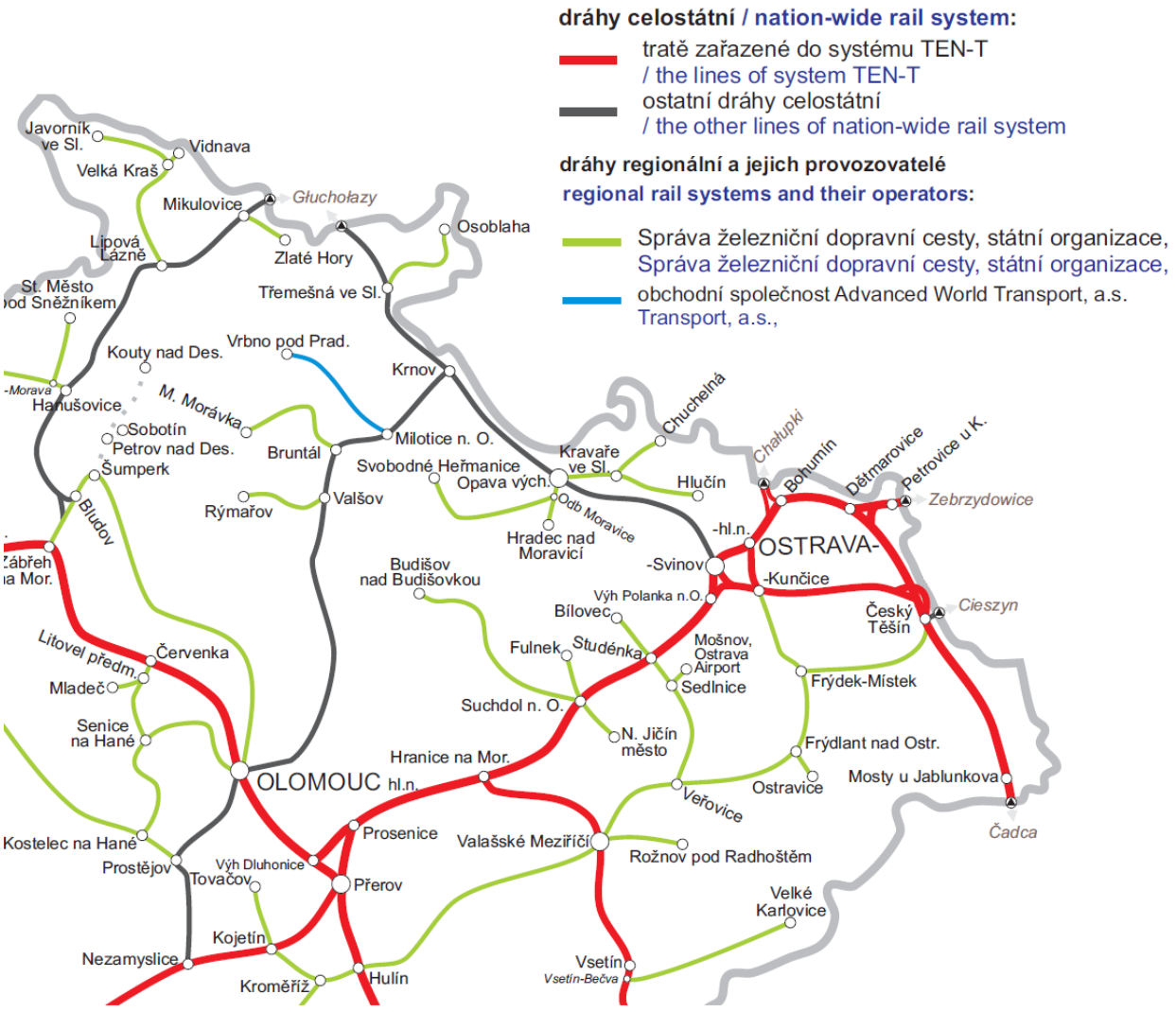


Figure 3 Railway tracks of the Moravian-Silesian region according to the importance

Table 26 Selection of important railway tracks for TRITIA traffic model - Czech republic (Moravian-Silesian region)

ID	Section name	Section length (km)
CZ301A	(SK) Mosty u Jabl.st.hr. - Bohumín	69.075 km
CZ305B	Bohumín - (border of the Moravian-Silesian region) - Jeseník n. Odrou (Přerov)	54.143 km
CZ301D	Č. Těšín - Polanka n.O.výh.	39.764 km
CZ301B	Petrovice u K.st.hr. - Dětmarovice	8.242 km
CZ305A	Bohumín - Bohumín st. hr. Chałupki (PL)	3.136 km
CZ305C	Bohumín-Vrbice st. hr. (PL) - Bohumín-Vrbice	4.279 km
CZ301C	Odb. Koukolná - Odb. Závada	5.123 km
CZ311A	Glucholazy - Jindřichov	25.694 km

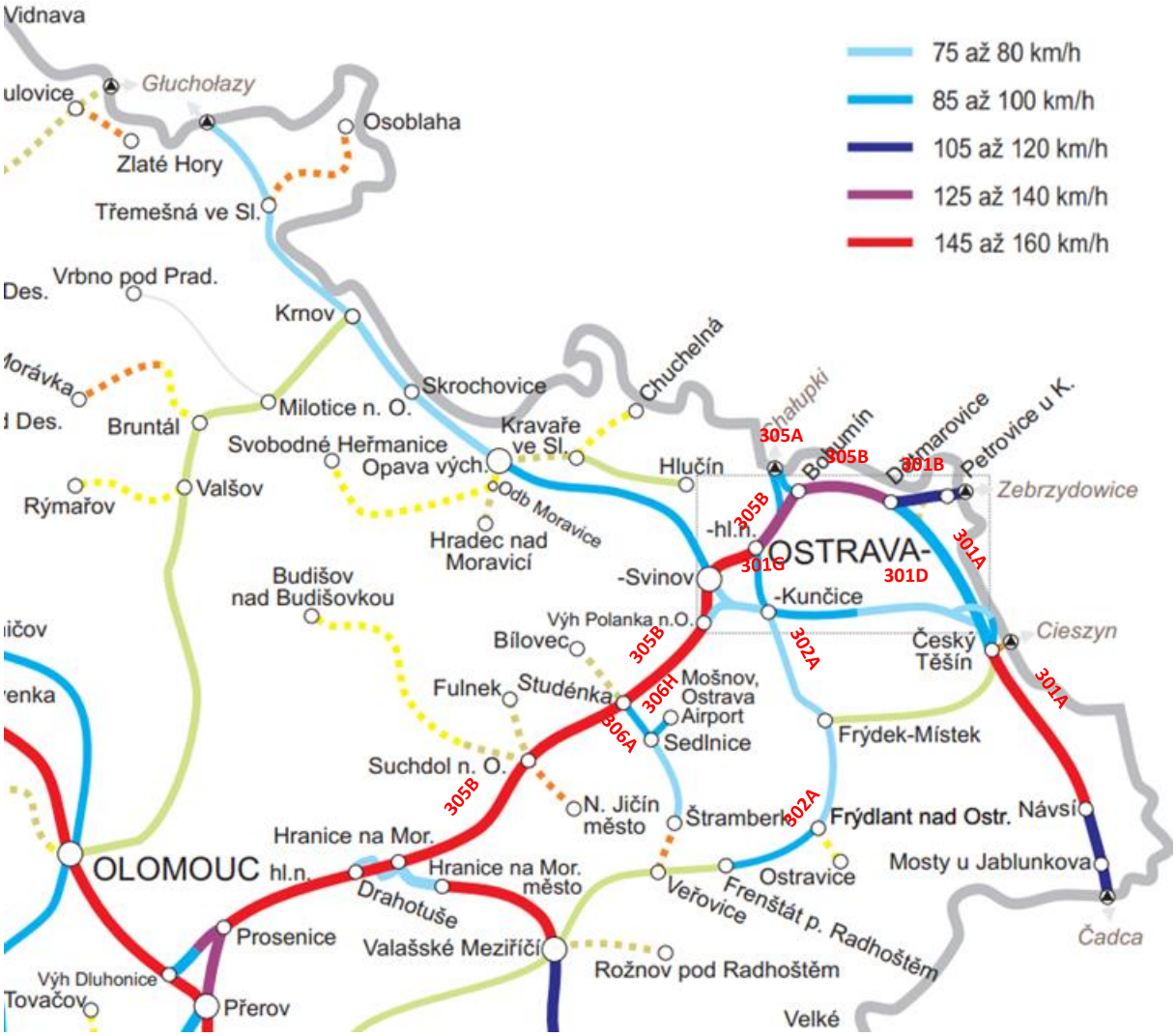


Figure 4 Selection of important railway tracks for TRITIA traffic model – Czech republic (Moravian-Silesian region)

The above mentioned routes form the main railway connection of the Czech Republic with Poland and Slovakia. The main route runs in two arms (Karviná, Havířov) and is connected to the Polish border in Bohumín and Dětmarovice. Other lines are not of greater importance in international traffic. The route from Ostrava to Olomouc via Krnov is only available for freight trains with a low load norm and with a limited train length. Similarly, the track Kunčice Mr. O - Valažské Meziříčí is also where the track parameters are insufficient.

Table 27 List of planned project on the railway infrastructure – Czech republic (Moravian-Silesian region)

Serial no.	Project name	Location	Project type	Planned schedule of the project (construction)
1.	Modernization of Ostrava railway junction	Town Ostrava with surrounding area	modernization and capacity utilization of the railway junction	07/2024 – 12/2027

Serial no.	Project name	Location	Project type	Planned schedule of the project (construction)
2.	Polom – Suchdol n. O., BC	Section Polom – Suchdol n. O.,	Reconstruction of 8,7 km of track	11/2021 – 09/2024
3.	Dětmarovice – Petrovice u K., státní hranice PR, BC	Section Dětmarovice – Petrovice u K	Reconstruction of 9,8 km of track	03/2020 – 07/2022
4.	Optimalizace trati Český Těšín – Dětmarovice	Section Český Těšín – Dětmarovice	speed up to 160 km / h	12/2019
5.	VRT Moravská brána	Section Přerov – Ostrava	diverting long-distance passenger traffic to a new line and thus creating new capacity for freight trains on an existing network	project 2020-2025, implementation by 2030.
6.	ETCS Mosty u Jablunkova - Dětmarovice	main corridors	Launch of the ETCS system on the main lines in the Moravian-Silesian Region	2018 - 2025
7.	Construction of R110kV at TNS Ostrava Svinov	Ostrava Svinov	Construction of a new 110kV substation including a 110 / 22kV transformer at TNS Ostrava Svinov	04/2020 – 12/2020

Since 2016, a study entitled "The Concept of Switching to a Single Power System in Relation to the Priorities of the 2014-2020 Program Period and Compliance with the ENE TSI Requirements", according to which traction power systems in the Czech Republic will be unified, is approved. The AC transition schedule (2019-2037) was accepted as a recommendation.

It must be borne in mind that the major freight transport routes will be upgraded across the EU by 2030 to allow trains of at least 740 m in length to be used, which is particularly useful for combined transport trains as another important factor to increase efficiency of freight transport.

Further planned renovations and optimization:

- Reconstruction of the signaling equipment in the Bohumín railway station - until 02/2019
- Optimization of the Český Těšín (outside) - Albrechtice u Českého Těšína (incl.) Track section - from 03/2022 to 03/2023
- Reconstruction of the Havířov railway station - from 04/2021 to 04/2022
- Optimization of the Ostrava-Kunčice (except) - Ostrava-Svinov / Polanka nad Odrou line section
- Revitalization and electrification of track sections Frýdek-Místek (outside) - Frenštát pod Radhoštěm town / Ostravice

The projects listed in the table above are to be funded from the EU funds and these projects are the main part of the railway infrastructure modernization in Czech Republic. The international and regional importance of the construction of the "Modernization of Ostrava railway junction" and "VRT Moravská brána" crere can significantly affect both passenger and freight transport.

3.2. Poland

Two corridors of European importance pass through the Tritia area in the Poland territory:

Corridor TEN-T No. 1: Korytarz Bałtyk – Adriatyk: Gdynia – Gdańsk – Katowice/Sławków, Gdańsk – Warszawa – Katowice, Katowice – Ostrava – Brno – Wien, Szczecin/Świnoujście – Poznań – Wrocław – Ostrava, Katowice – Žilina – Bratislava – Wien, Wien – Graz– Villach – Udine – Trieste, Udine – Venezia – Padova – Bologna – Rawenna, Graz – Maribor –Ljubljana – Koper/Trieste;

Figure 5 Alignment of the Baltic-Adriatic Corridor

Figure 6 Multimodal Transport Infrastructure

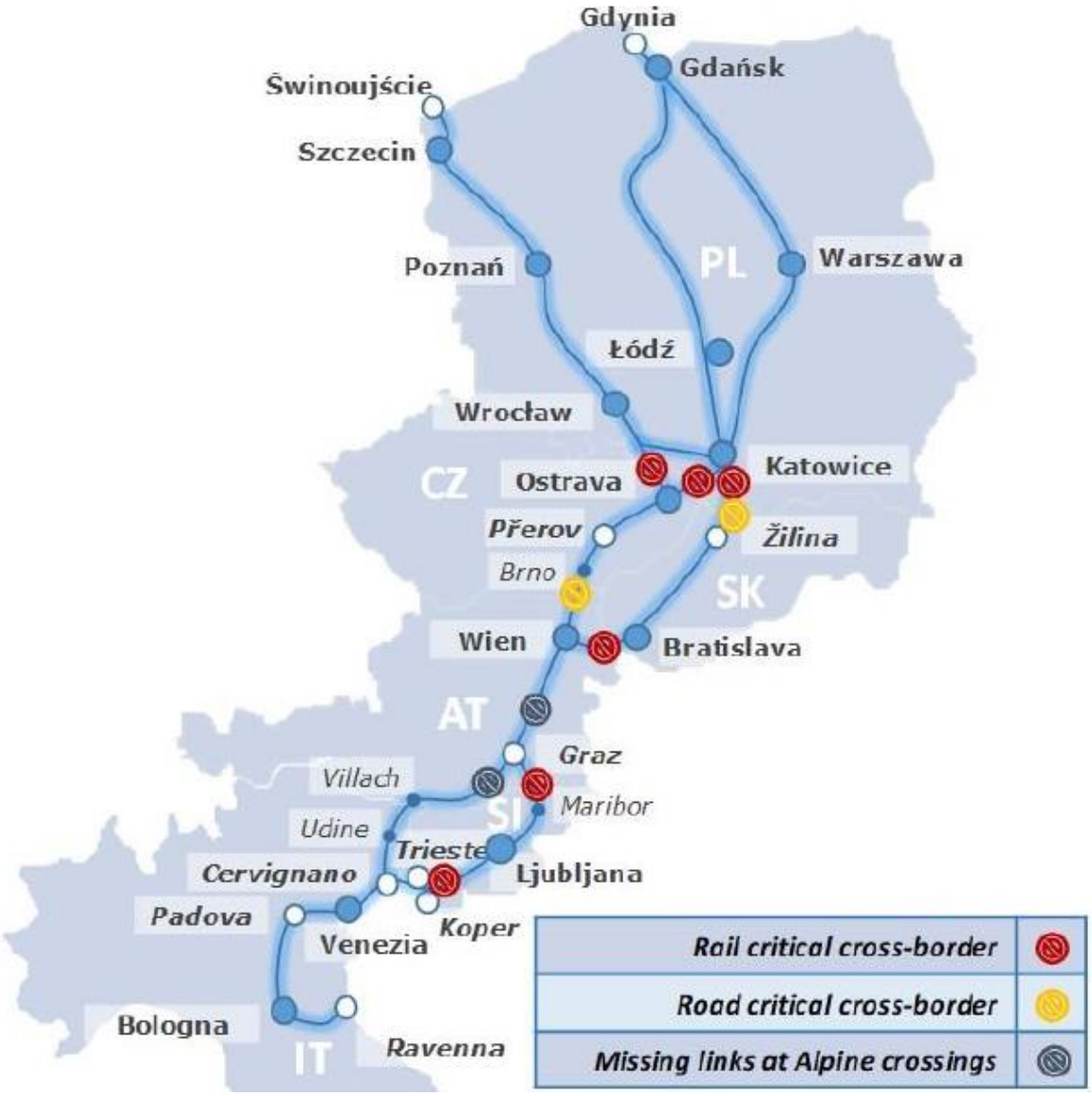


Figure 7 Critical cross-border sections and missing links on the Baltic-Adriatic Corridor

Corridor TEN-T No. 2: Korytarz Morze Północne – Bałtyk: Helsinki – Tallinn – Riga, Ventspils – Riga, Riga – Kaunas, Klaipeda – Kaunas – Vilnius, Kaunas – Warszawa, PL/BY border – Warszawa – Poznań – Frankfurt/Oder – Berlin – Hamburg, Berlin – Magdeburg – Braunschweig – Hannover, Hannover – Bremen – Bremerhaven/Wilhelmshaven, Hannover – Osnabrück – Hengelo – Almelo – Deventer – Utrecht, Utrecht – Amsterdam, Utrecht – Rotterdam – Antwerpen, Hannover – Köln – Antwerpen.

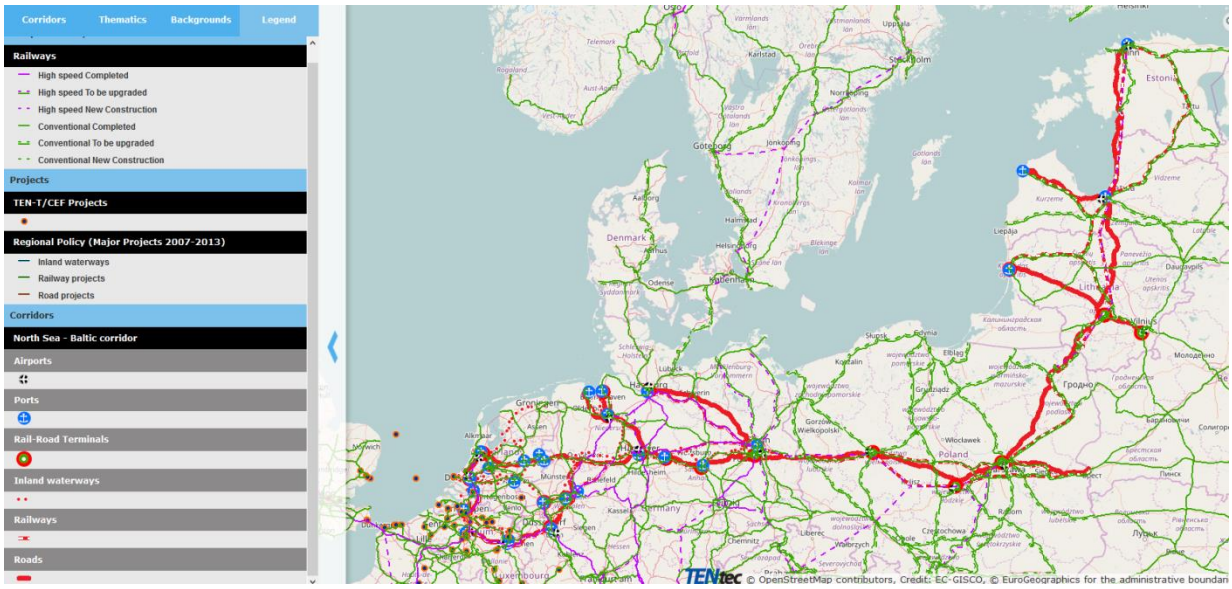


Figure 8 Alignment of the North Sea – Baltic corridor

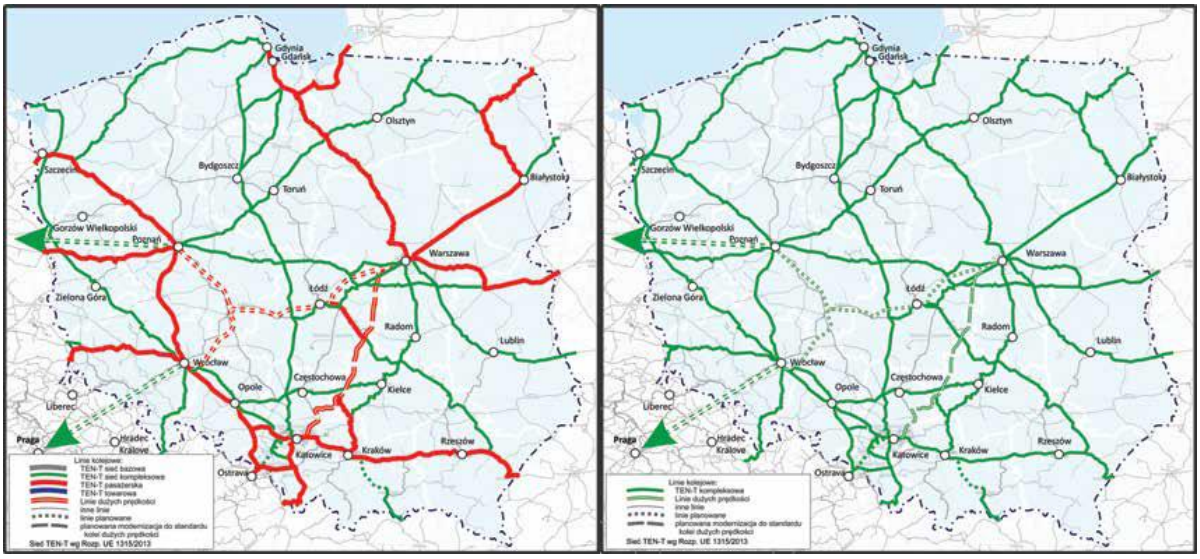


Figure 9 TEN-T 2013 base network according to EU regulation 1315/2013: passenger, freight

Rail cross-border sections:

- Opole (PL) – Ostrava (CZ) [Chałupki (PL) – Bohumín (CZ)]: This rail section requires improvement works on the Polish side between Kędzierzyn Koźle and Chałupki (state border) to reach compliance in terms of speed, and train length. Due to limited availability of financial resources the project comprised in the corridor project list to reach the required standards is included in the reserve list of the National Railway Programme; national funds are foreseen to secure only part of the works and the implementation dates are not defined (47 € million). Whilst the Polish Authorities assume that the project will be in any case completed by 2030 in line with the requirements set in the TEN-T Regulation, the possibility to implement the works during the current financing period (up to 2023) will be considered in the event additional financial resources will be identified. On the Czech side works were already completed to increase the speed up to 140 km/h, including the improvement of the Bohumín station. This cross-border section is also expected to benefit from the modernisation of the double track railway line E30 between Kędzierzyn Koźle – Opole Groszowice – Opole Zachodnie to increase maximum operational speed by 2022 (150.2 € million) as well as from the modernisation of the Ostrava junction on the Czech side by 2021 (222.2 € million). This cross-border section is

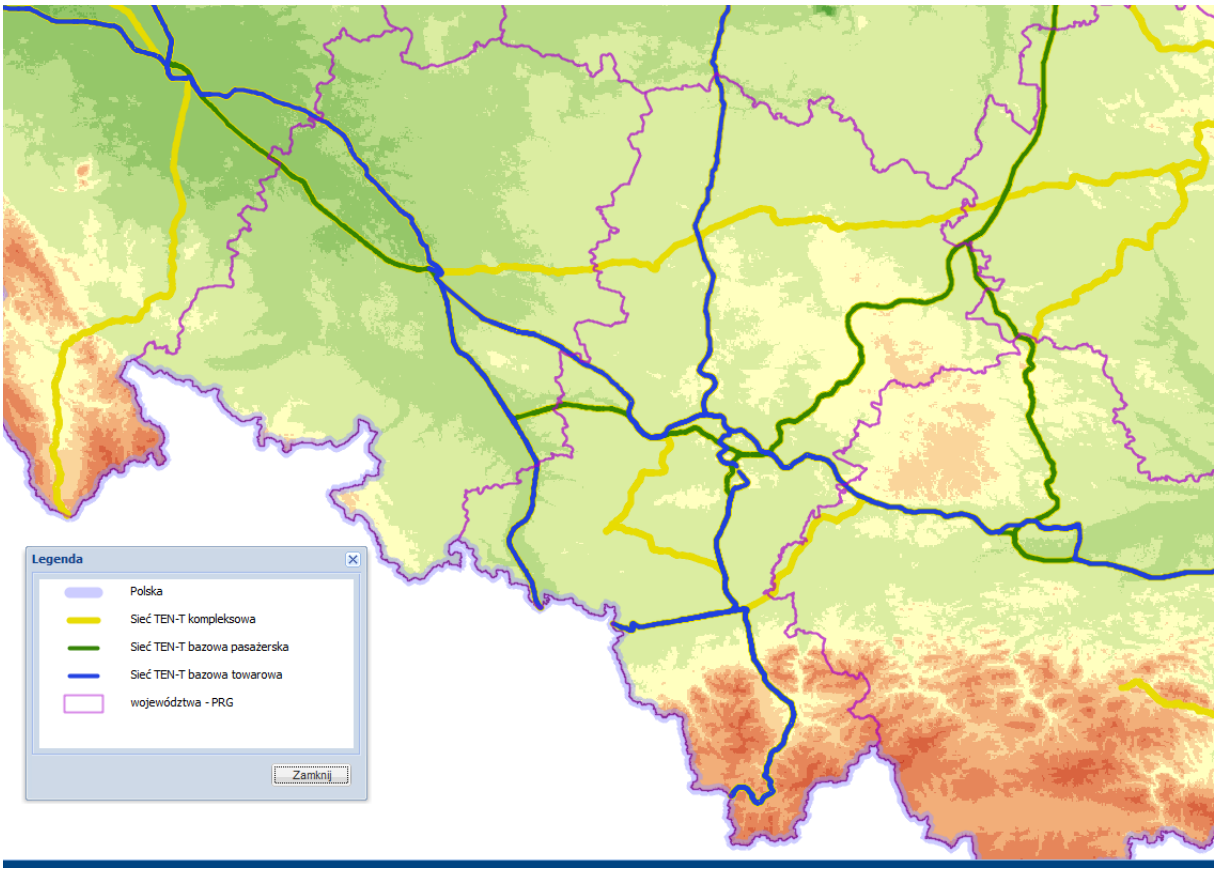
currently expected to be at standard by 2030 at the latest, except for train length on the Czech side.

- Katowice (PL) – Ostrava (CZ) [Zebrzydowice (PL) – Petrovice u Karviné (CZ)]: Preparatory works are ongoing on the Polish side for the modernisation of this rail section requiring major investments on the lines E30 and E65, especially in the area of Katowice, to increase the standards of the existing railway lines and stations. The modernisation of the existing dual track electrified line and stations is expected on the section Będzin – Sosnowiec – Katowice – Katowice Ligota and at exit from Katowice towards Gliwice (centre of agglomeration), where the railway tracks will be extended by an additional pair of tracks. The works will allow for separating long distance and agglomeration traffic. The action foresees the implementation of computer traffic control compatible with ERTMS/ETCS - Level 2. The modernisation works are expected to be implemented in three phases. The first phase includes works for the improvement of the sections Most Wisła – Czechowice-Dziedzice - Zabrzeg including Czechowice-Dziedzice station, currently expected to be completed by 2023 (141.6 € million). The second and third phases relate respectively to the modernisation of the section Tychy - Most Wisła and Zabrzeg - Zebrzydowice (state border); and to the modernisation of the network within the urban agglomeration of Katowice (sections Będzin – Sosnowiec – Katowice – Katowice Ligota and Katowice – Gliwice). For the latter phases the implementation dates are not defined yet. Whilst the Polish Authorities trust that the projects will be in any case completed by 2030 in line with the requirements set in the TEN-T Regulation, the possibility to implement the works during the current financing period (up to 2023) will be considered in the event additional financial resources will be identified (812.6 € million). On the Czech side, track optimisation works at the Dětmarovice station are planned to be finalised by 2019, which together with the instalment of remote traffic control system between Petrovice u Karviné and Ostrava during 2018, will further improve the performance of the line. The section from the state border to Petrovice u Karviné and Ostrava was already modernised; the works were completed in 2002, which increased the speed up to 120-140 km/h. Also this cross-border section is expected to benefit from the completion of the modernisation of the Ostrava junction by 2021 (222.2 € million). This cross-border section is currently planned to be at standard by 2030 at the latest except for train length on the Polish section Zebrzydowice – state border as well as on the Czech sections.
- Katowice (PL) – Žilina (SK) [Zwardoń (PL) – Skalité (SK)]: On the Polish side works are foreseen to modernise 65 km of the existing predominantly single track electrified railway line between Czechowice-Dziedzice and Zwardoń. Due to limited availability of financial resources the project comprised in the corridor project list to reach the required standards (47.8 € million, expected to be completed by 2023) is included in the reserve list of the National Railway Programme; national funds are foreseen to secure only part of the works. Whilst the Polish Authorities assume that the project will be in any case completed by 2030 in line with the requirements set in the TEN-T Regulation, the possibility to implement the works during the current EU financing period (up to 2023) will be considered in the event additional financial resources will be identified. On the Slovak side, no works are foreseen on the single track section Zwardoń – Skalité – Čadca. The Skalité – Čadca section was already modernised and electrified with a maximum speed of 100 km/h, axle load of 225 kN and maximum train length of 650 m. The 7.1 km subsection Zwardoń – Skalité is compliant with regard to the axle load, but non-compliant with respect to speed (70 km/h) and has limited train length operability (due to limitations at the Zwardoń station on the Polish side). The modernisation of the double track Krásno nad Kysucou – Čadca section, also common to the cross-border itinerary between Ostrava and Žilina, is expected to be completed by 2030 (220 € million). This cross-border section is currently expected to be compliant by 2030 except for speed limit on the short section Zwardoń – Skalité. No works are planned till 2030 to deploy ERTMS on the Čadca – Zwardoń section so far.

In Poland ETCS Level 1 was installed on the Eastern branch of the corridor, section CMK Grodzisk Mazowiecki – Zawiercie in 2014 (12.40 € million). The works for the modernisation of railway line E65/C-E65 on the section Gdynia – Warszawa which are planned for completion by mid of 2018 also include ETCS Level 2 instalment (142 € million). The ongoing modernisation of the railway line Warszawa – Łódź on the section Warszawa Zachodnia – Grodzisk Mazowiecki foresees ERTMS technology implementation works expected to be completed by mid of 2018. ETCS Level 2 is furthermore planned to be installed on the E59 between Wronki – Słonice as part of the works for the modernisation of the line, expected to be undertaken between the years 2020-2023. On railway line E30, section Legnica – Wrocław – Opole, ETCS Level 2 is expected to be installed by 2018 (26.46 € million). Works for the modernisation of the main passenger lines E30 and E65 in the Śląsk area (on section Będzin – Sosnowiec – Katowice – Katowice Ligota, without specified time schedule), include the instalment of the Remote Train Control system in view of future deployment of ETCS Level 2, subject to definition and confirmation of the National Plan for the Implementation of the Technical Specification for Interoperability "CCS". Finally, horizontal actions aiming at constructing ERTMS/ETCS on core TEN-T network lines as well as GSM-R on PKP PLK S.A. railway lines are also foreseen. The scope of the ERTMS/ETCS covers several national sections including sections Szczecin Dąbie – Poznań – Wrocław and Wrocław – Katowice, expected to be completed by 2023 (0.4 € billion). The scope of the GSM-R project covers the whole country network, approximately 13 800 km of railway lines, including all Baltic-Adriatic corridor lines, except the sections Gdynia – Warszawa – Grodzisk Mazowiecki and Wrocław – Brzeg – Opole, on which GSM-R is implemented as part of the ongoing works to be completed by 2018 (0.7 € billion). The National Plan for the Implementation of the Technical Specification for Interoperability "CCS" approved in June 2017, foresees implementation of ERTMS on all corridor lines. Investments are however missing on the corridor project list for the implementation of ERTMS on the Central branch of the corridor between Tczew and Bytom, on the section Opole Groszowice – Rudziniec Gliwicki on the main itinerary Wrocław – Katowice as well as on the cross-border sections between Poland and the Czech Republic, Opole Groszowice – Kędzierzyn Koźle – Racibórz – Chałupki and Katowice – Pszczyna – Most Wisła – Zebrzydowice – state border, and on the cross-border section between Poland and Slovakia, Most Wisła – Żywiec – Zwardoń.

Project category		Projects	Investment volumes in € million	Approved funds in value and % of investment volumes	
Development of the railway infrastructure	**Cross-border sections** (WP priority)	**22**	**4,028.1**	**1,730.5**	**43.0%**
	Missing links (WP priority)	**2**	**8,854.3**	**9,198.8**	**100.0%**
	Modernisation and upgrading of national railway lines, including junctions and nodes outside core urban areas in Cohesion Member States (WP priority)	**31**	**7,570.0**	**2,966.3**	**39.2%**
	Other projects for the modernisation and upgrading of national railway lines, including junctions and nodes outside core urban areas	18	11,052.9	1,602.6	14.5%
	Technological upgrading, telematics applications and other horizontal measures (art. 31 to 37 of Reg. 1315/2013)	25	1,421.3	1,282.6	90.2%
	ERTMS including dedicated projects at cross-border sections (WP priority)	**23**	**1,470.3**	**1,033.7**	**70.3%**
	Other railway projects	13	346.8	100.0	28.8%
Development of the road infrastructure	**Cross-border sections** (WP priority)	**13**	**3,077.3**	**657.1**	**21.4%**
	Completion and upgrading of national roads outside core urban nodes	46	10,894.5	6,060.5	55.6%
	ITS, ETC and other horizontal measures (art. 31 to 37 of Reg. 1315/2013)	43	1,962.6	682.5	34.8%
Development of the port infrastructure	**Developing interconnections** (WP priority)	**34**	**2,306.9**	**672.9**	**29.2%**
	Modernisation / Expansion of the infrastructure	55	8,268.6	785.2	9.5%
	VTMIS and Innovation and other projects	19	322.0	178.5	55.4%
	Cross-corridor projects including MoS	6	59.0	59.0	100.0%
Development of Inland Waterway Ports		13	254.8	10.2	4.0%
Development of the airport infrastructure, excluding last mile connections in core urban nodes		93	4,963.9	2,906.8	58.6%
Development of the RRT infrastructure		14	569.3	335.5	58.9%
Development of the urban node infrastructure (WP priority)		**68**	**9,286.4**	**3,453.2**	**37.2%**
Additional horizontal studies and initiatives		13	155.0	92.5	59.7%
Total project list		**551**	**76,864.1**	**33,808.4**	**44.0%**
WP Priorities		**186**	**35,185.8**	**19,119.8**	**54.3%**

Figure 10 Projects for the development of the Baltic-Adriatic Corridor:



(yellow – TEN-T comprehensive network, green – TEN-T passenger core network, blue – TEN-T freight core network, violet – voivodeships borders)

Figure 11 Map of railway lines lying in the TEN-T corridors in the region of Silesia and Opole

The comprehensive network is the basic level of the TEN-T and consists of all existing and planned transport infrastructures of the trans-European transport network, as well as measures to support the efficient use of this type of infrastructure. It should ensure the availability and coherence of all regions in the Union, including peripheral and outermost regions.

The core network is located above the comprehensive network and covers those parts of the comprehensive network that are of the greatest strategic importance from the point of view of achieving the development objectives of the trans-European transport network. It should be the basis for the development of a sustainable multimodal transport network and stimulate the development of the entire comprehensive network.

Table 28 Railway lines at border crossings

Country	Line	Name of line	Km	Country	Line	Name of line	Km
CZ	302E	Granica Państwa - Český Těšín	1.021	PL	170a	Cieszyn Markowice - Granica Państwa	5.935
PL	139	Katowice - Zwardoń	113.785	SK	114B	Čadca - Skalité-Serafínov št. hr. (SK/PL)	20.226
CZ	311A	Hanušovice - Mikulovice st. hr. (CZ/PL)	51.526	PL	343	Głuchołazy - Granica Państwa	5.650

Country	Line	Name of line	Km	Country	Line	Name of line	Km
CZ	311A	Krnov - Jindřichov ve Slezsku	25.694	PL	333	Głuchołazy - Pokrzywna	11.225
CZ	305A	Bohumín st.hr.(CZ/PL) - Bohumín	3.136	PL	151	Kędzierzyn Koźle - Chałupki	53.864
CZ	305C	Bohumín Vrbice - Bohumín-Vrbice st.hr. (CZ/PL)	4.279	PL	679	Chałupki - Granica Państwa	53.864
CZ	305B, 301A	Bohumín - Petrovice u Karviné st. hr. (CZ/PL)	16.694	PL	93	Trzebinia - Zebrzydowice	80.662
CZ	302B	Frýdek-Místek - Český Těšín st. hr. (CZ/PL)	25.981	PL	190	Bielsko Biała Główna - Cieszyn	40.182

Figure 12 Railway network in Silesia and Opole regions

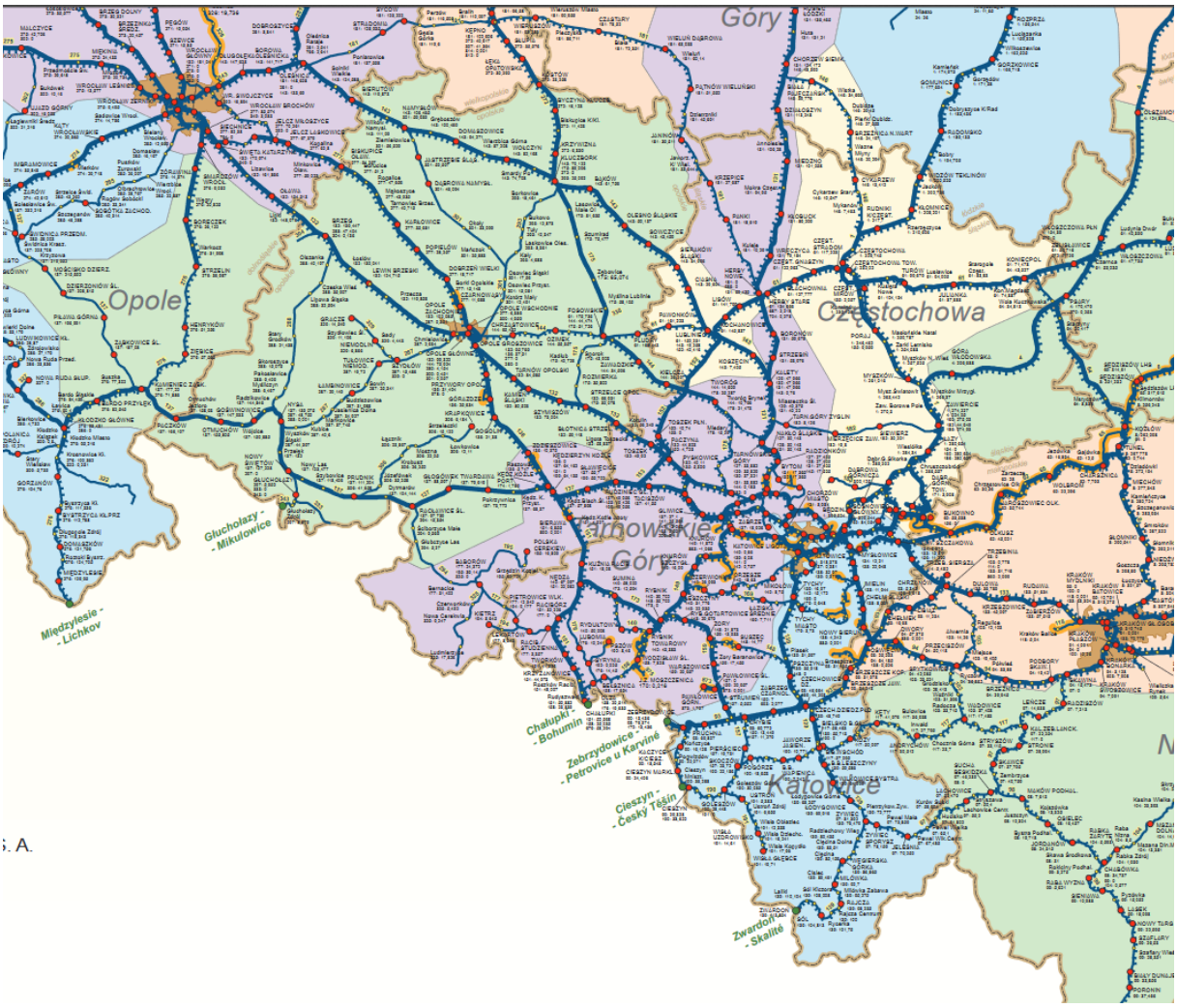


Figure 13 Railway stations and railway border crossings in the Silesian and Opole regions

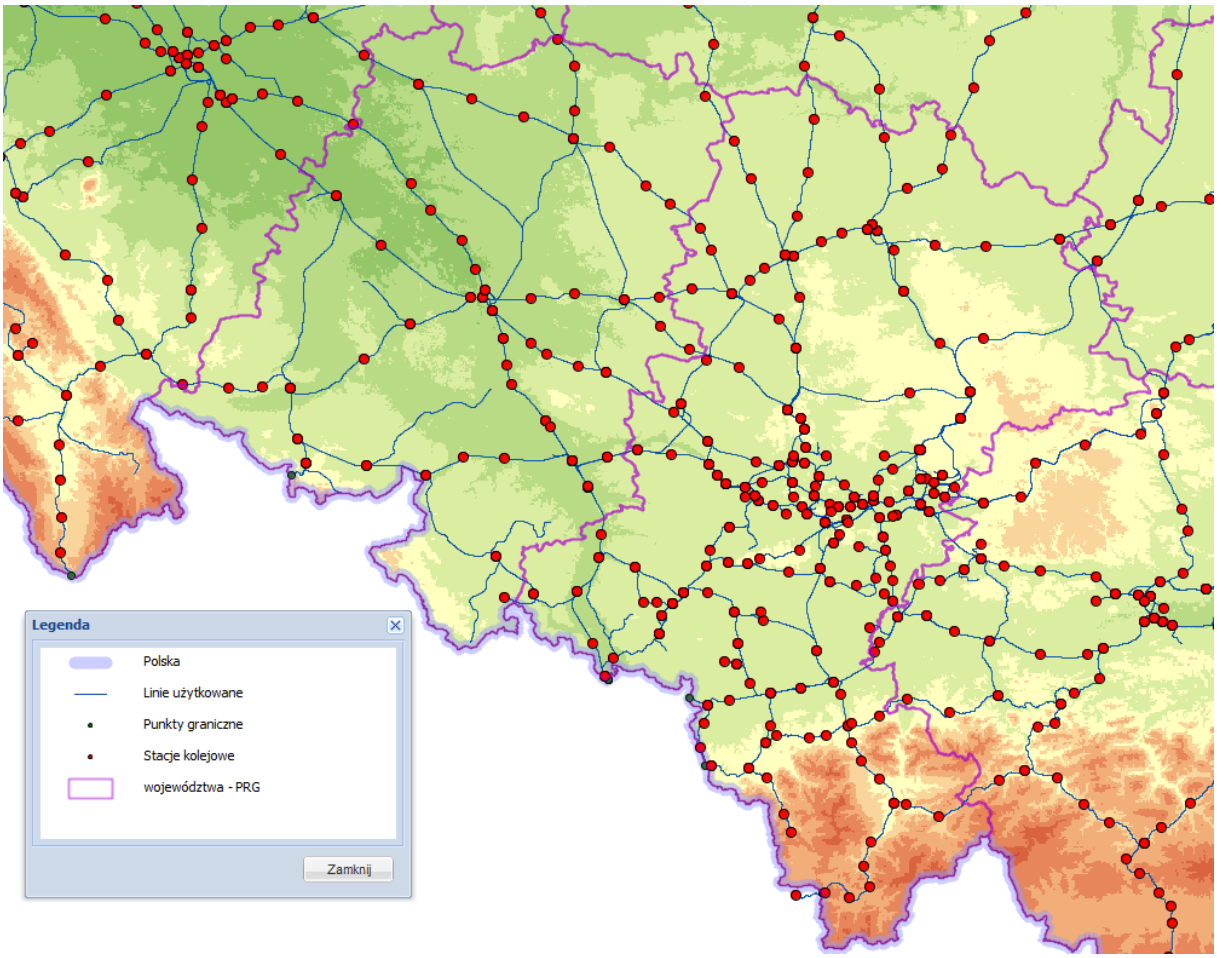
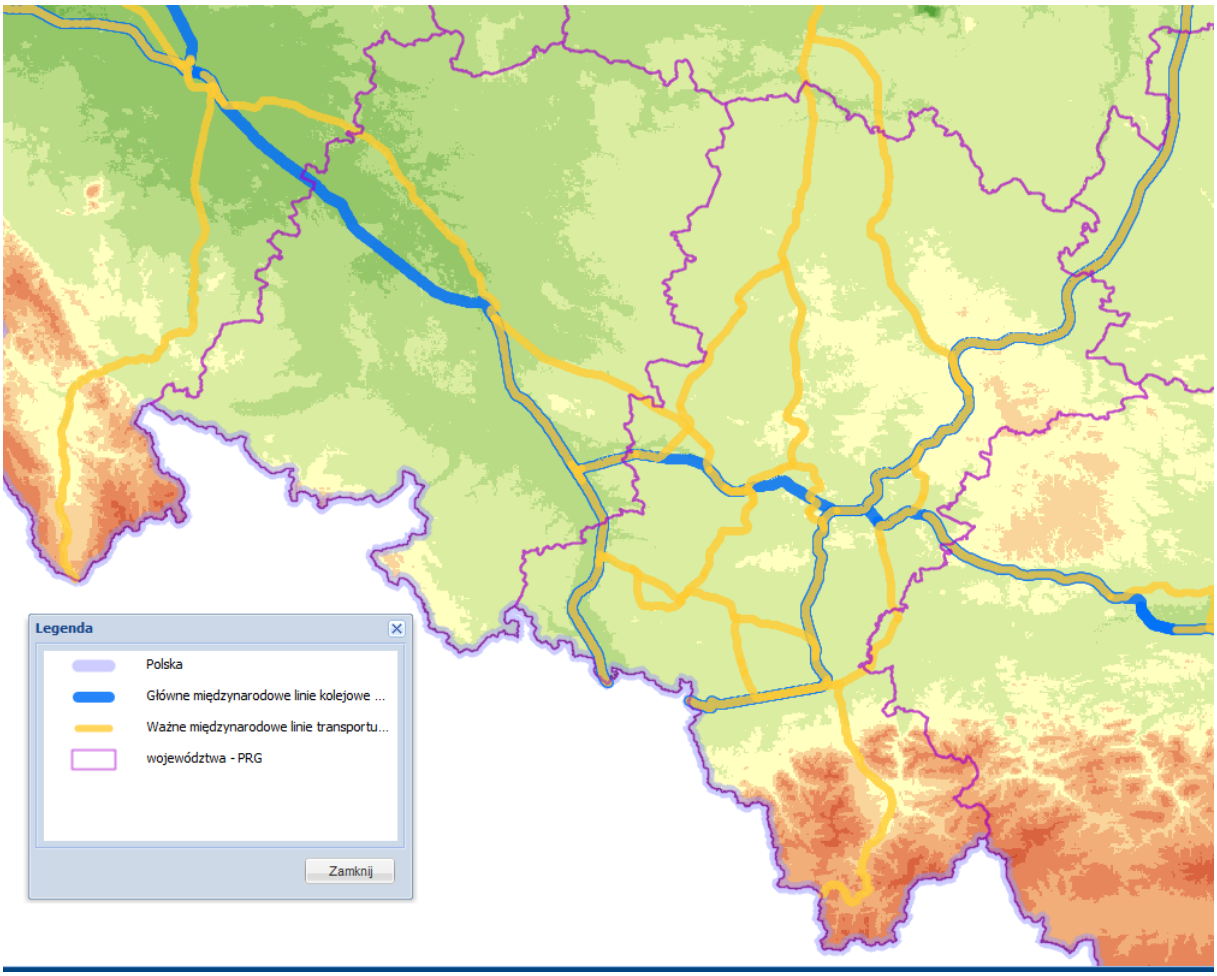


Figure 14 Railway lines of international importance AGC (blue) – train stations in region



combined transport (yellow), main international railways lines (blue)

Figure 15 Railway lines of international importance AGC

Table 29 Selection of important railway tracks for TRITIA traffic model – Poland

ID	Section name	Section length (km)
PL01	Linia Głuchołazy – Mikulovice (343/485)	8.3 (freight/passenger) (non-electrified)
PL02	Linia Głuchołazy – Pokrzywna (– Jindřichov ve Slezku) (333/484)	13 (freight/passenger)
PL03	Linia Racibórz – Pietrowice Głubczyckie (– Krnov) (177)	50.789 (freight) (non-electrified)
PL04	Linia Kędzierzyn Koźle – Bohumín (151/479/679)	275.908 (passenger) (T-ENT AGC I AGTC) (line of national importance)
PL05	Linia Trzebinia – Zebrzydowice (– Petrovice u Karviné) (93/478)	79.9 (freight/passenger)
PL06	Linia Bielsko-Biała Główna – Cieszyn (– Český Těšín) (190/480)	41 (freight/passenger)
PL07	Linia Katowice – Zwardoń (– Skalité Serafínov) (139/489)	113.785 (freight/passenger) (T-ENT AGTC) (line of national importance)
PL08	Rybnik Towarowy-Chałupki (158)	25.327 (freight/passenger) (line of national importance)
PL09	Trzebinia – Zebrzydowice (93)	81.346 (freight/passenger) (T-ENT AGC I AGTC)

Notice: specified in the European Agreement on international combined transport lines and accompanying facilities (AGTC), specified in the European Agreement on major international railway lines (AGC)

The table above shows sections length of international railway lines in region.

Work plan for TEN-T core network corridors, in accordance with art. 47 of Regulation 1315/2013 European Coordinators. Contains information about cross-border sections and analysis:

- implementation of interoperable traffic management systems;
- a plan to remove physical, technical, operational and administrative barriers within and between transport modes and improve the efficiency of multimodal transport and services;
- where appropriate, measures to improve the administrative and technical capacity to develop, plan, design, procure, implement and monitor projects of common interest;
- the possible impact of climate change on infrastructure and, where appropriate, proposed measures to increase resilience to climate change;
- measures to be taken to reduce greenhouse gas emissions, noise and, where appropriate, other adverse environmental impacts.

Railway lines included in the TEN-T network along with Poland's accession to the EU:

- I Warsaw-Białystok-Suwałki-Trakiszki 340 km
- Ia Gdańsk-Tczew-Elbląg-Braniewo 141 km
- II Kunowice-Poznań-Kutno-Warsaw-Łuków-Terespol and for freight: Łowicz-Pilawa-Łuków 869 km
- III Zgorzelec-Legnica-Wrocław-Opole-Katowice-Kraków-Tarnów-Przemyśl-Medyka and for freight transport: Wrocław-Opole-Gliwice 732 km
- VI Gdynia-Gdańsk-Tczew-Iława-Warsaw-Zawiercie-Katowice-Bielsko-Biała-Zwardoń / Zebrzydowice and for freight: Tczew-Inowrocław-Tarnowskie Góry-Chorzów-Pszczyna and the planned new line: Psary-Trzebinia-Bielsko-Biała 1 526 km
- TINA Świnoujście-Szczecin-Rzepin / Poznań-Wrocław-Międzylesie 999 km
- TINA Warsaw-Pilawa-Lublin-Dorohusk 267 km
- TINA Kędzierzyn-Koźle-Chałupki 54 km
- TINA Poznań-Inowrocław 107 km
- TINA Psary-Kraków 71 km

Table 30 List of planned projects on the railway infrastructure in the Silesian and Opoloe voivodship

Serial no.	Project name	Location	Project type	Planned schedule of the project (construction)
1.	Reconstruction of the railway connection to Jastrzębie Zdrój - Wodzisław Śl.	Silesia Voivodeship	Modernization of infrastructure	2019 - 2023
2.	Reconstruction of the Gogolin - Krapkowice - Prudnik connection	Opole Voivodeship	Modernization of infrastructure	2019 - 2023
3.	Rewitalizacja linii kolejowej nr 171	Silesia Voivodeship (Dąbrowa Górnicza Towarowa z posterunkiem Panewnik (between Katowice	Works on the south-eastern GOP beltway along with adjacent sections	2019 – 2021

Serial no.	Project name	Location	Project type	Planned schedule of the project (construction)
		Muchowiec and Ruda Kochłowice))		
4.	Works on the C-E 65 railway line on section Chorzów Batory - Tarnowskie Góry - Karsznice - Inowrocław - Bydgoszcz - Maksymilianowo	Silesia Voivodeship	Program Operacyjny Infrastruktura i Środowisko 2014-2020 (POIiŚ)	2018-2022
5.	Revitalization of railway lines No. 694/157/190/191 Bronów - Bieniowiec - Skoczów - Goleszów - Cieszyn / Wisła Głębce	Cieszyn district	Modernization of infrastructure	2014-2020

3.3. Slovakia

There is a good coverage of railway network in Žilina region and it is connecting all the major production and settlement centers, as all these points of interest are located in the Váh a Kysuca walleys. Also all the major points of interest had been established and growing based on good connection to the road and railway network.

The table below shows all the relevant railway line in the ŽSK area, which are used for both passenger and freight transport (with the exception of Budatínska spojka, which is used only for freight transport).

Table 31 National categorization of railway lines in the Žilina region[17]

Railway line	Category	Total length (km)	Description
105A Border of the Žilina region (Košice) – Kraľovany	1. category	80.741 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 or 120 km/h - Number of tracks 2
106A Kraľovany – Žilina – border of the Žilina region (Púchov)	1. category	61.467 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 40 km/h (Žilina station), 100 km/h or 120 km/h - Number of tracks 2
106B Odb. Potok – Žilina Teplička – Odb. Váh	1. category	6.458 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 80 km/h - Number of tracks 1
106C Varín – Žilina Teplička – Odb. Váh	1. category	3.580 km	- Gauge 1435 mm; - Traction 3kV DC

[17] Source: TTP ŽSR (https://www.zsr.sk/dopravcovia/infrastruktura/tabulky-tratovych-pomerov/) and ŽSR map application (https://aplikacie.zsr.sk/infomapainternet5/)

Railway line	Category	Total length (km)	Description
			- Axle load category D4 - Max speed 80 km/h - Number of tracks 1
106D Žilina – Čadca – Mosty u Jablunkova (CZ)	1. category	36.940 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 80 km/h, 100 km/h, 140 km/h - Number of tracks 2
106E Budatínska spojka	2. category	0.585 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 20 km/h - Number of tracks 1
113A Trstenná – Kralovany	3. category	53.894 km	- Gauge 1435 mm; - No traction - Axle load category C3 - Max speed 50 km/h - Number of tracks 1
114A Žilina – Rajec	3. category	21.285 km	- Gauge 1435 mm; - No traction - Axle load category D3 (Žilina – Lietavská Lúčka), C4 (Lietavská Lúčka – Rajec) - Max speed 60 km/h - Number of tracks 1
114B Čadca – Skalité – Zwardoň (PL)	1. category	20.226 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 70 km/h, 100 km/h - Number of tracks 1 (Svrčinovec – Skalité)
114C Čadca – Makov	4. category	26.172 km	- Gauge 1435 mm; - No traction - Axle load category C2 - Max speed 50 km/h - Number of tracks 1
118A Border of Žilina region (Zvolen) – Hronská Dúbrava - Vrútky	2. category	48.578 km	- Gauge 1435 mm; - No traction - Axle load category D4 - Max speed 60 km/h, 100 km/h - Number of tracks 1 (Vrútky – Horná Štubňa 2 tracks)
118D Border of Žilina region (Zvolen) – Banská Bystrica – Odb. Dolná Štubňa	2. category	11.497 km	- Gauge 1435 mm; - No traction - Axle load category D4 - Max speed 75 km/h - Number of tracks 1
122A Horná Štubňa – Border of Žilina region (Prievidza)	3. category	9.942 km	- Gauge 1435 mm; - No traction - Axle load category D4 - Max speed 60 km/h - Number of tracks 1

The table above shows all the relevant railway line in the ŽSK area, which are used for both passenger and freight transport (with the exception of Budatínska spojka, which is used only for freight transport).

The categorization of lines is based on the ŽSR designation and expresses the importance of the line from the perspective of the entire national railway network. The first category lines are of the international importance and are all included in the TEN-T core network. The second category lines are of national importance and the third category lines are of regional or interregional significance. The fourth category lines have a local importance (primarily for passenger transport).

Figure 16 Railway lines in Žilina region.[18]

The railway network covers the most of the area of the Žilina region, which is significant from the point of industry and the population. The railway network creates a skeleton, which naturally follows the relief of the landscape. The network follows the easiest way for the flow of traffic with predisposition of being the main mean of transportation in regional, interregional and international transport of passangers and goods.

[18] Source: Adapted ŽSR map

Table 32 International categorization of railway lines in the Žilina region[19]

Railway line	Corridors	Total length (km)	Description
105A Border of the Žilina region (Košice) – Kraľovany	OSŽD, RFC 9, TEN-T Core (Rhine – Danube)	80.741 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 100 or 120 km/h - Number of tracks 2
106A Kraľovany – Žilina – border of the Žilina region (Púchov)	OSŽD, RFC 5, RFC 9, RFC 11, TEN-T Core (Baltic Adriatic, Rhine – Danube)	61.467 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 40 km/h (Žilina station), 100 km/h or 120 km/h - Number of tracks 2
106D Žilina – Čadca – Mosty u Jablunkova (CZ)	OSŽD (Žilina – Čadca), RFC 5, RFC 11, TEN-T Core (Rhine – Danube)	36.940 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 80 km/h, 100 km/h, 140 km/h - Number of tracks 2
114B Čadca – Skalité – Zwardoň (PL)	OSŽD, TEN-T Core (Baltic Adriatic)	20.226 km	- Gauge 1435 mm; - Traction 3kV DC - Axle load category D4 - Max speed 70 km/h, 100 km/h - Number of tracks 1 (Svrčinovec – Skalité)
118A Border of Žilina region (Zvolen) – Hronská Dúbrava - Vrútky	-	48.578 km	- Gauge 1435 mm; - No traction - Axle load category D4 - Max speed 60 km/h, 100 km/h - Number of tracks 1 (Vrútky – Horná Štubňa 2 tracks)

Most of the lines concerned are of international importance in passenger as well as in the freight transport. Two lines are currently of lesser significance then in the past, namely Čadca - Skalité (Zwardoň) and Vrútky - Zvolen. The line through Skalité has lower volumes than in the past, but it has a great potential in terms of future growth, because it is included in TEN-T core network and the possibilities of a redundant railway line in the region providing sufficient capacity for future growth in rail transport due to the continuous increase in the number of passenger trains on the line Žilina - Ostrava. The Vrútky line is of particular importance for passenger transport, but it also has sufficient capacity for creating an efficient north - south connection for freight and at the same time, it can serve as an alternative connection for the Žilina - Trenčín / Leopoldov / Bratislava route. The alternative interconnection is particularly important in freight transport, which does not have such high sensitivity to the travelling time as the passenger transport. The use of an alternative freight routing may be important because of growth of the passenger transport demand on the line Košice – Žilina – Bratislava, with growing number of passenger trains and higher rate of occupancy of the tracks. The main motive for the alternate routing may be the Vrútky - Žilina section, with the highest occupancy (> 60%), because in terms of the actual growth rate in the number of the passenger trains, the capacity of the section may be inadequate in the future.

[19] Source: TPP ŽSR (https://www.zsr.sk/dopravcovia/infrastruktura/tabulky-tratovych-pomerov/) and ŽST map application (https://aplikacie.zsr.sk/infomapainternet5/)

Figure 17 International freight corridors passing through the Žilina region.[20]

In terms of the freight transport, the entire core network in the region is of an international importance and it is included in international corridors. Lines passing through Žilina region are important transport corridors for the bulk goods (mainly iron ore and coal) in the east-west direction. The exception is the line Vrútky - Horná Štubňa - Zvolen, which is primarily a supplementary line within the railway infrastructure and can be used in the case of malfunctioning of main routes or inadequate capacity of the network.

[20] Source: Adapted ŽSR map

Figure 18 Ten-T corridors in Žilina region.[21]

TEN-T corridors are almost identical to railway freight corridors in Slovakia. The only difference is the Čadca - Zwardoň line, which is not located in freight corridors, but it is located in the TEN-T core network within the Baltic - Adriatic corridor.

Table 33 Selection of important railway lines for TRITIA traffic model in the Žilina region

ID	Section	Section length (km)
SK01	Košice (border of Žilina region) - Žilina	119.802 km
SK02	Žilina - Bratislava (border of Žilina region)	22.406 km
SK03	Žilina - Čadca - Mosty u Jablunkova (CZ)	36.974 km
SK04	Čadca - Skalité - Zwardoň (PL)	19.368 km
SK05	Zvolen (border of Žilina region) - Hronská Dúbrava - Vrútky	48.578 km

The above-mentioned lines form the backbone infrastructure of the railway network in the region and on the basis of this parameter, they were chosen as significant. The lines of lower significance are connected to this base structure and provide the coverage of a wider region. The line from Vrútky to Zvolen is the only

[21] Source: Adapted ŽSR map

one that is not of the highest category (2. category). In terms of the railway network, it creates redundancy from north to south and, in the case of reduced or full capacity, it provides alternative route for freight transport.

Table 34 List of planned projects on the railway infrastructure in the Žilina region[22]

Proj.	Project name	Location	Project type	Planned timeframe of the project (construction)
1.	Žilina node	Town Žilina with surrounding area	Infrastructural, modernization with new line security (ETCS 2 with GSMR)) and transition to 25kV electrification	2019 – 2021
2.	Krásno nad Kysucou – Čadca (border), section Čadca – Krásno nad Kysucou	Čadca region	Modernization of infrastructure, line security and transition to 25kV electrification	2022 – 2025 (approx.)
3.	Poprad – Východná	Poprad and Liptov region	Modernization of infrastructure, line security and transition to 25kV electrification	2025 - 2028
4.	Východná – Liptovský Hrádok	Liptov region	Modernization of infrastructure, line security and transition to 25kV electrification	2024 - 2026
5.	Liptovský Hrádok – Liptovský Mikuláš	Liptov region	Modernization of infrastructure, line security and transition to 25kV electrification	2020 - 2023
6.	Liptovský Mikuláš – Ružomberok	Liptov region	Modernization of infrastructure, line security and transition to 25kV electrification	2024 - 2025
7.	Ružomberok – Turany	Liptov and Turiec region	Modernization of infrastructure, line security and transition to 25kV electrification	2026 - 2029
8.	Turany – Vrútky	Turiec region	Modernization of infrastructure, line security and transition to 25kV electrification	2024 - 2025
9.	Vrútky – Varín	Turiec and Žilina region	Modernization of infrastructure, line security and transition to 25kV electrification	2026 - 2028

The projects listed in the table above are to be funded from the EU funds and these projects are the main part of the railway infrastructure modernization in Slovakia. From the regional point of view, the most important project is the modernization of the Žilina Node. This project will incorporate upgrade of the Žilina station along with the adjacent railway network, safety davices and catenary system along with transition of power supply system from 3kV DC to 25kV AC with the same conversion on line Púchov – Žilina.

[22] Source: Feasibility study Žilina – Košice – Čierna nad Tisou št. hr.

3.4. Summary of the railway infrastructure in the TRITIA area

Infrastructure in its basis similar in all three regions in Tritia area. The main differences are in the security devices and potentially in gradual modernization of traction from DC to AC current and subsequent demand for bimodal electric locomotives, as in present the majority of netvork have direct current. The modernization of security devices have opposite impact, as the new infrastructure is based on european wide TSI and the rolling stock is this way better equiped for usage in whole europe.

Table 35 Technology used on the selected railway lines

Country	Slovakia	Czech Republic	Poland
Track security devices	Automatic block without train safety system (ETCS in progress)	Přerov – Petrovice u Karviné ETCS (1/2025), other tracks Automatic block,	Automatic block without train safety system (ETCS in progress)
Normative of freight train length	Košice – Kraľovany – Žilina - Bratislava 650 m Žilina – Čadca – Mosty u Jablunkova 700 m Čadca – Skalité – Zwardoň 650 m	Mosty u Jab.st.hr. - Č.Těšín 654 m Č.Těšín – Bohumín 700 m Petrovice u K.st.hr. – Dětmarovice 700 m Č.Těšín – Polanka n.O.výh. 700 m Bohumín st.hr. – Bohumín 600 m Bohumín – Přerov 720 m	Chałupki – Bohumin – max 650 m Cieszyn – Český Těšin – max 220 m Zebrzydowice – Petrowice u Karvine – max 650 m
Axle normative	All tracks are of category D4 (8 t on 1 m of track; 22,5 t on one axle)	All tracks are of category D4 (22,5 t on one axle)	Chałupki – Bohumin – D4: 22,5 t, 8 t/mb Zebrzydowice – Petrowice u Karvine –D3: 22,5 t, 78 7,2 t/mb Cieszyn – Český Těšin – C3: 20,0 t, 7,2 t/mb
Traction voltage	3kV DC, will be changed to 25kV AC as a part of Žilina node project (Púchov – Žilina, Žilina – Krásno nad Kysucou)	3kV DC, will be changed to 25kV AC until 2025 - 2030	3 kV DC, 25 kV AC 50 Hz (Slovak borders) 25 kV AC 50 Hz, 3 kV DC (Czech borders) 3kV DC (in Poland)
Train movement (left / right-handed)	right-handed	right-handed	right-handed
Track gauges	1435 mm	1435 mm	1520 mm (LHS), 1435 mm
Maximum speed without cabin signaling systems in a single cast (km/h)	up to 120 km/h (modernized sections up to 160 km/h, with tilting wagon axis up to 200 km/h)	160 km/h	130 km/h (in future 160 km/h)

Czech Republic – The main backbone of railway network in the Czech Republic is operated the state owned company SŽDC. In recent years, the infrastructure manager has unified the basic technical parameters of the main railway network as part of the construction of the so-called transit railway corridors.

The main railway lines included in the TEN-T network are normal gauge, double-track, electrified (only 3 kV DC in the Moravian-Silesian Region), with D4 axle pressure and 22.5 t per axle, and secured by the 3rd category National Security (automatic block) security device. The line speed is up to 160 km / h (with local

limitations) with the braking distance of 1000 m. Most of the railway stations are designed to handle trains with the length of 600 to 650 m, and only cupple stations can handle trains with lenght of 740 m.

Remote control of the signaling equipment of the stations and track sections from the central dispatching center Přerov is gradually being introduced in the affected area. The aim of the manager is to ensure remote control of all major railways in the Czech Republic from the central dispatching centers in Přerov and Praha.

As part of the unification of security equipment in the EU, ERTMS is being gradually implemented, the main lines included in the TEN-T network are currently covered by the GSM-R signal, the ETCS system is being installed, but it is only in trial operation. Exclusive operation of ETCS Level 2 on the main lines in the SŽDC network is to be achieved from year 2025.

At present all the electrified lines are 3 kV DC and are due to be modernized to 25kV AC, which will unify the power supply grid line of the SŽDC. It is a long-term process that will progress gradually over the coming years in line with the power conversion plan.

Poland - The length of railway lines is 19 291.3 km and the manager of the majority of railway lines is the PKP Polskie Linie Kolejowe company belonging to the state-owned Polish State Railways, and the main passenger carriers also included in the PKP Group - PKP Intercity and Przewozy Regionalne, owned by the provinces and the Industrial Development Agency. The average density of the railway network in Poland was 6.3 km / 100 km^2. The voivodships with the highest density of the railway network, next to the Śląskie Voivodeship, include the following voivodeships: Opolskie, Dolnośląskie, Wielkopolskie and Małopolskie. Management, construction, maintenance and access to railway infrastructure in Poland are the responsibility of the licensed infrastructure manager. The largest infrastructure manager is PKP Polskie Linie Kolejowe (PKP PLK) - a company from the Polish State Railways group. Passenger transport in rail transport is currently carried out on behalf of 18 organizers concluding public service contracts: the minister responsible for transport, voivodship marshals and the President of the Capital City of Warsaw. At the end of 2017, 35 railway carriers had active licenses for rail passenger transport, of which 15 reported regular passenger transport on a standard-gauge infrastructure. At the end of 2017, 91 railway carriers had active licenses (freight transport) authorizing them to run their business activities, of which one had a temporary license. In 2017, 69 entrepreneurs from 91 with licenses carried out transport activity. PKP Cargo remains the unquestionable leader of the freight transport market. In 2017, the company transported over 106.1 million tonnes, which meant an increase in the transported weight by 8.6 million tonnes (8.9%).

Trains running in Zebrzydowice at the final station were delayed by an average of 6 hours.

ETCS would gradually replace some 20 different national train protection systems, thus allowing trains to be driven throughout Europe without the need to replace front-end vehicles without the need to equip traction vehicles with different national systems.

The aim of introducing ETCS is not only to combine the management and security of train driving and to bring these systems to the current level of technology, but also:

- Reduced maintenance and operation costs for track side
- Removing a number of national security systems and thus
- Enable vehicle interoperability on European railways
- Increased track throughput
- Increasing track speeds
- The launch of the ETCS system on the main lines of the Czech Republic, ie also on the territory of the Moravian-Silesian Region within the territory of TRITIA, should take place by 2025.

Slovakia - Some of the major lines in the Žilina region are being modernized with the safety system ETCS 2, which ensures the compatibility of the improved railway infrastructure with the rolling stock. Compatibility

issues need to be addressed primarily for electric locomotives, which may affect the security device by its energy consumption characteristics, which may cause incorrect track occupancy assessment, and hence the increased likelihood of an accident on the track or at railway stations. For this reason, the harmonization tests are performed for each locomotive and thus they are approved for use on each line.

Overall - At present, there are no technical restrictions on national borders, which would directly affect the time needed for crossing of the border. The main reason for this is the participation of the Tritia states in the Schengen area, in which the border checks were removed and thus the biggest reason for time delays while crossing the borders was removed. The technical and technological aspect of railway transport is addressed by international legislation, which seeks to harmonize railway vehicles by creating uniform standards, where it shall be possible to cross with a single train across the EU without the need for locomotive changes caused by technical or technological differences on the chosen route.

The fact that all participating Tritia regions are part of the European Union creates a situation, in which a railway operator can easily obtain railway transport permits on any route and at the same time it simplifies the technical approval of the new rolling stock on selected routes.

From a legislative point of view, there is no reason why trains should stop at the border. The introduction of the Schengen area ended the border controls. From a transport point of view, there are agreements and conventions between states that allow freight trains to pass without the need for transport delays throughout the European Union. CIM / SMGS even to third countries.

From a technical point of view, there are also no obstacles in the stations, which would prevent the smooth transition of trains between Trans Tritia countries. Within the construction of individual projects on the corridor lines, it is possible that there are short-term technical barriers (insufficient capacity of the line, reduction of the weight norm, etc.)

In spite of these favorable conditions, we are now in a situation where freight trains are being shut down at intermediate stations. It is probably a bad communication between carriers or poor design organization when creating GVD at border stations.

In terms of the modernization of lines in Slovakia there may be a temporary deterioration of the compatibility, as the upgrading of the Žilina node shall proceed with the transition of catenary system from DC to AC (change of the requirements for the operation of electrical locomotives). This transition may cause the necessity to change electric locomotives, when crossing the Žilina region, which would lead to a prolongation of the time while crossing the border area. This situation will mainly affect older locomotives that support only one traction system (concerning mainly DC 3 kV system).

Table 36 Cross border differences in railway lines in the TRITIA area

	Slovakia	Czech Republic	Poland
Traction	3kV DC (25 kV after 2030)	3kV DC (25kV - 2037)	3kV DC
Gauge	1435 mm	1435 mm	1520 mm (LHS), 1435 mm
ETCS	Čadca – Jablunkov Yes Čadca – Zwardoň No	Mosty u Jablunkova - Čadca No Petrovice u Karviné - Zebrzydowice Yes/No Bohumín – Chałupki Yes/No	Chałupki – Bohumin – No Zebrzydowice – Petrowice u Karvine – No Cieszyn – Český Těšin – No
GSM-R	Čadca – Jablunkov Yes Čadca – Zwardoň No	Mosty u Jablunkova - Čadca Yes Petrovice u Karviné - Zebrzydowice Yes/No Bohumín – Chałupki Yes/No	No

	Slovakia	Czech Republic	Poland
Language of communication	Slovak	Czech	Polish
Train safety device	Mirel	LS	SHP+Radiostop+CA

In the transition station between Poland and the Czech Republic, driving vehicles are replaced due to a change in the traction system in the Czech Republic. All three rail crossings belong to the TEN-T system.

At the transition station between Poland and the Czech Republic, there is an exchange of traction vehicles due to the change in the traction system in the Czech Republic. All three railway transitions belong to the TEN-T system.

Since both border crossings are included in the main TEN-T network, there is a gradual modernization of the equipment and infrastructure, with an emphasis on achieving European-wide interoperability to facilitate crossing of borders and to support the single market in technical and technological terms.

3.5. Intermodal transport

Intermodal transport has an important position in terms of economic development, as it offers the possibility of using the most efficient transport mode in relation to the distance travelled and the kind of goods. The main benefit is the use of a separate transport route (rail, water) over long distances and transport by road only for short distances at the end of the transport chain. This reduces the volume of transport on the road network and thus reduces the environmental impact of transport (caused by traffic and congestions), as the railway and inland waterway transport have significantly lower emissions per tonne transported.

In order to increase the attractiveness of the intermodal transport, it is necessary to have a relevant network of intermodal (multimodal) terminals in the target area to ensure the optimization of the transport of containers into the terminals and to optimize the time required for transhipment to the preferred mode of transport. At the same time, these terminals need to be constructed taking into account the European standard of 700 m long intermodal block trains, so that the whole train can be transhipped at the same time without the need for additional shunting and gradual processing of the train. The terminals should also have a sufficient number of stacking devices to achieve the required transhipment capacity, while taking into account the projected performance increase and growth of the transported goods volume in the region.

3.5.1. Moravian-Silesian region

The modernization of the railway network in the Czech Republic is also connected with its connection to the railway network of neighboring countries. Rail modernization projects must comply with international agreements adopted within the European Union (EU) and the International Union of Railways (UIC). Two of the most important agreements are the Europe Agreement on Main International Railways (AGC Agreement) and the Europe Agreement on the most important international combined transport routes and related objects (AGTC Agreement).

There are important directions for the Czech Republic connecting western and eastern Europe and northern and southern Europe. The following four transit corridors have been established in these directions:

- 1 TŽK: (Germany) - Děčín - Prague - Česká Třebová - Brno - Břeclav - (Austria / Slovakia) 12
- 2 TŽK: (Austria) - Břeclav - Přerov - Petrovice u Karviné - (Poland) with branch to Česká Třebová - Přerov
- 3 TŽK: (Germany) - Cheb - Plzeň - Prague - Olomouc - Ostrava - Petrovice u Karviné / Mosty u Jablunkova - (Poland / Slovakia)
- 4 TŽK: (Germany) - Děčín - Prague - Veselí nad Lužnicí - Horní Dvořiště / Czech

- Velenice - (Austria)

Transit turtles based on AGTC

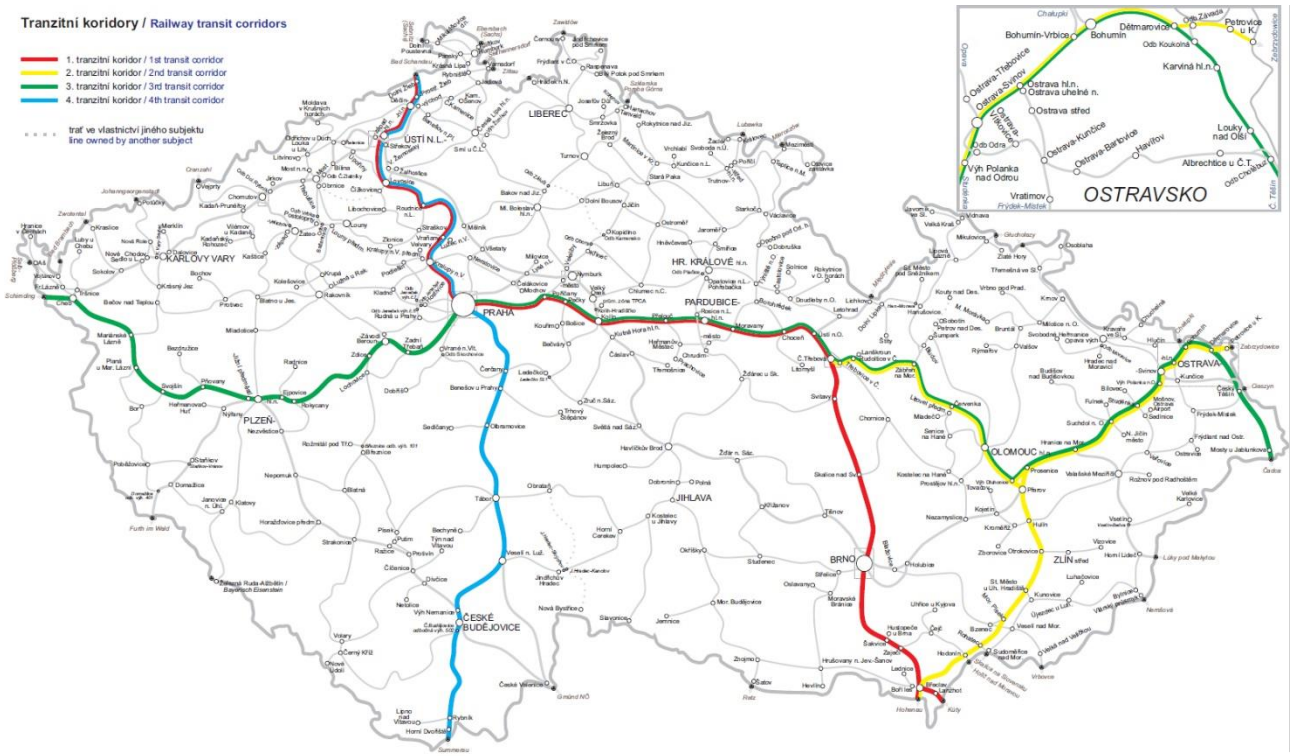


Figure 19 Transit Corridors of the Czech Republic

Table 37 Intermodal terminals in Moravian-Silesian region

	Moravian-Silesian region				
	Transport modes	Location	Operator	Public/Private	TEU/year
TIP 1	Road/rail	Ostrava Senov	Metrans a.s.	Private	Capacity of: loaded 1200 TEU + empty 1200 TEU
TIP 2	Road/rail	Kopřivnice	AGRO BOHEMIA s.r.o.	Private	Kapacita: 400 TEU
TIP 3	Road/rail	Paskov	Advanced World Transport B.V.	Private	100 000 (2017) Capacity: current state 2400 TEU / future state 5000 TEU
TIP 4	Road/rail	Mošnov	-	Public	-

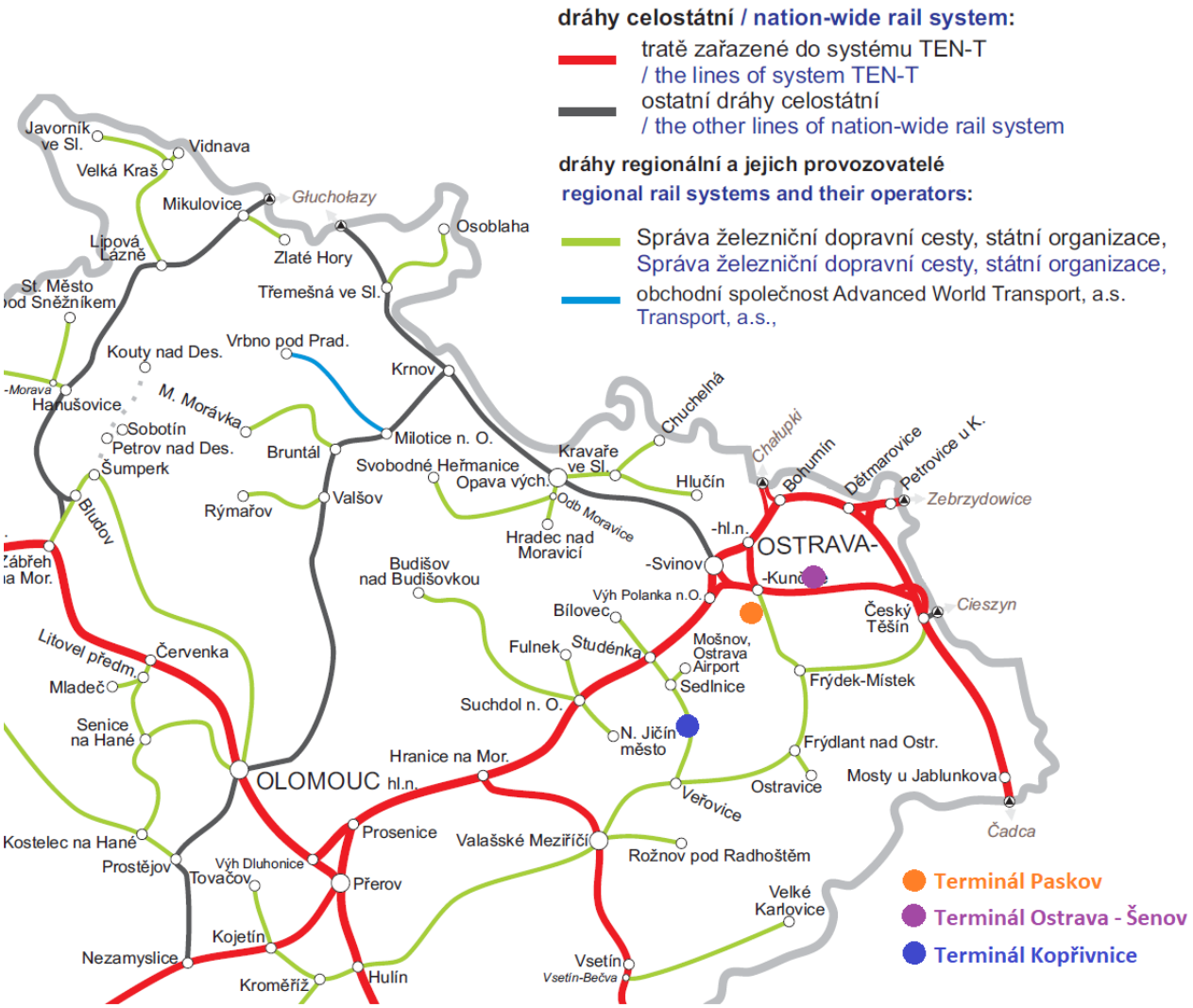


Figure 20 Container Transport Terminals in the Moravian-Silesian Region

3.5.2. Silesian and Opole voivodship

In the Śląskie Voivodship there is Port Gliwice. Its manager is the Śląskie Centrum Logistyki SA. Since 2017, the port has been transhipping coal from rail to inland. The transport is carried out by inland route to Wrocław. At the Port of Gliwice, there are currently no intermodal reloading (eg containers).

There is a Port in Kędzierzyn Koźle in the Opolskie Voivodeship; however, it does not carry out intermodal transhipments. Investment plans mention the creation of a container terminal in the port, but at the moment there is no specific information on this subject. The second port in Kędzierzyn Koźle within Grupa Azoty ZAK has been used incidentally in recent years; there are no intermodal transhipments.

Table 38 Intermodal terminals in Silesian voivodship

	Silesian voivodship				
	Transport modes	Location	Operator	Public/Private	TEU/year (maximum annual handling capacity)
TIP 1	Railway, road	Gliwice (na terenie ŚCL SA)	PCC Intermodal SA	private	150 000
TIP 2	Railway, road	Gliwice	Terminal Kontenerowy Gliwice - PKP Cargo Connect Sp. Z o.o.	private	128 000
TIP 3	Railway, road	Dąbrowa Górnicza	Polzug Intermodal Polska Sp. z o.o.	private	233 600
TIP 4	Railway, road	Sławków	Euroterminal Sławków Sp. Z o.o.	private	284 810

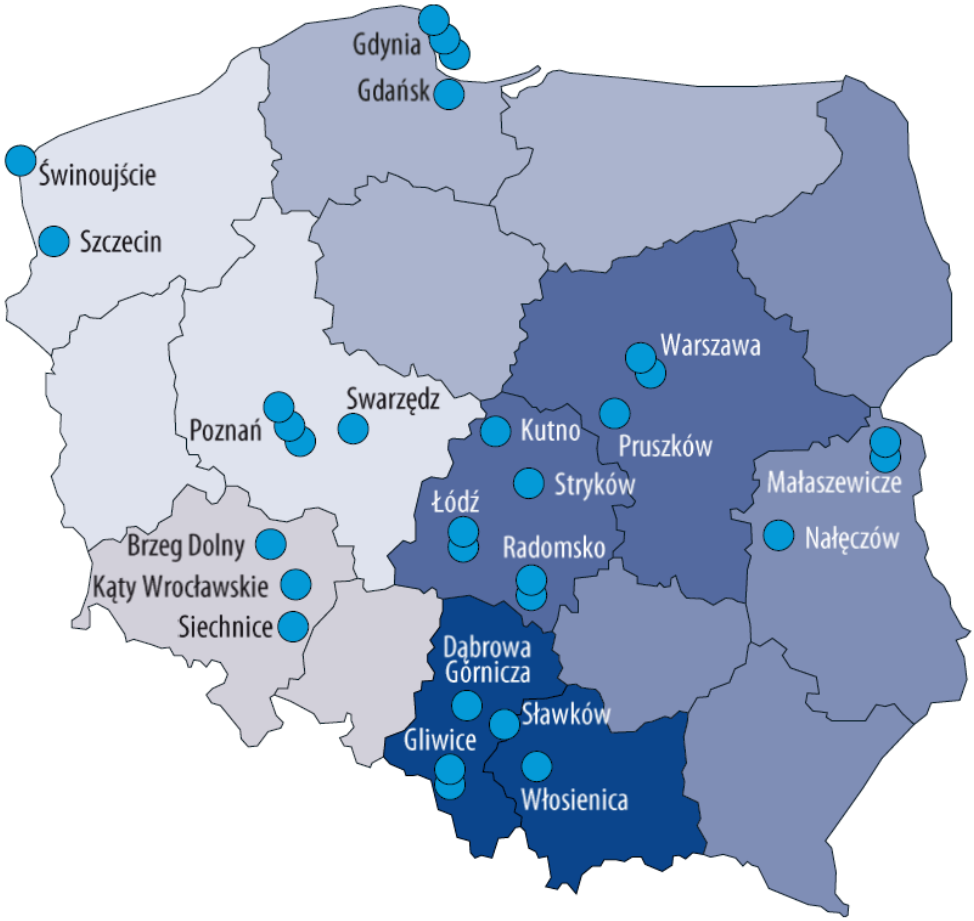


Figure 21 Map of Intermodal terminals in Poland

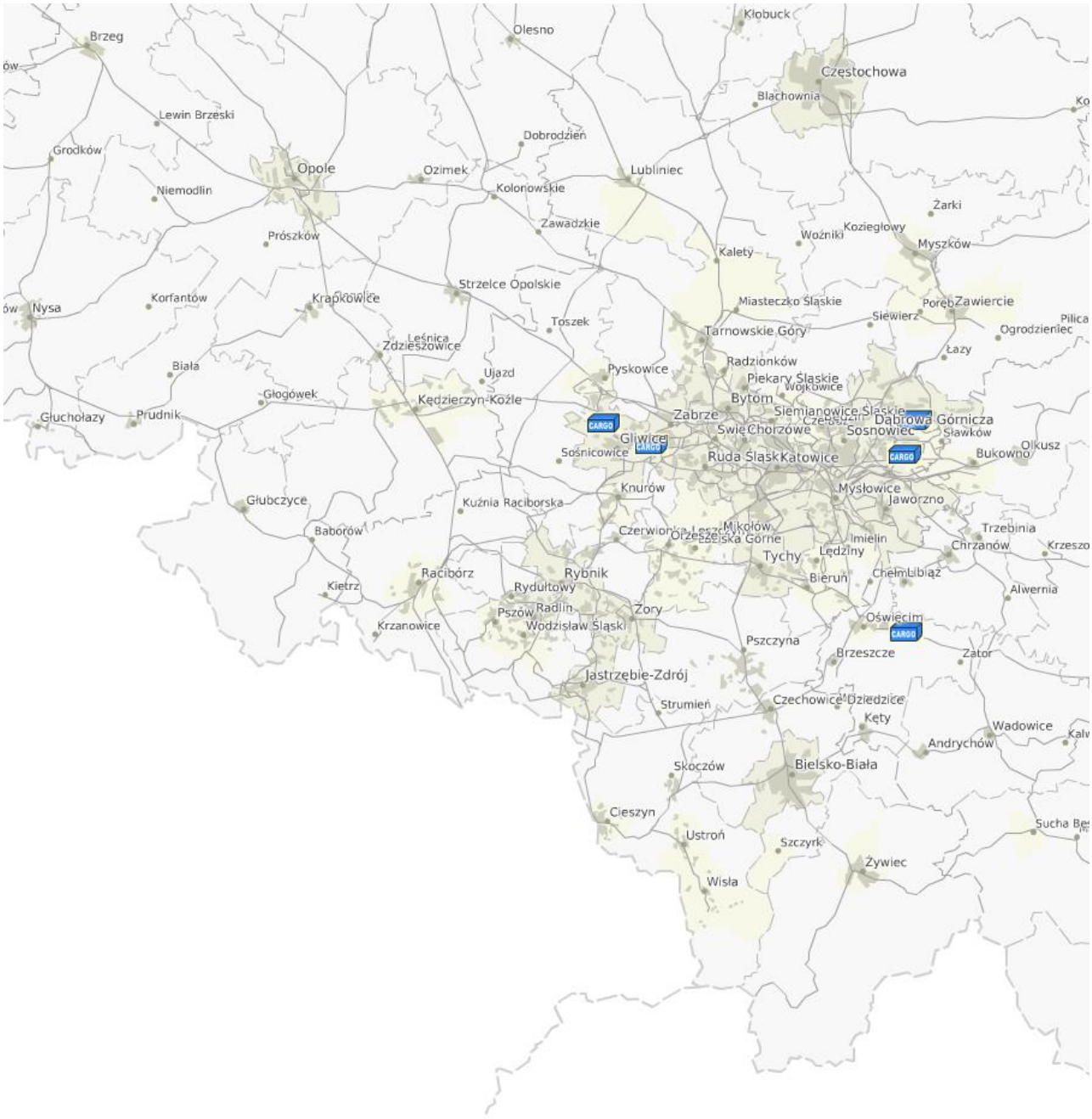


Figure 22 Map of Intermodal terminals in Silesian voivodship

The Opolskie Voivodeship does not have intermodal road and rail terminals.

3.5.3. Žilina self-governing region

In Žilina region, the most important terminal is located directly in Žilina. Its main performance comes from the container transhipment designed for the KIA plant. Outputs of the Žilina terminal are estimated and extrapolated from the share of export, import and domestic container freight in the total number of TEUs shipped in Slovakia. This number was subsequently multiplied by the share of the TEUs manipulated at the Žilina terminal. Current situation will be changed due to the new terminal in Teplička, which will act as a public service and contribute to better accessibility of intermodal transport to the general public. At present (2/2019), the terminal is due to be transferred to the private company TIP Žilina, which has won the public

procurement for the operation of the terminal for the next 30 years (the opening is expected in Q1/ Q2 2019).

The older Žilina terminal is currently operated by the Rail Cargo Operator - CSKD s.r.o., a member of a multinational company operating in several European countries (Czech Republic, Germany, Austria, Hungary, Romania and other). There are two 425 m and 470 m long tracks in the terminal, which is not ideal, as the block trains are up to 700 m long, so these trains are to be divided into two sets and this procedure has negative impact on the time required for handling and the occupancy of the tracks. The trains set are handled by two reach stackers and approximately 1,000 m2 of storage space is available.

The operator of the Teplička terminal is TIP Žilina s.r.o., a subsidiary of Metrans Danubia, a.s. based in Dunajská Streda. The terminal has a total storage area of 11,650 m2 (with the possibility of extension), this area being under two gantry cranes serving two handling tracks with an effective length of 750 m. Overall, it is possible to store up to 1,368 container units in the current configuration. Both gantry cranes can manipulate one container in 3 minutes, thus have the total theoretical performance of 480 containers in 12 hour change.0

Table 39 Intermodal terminals in the Žilina region

	Žilina region				
	Transport modes	Location	Operator	Public/Private	TEU/year
TIP 1	Rail / road	Žilina	SKD Intrans, a.s.	Private	94 244
TIP 2	Rail / road	Žilina – Teplička	Public terminal, opened in Q1 2019	Public	-
TIP 3	Rail / road	Trstená	ZSSK, a.s.	Public	Out of service
TIP 4	Rail / road	Ružomberok	ŽSR	Public	Out of service

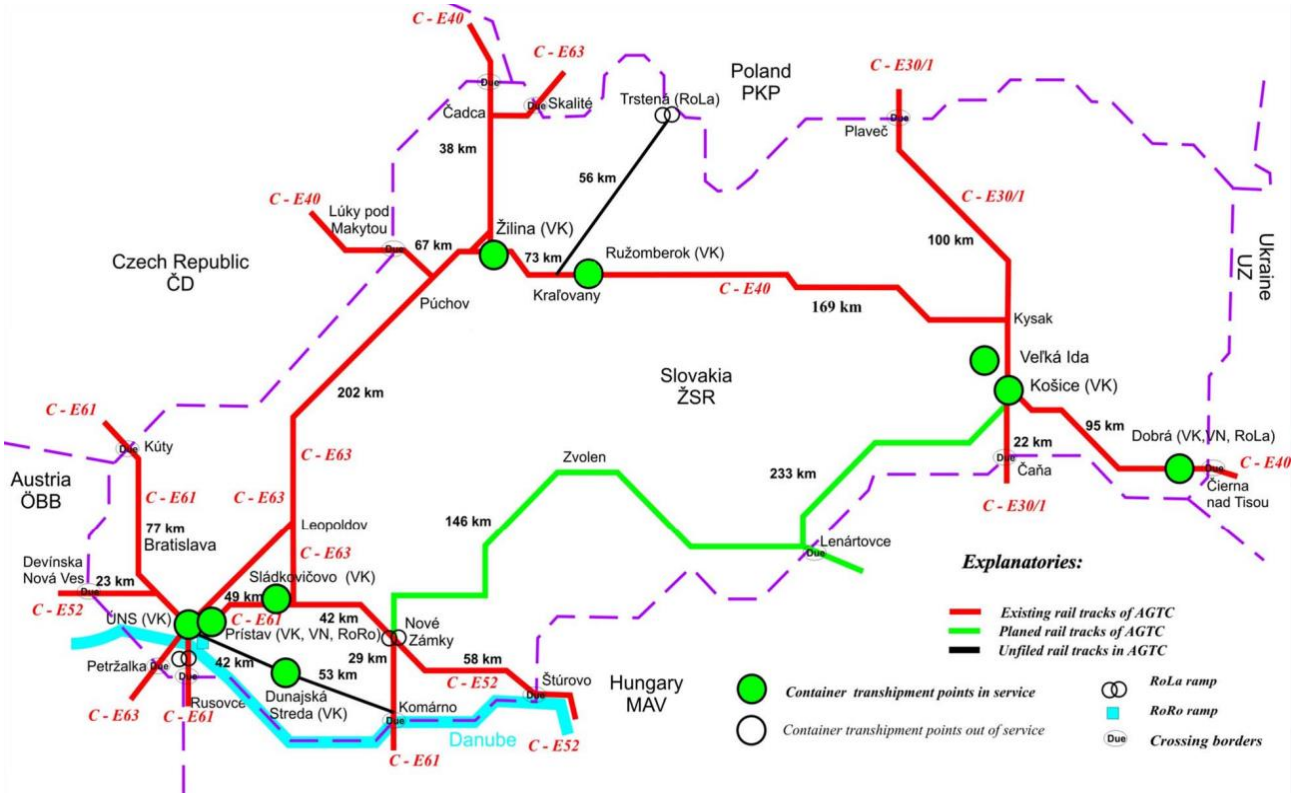


Figure 23 Intermodal infrastructure in the Slovak Republic

On the map both terminals in Žilina are displayed as one point, since the map is older and at that time TIP Žilina was not built yet. This terminal is currently in operation with the first test train arival on 22.3. 2019

to test terminal equipment functionality. Currently the terminal is processing one train a day and it is necessary to have a sufficient period of time for a real start-up of functionality, given the current capacity of TIP Žilina. The terminal is currently using two rail cranes for transshipment with high capacity that can be useful afther the expansion of the storage area for the conteiners, that is planed in the near future.

4. Railway transport parameters

As all three countries vare in Eastern block, the railway infrastructure is quite similar ande there are just minimal differences. The goal of this section is to identifie the differences to recognize potential barriers in further development of freight railway transport in the near future. This barriers may be just short term lived as the goal of modernization is to eliminate bottle necks, technical and technologickal barriers in international railway transportation.

4.1. Czech republic

Table 40 Parameters of selected railway tracks in Moravian-Silesian region

ID	Section name	Length (km)	Tracks (number)	Speed (km/h)	Capacity in even/odd direction (Number of trains)	Occupancy even/odd direction (%)	TEN-T corridor	Freight/Passenger transport
CZ301A	(SK) Mosty u Jabl.st.hr. - Bohumín	69.075	2	100/160	120 / 121	79 % / 78 %	Yes	Both
CZ305B	Bohumín - (border of the Moravian-Silesian region) Jeseník n. Odrou (Přerov)	54.143	2	130/160	Bohumín-Vrbice - Ostrava-Hrušov 125/136, Ostrava vjezd. výh. - Ostrava-Svinov 136/138 Ostrava-Svinov-hranice MSK Jeseník n.Odrou (Přerov) 125/128	111 % / 108 %, 116 % / 118 %, 83/81%	Yes	Both
CZ301D	Č. Těšín - Polanka n.O.výh.	39.764	2	80/100	135/152	61 % / 53 %	Yes	Both
CZ301B	Petrovice u K.st.hr. - Dětmarovice	8.242	2	100/120	114/122	48 % / 48 %	Yes	Both
CZ305A	Bohumín st. hr. (PL) - Bohumín	3.744	1	100	107	23 %	Yes	Both
CZ305C	Bohumín-Vrbice st.	4.279	1	100	52	92 %	Yes	Both

ID	Section name	Length (km)	Tracks (number)	Speed (km/h)	Capacity in even/odd direction (Number of trains)	Occupancy even/odd direction (%)	TEN-T corridor	Freight/Passenger transport
	hr. (PL) - Bohumín-Vrbice							
CZ301C	Odb. Koukolná - Odb. Závada	5.123	1	40	95	21 %	Yes	Freight transport
CZ301G	Ostrava hl.n. (uhel. nádraží) - Ostrava-Kunčice	7.805	2	60/100	119/117	79% / 71 %	No	Both
CZ302A	Ostrava-Kunčice - border of the Moravian-Silesian region (Valašské Meziříčí)	64.378	1	70/100	105	83 %	No	Both
CZ306A	Studénka - Veřovice	26.191	1	80/100	80	55 %	No	Both
CZ306H	Sedlnice předj. kol. - Mošnov, Ostrava Airport	2.903	1	90	128	50 %	No	Passenger transport (freight transport perspective)

The values in the table regarding throughput are calculated according to the new methodology, which differs significantly from the existing calculations within the SŽDC network. Usually, the throughput has decreased since previous calculations.

Eg: Ostrava entrance gate. vyh. - Ostrava-Svinov new values of transmittance are 136/138 and according to the old method they were approximately 198/204.

In the track section (SK) Mosty u Jabl.st.hr. - Bohumín is located section Odb Chotěbuz - Louky nad Olší and Odb Chotěbuz - Albrechtice u Č.T. where we get to use 117-120%. The throughput in these sections is 54-56 connections. In this part of the track the corridor is being reconstructed and the ride times are considerably extended. This is a temporary state and therefore these values are not listed in the table.

4.2. Poland

Chorzów Batory - border of Ślaskie/Lodzkie voivodeship: The entire analysed section is 27 km long, whereas according to carriers, the most vulnerable to capacity problems is the almost 6 km long section between Katowice and Chorzów Batory. Although trains can use the railway line no. 713 providing the third track, there is also traffic between Katowice and Gliwice between Katowice and Bytom and Tarnowskie Góry. It should be noted that after the completion of the modernization of the entire E30 trunk line, long-distance traffic will increase on the discussed section of line no. 137.

Katowice Ligota - Gliwice: On this 16 km section traffic between Katowice and such cities as: Tychy, Pszczyna, Bielsko-Biała and Wisła is accumulated. Between Katowice and Katowice Piotrowice stations there is also traffic from Mikołów and further on from Rybnik. Carriers point out that during peak periods, e.g. when reaching Katowice in the morning, the capacity is used to the maximum. This makes it impossible to increase the frequency of train runs or to add a new connection in a different relation. Parallel to the part of the section in question runs a single-track line no. 142, but it is characterized by a low permissible speed of 50 km/h and is used in freight traffic. The capacity of the Katowice-Tychy section and the Katowice Ligota station is a significant barrier to the development of the railway transport offer south of Katowice.

Katowice - Widzów Teklinów (Warszawa Zachodnia through Piotrków Trybunalski, Koluszki. Skierniewice, Żyrardów): Passenger carriers pay attention to the lack of separation of agglomeration and long-distance traffic on the 44-kilometre section between the stations Zawiercie and Katowice. Parallel to line no. 1, two railway lines no. 160 and 186 run parallel to line no. 1 in the section Zawiercie - Dąbrowa Górnicza Ząbkowice. They were revitalised in 2014 as part of the OPI&E (Operational Programme Infrastructure and Environment) project 2007-2013 assuming improvement of the technical condition of railway lines no. 1, 133, 160, 186 in the section Zawiercie - Dąbrowa Górnicza Ząbkowice - Jaworzno Szczakowa. These lines have already been used in passenger traffic, but they bypass passenger stops Dąbrowa Górnicza Sikorka, Chruszczobród, Wiesiółka. Therefore, these lines could be used by long-distance passenger trains, but their main purpose is freight transport, and the permissible speed after repair is 100 km/h on line 160 and 80 km/h on line 186. The lack of a second pair of tracks may be a barrier to increasing transport between Katowice and Dąbrowa Górnicza.

Table 41 Parameters of selected railway tracks in Silesian voivodship

ID	Section name	Length (km)	Tracks (number)	Speed (km/h)	Capacity in even/odd direction (Number of trains)	Occupancy even/odd direction (%)	TEN-T corridor	Freight/Passenger transport
PL131	Chorzów Batory - granica województwa ŚL/LD	103.37	2	40/50/60/90/100/120			C-E65	Both
PL141	Katowice Ligota - Gliwice	25.564	2/1	80				Freight transport
PL1	Katowice - Widzów Teklinów (Warszawa Zachodnia p. Piotrków Trybunalski, Koluszki. Skierniewice, Żyrardów)	118	2	80/100/120				Both
PL62	Sosnowiec Główmy - Sławków (Tunel)	26	2/1	120/70				Both
PL158	Rybnik Towarowy - Chałupki	25.327	1/2	80				Both
PL139	Katowice - Zwardoń	113.785	1 / 2	140				Both

ID	Section name	Length (km)	Tracks (number)	Speed (km/h)	Capacity in even/odd direction (Number of trains)	Occupancy even/odd direction (%)	TEN-T corridor	Freight/Passenger transport
PL93	Zebrzydowice - Kaniów (Trzebinia)	41.978	2	120				Both

Table 42 Parameters of selected railway tracks in Opole voivodship

ID	Section name	Length (km)	Tracks (number)	Speed (km/h)	Capacity in even/odd direction (Number of trains)	Occupancy even/odd direction (%)	TEN-T corridor	Freight/Passenger transport
PL144	Kielcza - Opole Głowne	49.628	2	100/140				Both
PL132	Błotnica Strzelecka - Lipki	89.827	2	160			E30	Both
PL137		114.969	2/1	120				Both
PL136	Kędzierzyn-Koźle - Opole Gorszowice	37.511	2	50/60/80			E30	Both
PL277	Opole Groszowice - granica województw OP/DŚ	53.250	2	120				Both

Table 43 Freight railway transport performance in Silesian voivodship (2017)

Section name	Transported goods (tonne)	Transport performance (tonne-km)	Transport performance (gross-tonne-km)	Transport performance (train-km)	Average transport distance (km)
2017	119 750 500	60 911	No data	No data	No data

Approximately 50 % of domestic rail transport is carried out in the voivodship. When describing the railway infrastructure in Silesia, one should mention the railway junction in Tarnowskie Góry - one of the largest railway junctions in Europe. Transport between Bielsko, Katowice and Warsaw is provided by the Central Railway Line (CMK), and between Katowice and Gdańsk by the Port Main, which transports most of the goods from the area of the voivodship. In addition, thanks to CMK, a trip from Katowice to Warsaw (distance 297 km) takes less time. Important railway routes run through the region, three of which are included in the international AGC network - these are:

E30 Dresden - Zgorzelec - Wroclaw - Katowice - Medyka- Lviv - Kiev - Moscow,

E59 Malmo - Ystad - Świnoujście - Zielona Góra - Wrocław - Racibórz - Chałupki,

E65 Gdynia - Warsaw - Katowice - Zebrzydowice - Ostrava - Vienna.

Noteworthy is also Euroterminal in Sławków. It is the westernmost point of contact between wide- and standard-gauge railway systems operating according to European standards. The terminal has an internal network of railway tracks with both a wide gauge and a European standard, thus having a connection with the cargo flow system on the axis of Asia and the Far East - Western Europe. The Polish section of the broad gauge railway is the Szeroka-Gora Steelworks, which is the westernmost line with a clearance of 1520 mm in Europe.

Table 44 Passenger railway transport performance in Silesian voivodship (2017)

Section name	Transported passengers (no.)	Transport performance (passenger-km)
2013	19 369 350	9 852
2014	19 590 480	9 965
2015	19 621 000	9 980
2016	19 890 000	10 122
2017	20 341 200	10 346

Table 45 Passenger railway transport performance in Opole voivodship (2017)

Section name	Transported passengers (no.)	Transport performance (passenger-km)
2013	6 691 230	8 578
2014	5 462 730	7 003
2015	5 325 700	6 828
2016	4 972 500	6 372

Table 46 The list of transported commodities in railway transport – Poland (2017)

Commodity	Thous. tonne
Hunting and fishery forestry products	**3 976.539**
- including cereal	760.635
Hard coal, lignite, oil and natural gas	**97 069.357**
- including hard coal	95 289.133
Metal ores and other mining and quarrying products	**62 242.923**
- including iron ore	10 991.573
- and aggregate, sand, gravel, clays	43 667.154
Food products, beverages and tobacco products	**1 464.998**
Textiles, leather clothing and leather products	**16.211**
Wood, wood and cork products, straw, paper, and paper products, printed products and recordings	**1 925.689**
Coke, briquettes, refined petroleum products, gases produced by industrial methods	**27 576.119**
- including oil refining products	17 122.009
Chemicals, chemical oil products, synthetic fibers, rubber and plastic products, nuclear fuel	**9 823.198**
Products from other non-metallic raw materials	**3 183.414**
- Cement, lime, gypsum	2 669.376
- Other building materials	478.204
Metals and finished metal products (excluding machinery and equipment)	**9 517.422**
Machines, devices, electric and electronic equipment	**240.638**
Transport equipment	**903.516**
Furniture, other finished products	**75.433**

Commodity	Thous. tonne
Secondary raw materials, municipal waste	**3 689.175**
Letters and parcels and courier shipments	**0.048**
Empty packaging	**1 063.870**
Cargo transported during the removal of other non-traded cargo	**0**
Mixed goods without food	**1 903.610**
Unidentifiable goods	**9 796.830**
Other goods	**5 416.429**

4.3. Slovakia

The lines generally have different characteristics due to their specific planned purpose. The main differences are security devices (track and station), speed, number of tracks, track load class (on axle and on one meter length of track) and capacity.

All lines involved are of transnational importance and almost all are included in the TEN-T network. This fact predetermines the lines for significant future growth and large amounts of technical and technological development to increase track throughput, focusing on constraints that limit the overall throughput of the entire line segment.

Table 47 Parameters of selected railway lines in the Žilina region

ID	Section name	Length (km)	Tracks (number)	Speed (km/h)	Capacity in even/odd direction (Number of trains)	Occupancy even/odd direction (%)	TEN-T corridor	Freight/Passenger transport
SK01	Košice (border of Žilina region) - Žilina	119.802 km	2	120	160/168 (Vrútky - Žilina 194/179)	67.60 % / 70.37 %	Yes	Both
SK02	Žilina - Bratislava (border of Žilina region)	22.406 km	2	120	127/126	55.90 % / 52.86 %	Yes	Both
SK03	Žilina - Čadca - Mosty u Jablunkova (CZ)	36.974 km	2	140	165/162	53.70 % / 42.97 %	Yes	Both
SK04	Čadca - Skalité - Zwardoň (PL)	19.368 km	1	100	76 (total as there is only one track)	19.80 % (1 track)	Yes	Both
SK05	Zvolen (border of Žilina region) - Hronská	48.578 km	1 (partially 2)	100	51 (83/75)	39.20 % (1 track)	No	Both

ID	Section name	Length (km)	Tracks (number)	Speed (km/h)	Capacity in even/odd direction (Number of trains)	Occupancy even/odd direction (%)	TEN-T corridor	Freight/Passenger transport
	Dúbrava - Vrútky							

The table above lists the most important lines relevant in terms of the cross-border cooperation. All lines have the same axle load category (D4), and therefore it is not stated in the table. It is the highest category of track in Slovakia and allows the operation of all standard wagons at their maximum load capacity in terms of one axle load and the load per one meter of track. The track capacity is taken from the most occupied segment on the listed section.

Table 48 Share of transported commodities in the railway transport - Slovakia (2017)[23]

Commodity	Thous. tonnes, estimate
Iron ore	16 794
Metals	6 973
Coal	6 321
Construction material	4 852
Oil derivatives	3 606
Wood	3 236
Chemistry	2 949
Intermodal	1 582
Not specified	1 099
Edibles	378
Total	**47 790**

The distribution of the transported quantity of different commodities corresponds to the main purpose of the railway transport and that is to move the bulk goods. These commodities represent categories with the largest freight volume and more than 80% of the total quantity of transported goods in 2017.

4.4. Summary railway transport parameters in TRITIA countries

As it was stated in the beginning of the 4th chapter, the infrastructure is similar in whole TRITIA area and the differences are mostly technological and therfore there is no major barrier for cross border utilization of railway network that could be eazily eliminated by implementation of new technology.

Table 49 Structure of goods transported by railway transport (2017)[24]

Country	Export (tonne)	Import (tonne)	Transit (tonne)	National transport (tonne)
Slovakia	11 912 000	16 736 000	8 953 000	5 245 000
Czech Republic	19 661 000	28 319 000	10 097 000	38 440 000
Poland*	26 464 000	42 247 000	6 227 000	164 563 000

*without shunting

In the table above we can see that as the country is getting bigger so does grow the national transport. This is related to the economy and efficiency of the railway transportation, which is getting more economic with

[23] Source: Statistical office of Slovakia (overall transport), derived from commodity distribution of the largest freight operator ZSSK (annual report)

[24] Source: Statistical data of MDV (data for operators with 20 and more employees)

the transport distance of more than 200 km. In Slovakia the proportionality of export, import and national transport is shaped by automotive industry, as there is not that high percentile of home made parts for the cars. Poland naturaly inclines to large quantities of national transport, as the contry have a natural predisposition for inland transportation with good density of railways in industrialized parts of the country.

Table 50 Structure of TEUs transported by railway transport (2017)

Country	Transported TEU
Czech Republic	796 885 (import, export, transit) loaded big containers 217 092 (import, export, transit) empty big containers 15 623 (import, export, transit) loaded swap body 2 960 (import, export, transit) empty swap body 40 404 (import, export, transit) loaded semi-trailers 423 (import, export, transit) empty semi-trailers
Poland	1 667 000
Slovakia	610 941 (import, export, transit)

The Czech Republic is experiencing significant growth in intermodal shipments, based on good coverage of major areas by terminals and a high level of competition between terminal operators. There is also an growth of storage facilities with the goal of providing additional services for the transhipment and storage of intermodal units. In the Czech Republic, most terminals are non-public in nature and are primarily used by regular customers who negotiate a contractual price, given the nature of the services provided.

Analyzing intermodal transport in Poland for TEU (1 20-foot container = 1 TEU) in 2017, 1 667.3 thousand ware transported. TEU, which was an increase of 16.1% compared to the results from 2016. As in 2016, the main players in this segment of the market remain the PKP Group companies. The share of PKP Cargo and PKP LHS at the end of 2017 was: in the mass of transported units - 48.1 % and transport performance - 51.4 %. In 2017, DB Cargo Polska and Lotos Kolej also had a significant position on the intermodal transport market. Their market share, taking into account the transported weight, was 17.7 % and 14.2 %, respectively. In terms of transport performance, the market share of these companies was 21.1 % and 12.4 %, respectively. The growing market share of other companies is also noteworthy. Carrier Captrain Polska at the end of 2017 reached 8.7 % share in the transported weight and 7.3 % in the transport performance. The next two companies, Ecco Rail and LTE Polska, obtained 3.7 % and 2.4 % considering the mass of cargoes and 3.8 % and 2.2 % in terms of transport performance.

In the long run, the transportation of intermodal units is growing. The reason for the growth is the construction of a new industries that requirr significant supplies of materials and components (automotive) and the hrowth is also fuelled by entry of private companies into the operation of terminals. The effect of the private operation can be demonstrated at the Dunajská Streda terminal, which, despite the relatively weak industry in the adjacent region, has developed into the most important terminal in the Slovak Republic, with a share of almost 65% of all handled TEUs is Slovakia. Comparable development can be expected in the territory of the Žilina region, where the private terminal currently can't adequately cover the potential increase of demand for intermodal transport, given its capacity (number and length of the track, deposition area). Therefore, the new terminal in Teplička can boost the amount of transhipped intermodal units, because of his significant storage and handling capacity (with possible extension in the future).

Table 51 Unit average charges for using railway infrastructure

Country	Unit average charges EUR/train km
Slovakia (2017)	ZSSK Slovensko - 1.9427 ZSSK Cargo Slovakia - 2.1679
Czech republic	České Dráhy - 0.5846 ČD Cargo - 2.0014
Poland	Passenger - 1.5

Country	Unit average charges EUR/train km
	Freight - 3.13

The individual prices are determined by calculating the total revenues for the use of the railway infrastructure (ČD, ČD Cargo) and the performance of the carriers in train km. It is based on the annual report of SŽDC.

In the passenger transport, unit cost per kilometre is calculated as a proportion of the total amount of infrastructure charges for the total performance in train kilometres (both data are from the ZSSK annual report). In the freight transport, the indicator was calculated similarly, but ZSSK Cargo does not publish the total performance in train kilometres, so this figure was calculated from the total traffic performance through the determination of the average quantity of goods transported per train (600 tonnes), the value is thus an estimate.

Czech Republic

Table 52 Structure of trains in the Czech republic

Train category	Passenger/freight transport	Long/short trips	Name-description
SC	Passenger	Long	Super City
EC	Passenger	Long	Euro City
EN	Passenger	Long	Euro Night
IC	Passenger	Long	Inger City
Ex	Passenger	Long	Express
R	Passenger	Long	Fast train
Rx	Passenger	Long	Regional Express
Sp	Passenger	Long/ Short	Regional fast train
Os	Passenger	Short	Ordinary passenger train
Nex	Freight	Long	Freight express
Pn	Freight	Long	Continual freight train
Rn	Freight	Long	Fast freight trains
Mn	Freight	Short	Manipulating train

The table shows trains moving on the Czech Republic network for passenger and freight transport. Some trains that are on the network have a specific meaning. In passenger transport, this is the set train (Sv) which provides transportation of empty passenger wagons. Furthermore, in freight transport we know freight freight trains (Vn) trains designed for the transport of empty wagons, siding trains (Vleč) trains designed to run on a siding branching off a main line, service trains (Služ) trains for the needs of a railway operators. Locomotive train (Lv) train consisting only of locomotives.

Table 53 Number of trains on selected lines in Moravian-Silesian region (total in one week)

ID	Section	Number of passenger trains (GVD 2018/2019 from December 2018)				Number of freight trains (routs in GVD not real number of dispatched trains)			
		SC, EN, EC, IC, Ex	R, Rx, Sp	Os	Total	Nex	Pn	Mn	Total
CZ301A	(SK) Mosty u Jabl.st.hr. - Bohumín	196	84	287	567	182	301	49	532
CZ305B	Bohumín - (border of the Moravian-	553	406	385	1344	287	287	28	602

ID	Section	Number of passenger trains (GVD 2018/2019 from December 2018)				Number of freight trains (routs in GVD not real number of dispatched trains)			
		SC, EN, EC, IC, Ex	R, Rx, Sp	Os	Total	Nex	Pn	Mn	Total
	Silesian region) Přerov								
CZ301D	Č. Těšín - Polanka n.O.výh.	140	182	280	602	189	203	28	420
CZ301B	Petrovice u K.st.hr. - Dětmarovice	70	0	168	238	84	287	42	413
CZ305A	Bohumín st. hr. (PL) - Bohumín	70	14	77	161	0	0	0	0
CZ305C	Bohumín-Vrbice st. hr. (PL) - Bohumín-Vrbice	14	0	0	14	84	168	0	252
CZ301C	Odb. Koukolná - Odb. Závada	0	0	0	0	7	63	21	91
CZ301G	Ostrava hl.n. (uhelné nádraží) - Ostrava- Kunčice	20	24	60	104	9	21	15	45
CZ302A	Ostrava-Kunčice - border of the Moravian-Silesian region (Valašské Meziříčí)	0	7	378	385	14	14	98	126
CZ306A	Studénka - Veřovice	0	0	224	224	0	7	42	49
CZ306H	Sedlnice předj. kol. - Mošnov, Ostrava Airport	0	0	350	350	0	7	42	49

Individual train numbers are based on GVD 2018/2019. These are average values for the entire calendar year. These numbers do not include locomotive, service or balancing trains. These are the average number of trains per calendar year. Following a specific week, these values may vary slightly.

Poland

Table 54 Structure of trains in the Poland

Train category	Passenger/freight transport	Long/short trips	Name-description
EN	Passenger	Long trips	Euro Night
EC	Passenger	Long trips	Euro City
EI	Passenger	long trips	Intercity Expres
MM	Passenger	long trips	Międzynarodowe pośpieszne
MH	Passenger	long trips	Międzywojewódzkie pośpieszne typu hotelowego
MP	Passenger	long trips	Międzywojewódzkie pośpieszne
MO	Passenger	Long trips	Międzywojewódzkie osobowe
RP	Passenger	Short and long trips	Regionalne Psażerskie
RO	Passenger	Short trips	Regionalne krajowe osobowe
TA	Freight	Long trips	Priorytetowe przewozy międzynarodowe

Train category	Passenger/freight transport	Long/short trips	Name-description
TC	Freight	Long trips	Międzynarodowe całopojazdowe przewozy intermodalne
TH	Freight	Long trips	Międzynarodowe przewozy masowe I graniczne
TR	Freight	Long trips	Międzynarodowe przewozy rozproszone
TB	Freight / Passenger	Long trips	Przewozy priorytetowe
TD	Passenger	Long / short trips	Całopociągowe przewozy intermodalne
TP	Freight	Long trips	Pośpieszny o podwyższonym standardize szybkości technicznej do przewozu ładunków w pojedynczych wagonach i grupach wagonów
TS	Freight	short trips	Próbne oraz inne pociągi

In 2017, Polish carriers had 4 004 locomotives (3 449 items), 1 279 electric traction units, 240 diesel motor vehicles, 7 290 passenger cars and 90 849 freight wagons.

Slovakia

The type designation of trains in Slovakia has been established for some years and there are only minor changes due to international lines. All train labelling listed bellow can be used for international service, since the train taging is primarily based on the extent of the transport and the covered territory that will be serviced by the particular train.

Table 55 Structure of trains in Slovakia

Train category	Passenger/freight transport	Long/short trips	Name-description
SC	Passenger	Long	Super City
EC	Passenger	Long	Euro City
EN	Passenger	Long	Euro Night
IC	Passenger	Long	Inger City
Ex	Passenger	Long	Express
R	Passenger	Long	Fast train (rýchlik)
RR	Passenger	Long	Regional fast train (regionálny rýchlik)
REX	Passenger	Long/ Short	Regional Express
Os	Passenger	Short	Ordinary passenger train (osobný vlak)
Nex	Freight	Long	Freight express (nákladný expres)
Pn	Freight	Long	Continual freight train (priebežný nákladný vlak)
Mn	Freight	Short	Manipulating train (manipulačný vlak)

Labbeling of lond distance trains are based on European standards and are comparable to European network. The description also refer to what kind of train is it and if it operates on international, national or regional level.

There are some special trains that are not for the public, like set trains (empty ride without passengers), trains consisting of locomotives only and trains for the employees of the ŽSR and/or operators. These trains are not included as they are not based on regular schedule but are operated on demand. Also these trains got the lowest priority, when it comes to train dispatching and are not avaible for public usage.

The SC, EC, EN trains are operated on international level and theire strops are only in bigger towns with at least regional importance. The IC and Ex trains can be national and international and can connect towns with less than regional importance and stations with high importance on railway network (junctions etc.). The R, RR and REX trains usualy connect all stations on the route. The Os trains stopping in all station and train stops on the route and have the lowest average speed.

The Nex and Pn trains are designated for long distance shipement and are connecting two treight train station (usualy with marshalling yard). The Mn trains are designated for local deliveries on regional railways and on short distances (in tens of kilometres), also this type of trains is somewhat rare in actual situation, because most of carriers are using block trains and doesn't really ship small amount of wagons at a time.

Table 56 Number of trains on selected lines in the Žilina region (total in one week)

Section	Number of passenger trains (GVD 2018/2019 from December 2018)				Number of freight trains (routs in GVD not real number of dispatched trains)			
	SC, EN, EC, IC	Ex, R, RR, Rex	Os	Total	Nex	Pn	Mn	Total
Košice (border of Žilina region) - Žilina	126	268	194	588	350	504	14	868 (busiest section 518)
Žilina - Bratislava (border of Žilina region)	42	214	142	398	287	364	14	665 (busiest section 413)
Žilina - Čadca - Mosty u Jablunkova (CZ)	88	98	246	432	315	364	28	707 (busiest section 406)
Čadca - Skalité - Zwardoň (PL)	0	0	94	94	0	49	14	63
Zvolen (border of Žilina region) - Hronská Dúbrava - Vrútky	0	122	190	312	7	168	14	189 (busiest section 98)

The total number of passenger trains is based on the 2018/2019 timetable and reflects the real amount of regularly operated trains in the relevant sections. The real number of trains may slightly differ on an annual basis due to special trains before / after the holidays and special ocasiong (world hockey championship etc.), but since those are a few in between, the real impact on the total number of trains is negligible.

The total number of freight trains is derived from the schedule book, which is a list of all regular and irregular trains that are marked on the affected routs (this number is multiplied by 7, for one week). The real number of trains will be lower as not all trains will be dispatched daily, on the other hand there are no ad-hoc trains in the schedule book that will increase the total amount of trains that have been dispatched.

5. Conclusions

Railway infrastructure in the affected area of the TRITIA project has a similar technical character and the main differences nowadays are the safety equipment technology and potentially different power supply system in the future, as the change of the catenary system from 3kV DC to 25kV AC is not currently considered in Poland. From a legislative point of view, all three countries are similar, as they are involved in all major railway organizations operating in the region. Slight differences are due to different levels of implementation, where individual countries have different views of each individual elements of infrastructure, for example track that is passable in Czech republic could be impassable in Slovakia due to condition of superstructure (exact track gauge, track elevation, etc.) as the legislation is stricter.

Czech Republic

The railway network in the Moravian-Silesian Region is quite dense and easily accessible. Ostrava and its surroundings form an important node of rail transport in the whole of Moravia. It is a combination of two TEN-T corridors.

These are the West-East and North-South TENT-T corridors of the Baltic-Adriatic and Rhine-Danube. By using these coridors, the line around Ostrava is getting to its capacity. The plan is to modernize the railway junction Ostrava and other parts of the line, which will lead to the improvement of this situation.

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Poland

The railway infrastructure in the region has a good density and good predispositions for future growth, in terms of freight and passanger railway transportation. The connection to Czech Republic have a limited potential as the border infrastruckture is used nearly to theire maximal capacity and can be a real obstacle for new routes for passenger and/or freight trains. One of the solutions can be rerouting train to Zwardoň - Skalité track, although this line is operated on one track the currently unused capacity can accommodate significant growth in railway transport. In the future, this transition can also be important for new integrated trains, which are heading from the port of Gdańsk to the new terminal TIP Žilina, which can significantly cover the needs for intermodal transportation in border areas near Žilina region.

The overall situation in terms of rail infrastructure utilization can change after the construction of a new high-speed line on the Budapest - Bratislava - Preha (Brno) - Warsaw axis. This route would thus partially relieve the current infrastructure, as long-distance trains would be moved to dedicated infrastructure. At present, the project is in a very early phase and a multilateral declaration on high-speed rail has been signed between the participating states.

Slovakia

Railway transport have the second highest share between modes in the Slovakia and also in the Žilina region. The offer of the railways services is enough in comparison with demand for this mode. There are not any section of the railway infrastructure with capacity problems. The city of Žilina is the intersection of the west-east and north south TENT-T corridors Baltic Adriatic and Rhine-Danube. In the Slovakia and also in Žilina region are the modernization of the railway tracks on the main corridors in progress.

TRITIA region

The analysis shows that there is under way a significant modernization of the railway infrastructure in the region, which will ensure compatibility with the whole of the European railway infrastructure, including the safety equipment and the unification of the power system. This compatibility will ensure a smooth transition across the EU afther the modernization is completed. By using a compatible infrastructure, it is possible to simplify the technical equipment of a railway locomotive with regard to the uniformity of the elements used and the elimination of the need for different systems, or a change of locomotive in the border crossing stations.

At present, it applies to all three countries that modernization is primarily carried out on the TEN-T corridors and is mainly financed by the EU funds. For this reason, the total execution time is prolonged, given the high requirements for quality of the project and the justification of all its parts. For this reason, modernization has been slower than is optimal and needs to be considered in the longer term for the completization of the entire TEN-T network in the concerned region. For the international railway transportation it is important that states complete the moderznization of the TEN-T corridors because most of the international connections is operated on this network. The modernization can support the growth of freight transport accompanied by the growth of intermodal transport, which is currently one of the fastest growing commodity in the freight railway transportation because of the flrexibility of this method.

In general, the main reason for prolonging the transit time in international traffic is the exchange of the train personnel and the train paperwork at the border (exchange point). At present, there are several factors that cause the train to stand unnecessarily on borders for hours up to days. The main factors are the availability of accepting carrier train stuff and the availability of locomotives. These major factors may be partially removed after the modernization of the railway infrastructure, as it will be possible to use the same locomotive on the whole route, but the delay may be due to the lack of train drivers. This factor can be partly eliminated by simplifying the process of permitting the driver to ride on new routes, whereby one person could drive the entire route without the need for additional personnel for crossing of the border. This factor has the character of carrier in-house problem and is dependent on set processes and control processes for targeting the optimum rotation of locomotives and crew in such a way as to eliminate train and wagon downtime. The optimalization of downtime of the trains is in the interest of all the carriers, because it reduces the cost for access package (track occupancy), decrease the wagon occupancy and demand, decrease the time needed for one circulation of wagon as only rolling wagon is makin money.