

## Abstract

# Potentials identification and vehicle concept for the cross-border traffic between Poland and VBB

Study within the INTERREG -Project InterRegioRail

Developed for:

**VBB Verkehrsverbund Berlin-Brandenburg GmbH**  
Hardenbergplatz 2  
10623 Berlin

Presented on 30.01.2012 by:

**ETC Transport Consultants GmbH**  
Martin-Hoffmann-Str. 18  
12435 Berlin

In addition to the often inadequate infrastructure also the lack of applicability vehicles of both sides of the border limits the transportation offer between Germany and Poland. In particular, modern locomotives can't be accepted in the neighbouring country without considerable effort. For passengers, this is connected with change on the border from a vehicle registered in Germany to an approved vehicle in Poland and vice versa. For the organizer and provider of cross-border connections, this leads to additional operating costs and it's one of the reasons for the poor transportation offer. As a result, there are only few trains passing the German-Polish border, which doesn't allow using the existing traffic potential.

In the past few years the infrastructure development has been a focus in the considerations of better cross-border traffic. Due to the high operation costs, the transport services also on modernised routes, such as between Berlin and Warsaw has not been extended. Therefore, operational issues, in particular the vehicles requirements, should be considered in the strategic plans for the expansion of cross-border connections.

The basis for the conception of the medium-and long-term transportation offer is generated by the following identification of potential traffic:

Corridor	Cross-border demand		
	2010	2014	2015
Berlin - Szczecin	600	700	1.800
Berlin - Kostrzyn - Gorzów Wlkp	850	1.000	1.000
Berlin - Frankfurt - Poznań / Zielona Góra	1.000	1.200	3.000
Cottbus - Guben - Zielona Góra	0	50	300
Berlin - Cottbus - Wrocław	150	400	800

Transportation offer has been developed on the basis of potentials investigation for the five corridors for the two time horizons 2014 and 2025 and derives the corresponding vehicle requirements. The transportation offer concepts in the medium-term horizon of 2014 are based on the existing transportation offer; new direct connections such as the one between Berlin and Wrocław are rather the exception. For long-term planning in 2025, however, entirely new transport services have been developed, which often result in appropriate infrastructure, such as the completed electrification between Berlin and Szczecin. For final consideration of possible synergy effects essential questions have been already considered in operation and vehicle concept:

- Standardization of cross-border vehicles fleet (2 or 3 vehicle types: 2 or 3-piece diesel railcar DMU-2/DMU-3, 3-piece electric railcar EMU-3)
- Legal and technical frameworks
- Demand for capacity and requirements for vehicle equipment
- Possible transition scenarios between 2014 and 2020/25 operational concepts

### **Berlin – Szczecin – Kołobrzeg**

The medium-term transportation offer concept with 9 pairs of trains daily doesn't differ substantially from the one in status quo. However, the number of direct connections between the Szczecin and Berlin can optionally increase from 3 to 4. Additionally two variants with the direct connection to Kołobrzeg have been examined.

In the long term after completion of electrification between Berlin and Szczecin ( $V_{max} = 120$  km/h or 160 km/h) the transportation offer can be extended and provide direct connection with the usage of electric railcars. This will consist of two products, which will run every two hours:

- Fast connection (IC or RE) Szczecin – Berlin Hbf – BER Airport
- RB Szczecin – Berlin Ostkreuz – BER Airport – Wünsdorf-Waldstadt

The travel times can be shortened significantly with the max speed of 120 or 160 km/h to:

- Szczecin – Berlin Hbf: IC/RE: 1:25 or 1:10
- Szczecin – BER Airport: IC/RE: 1:45 or 1:30; RB: 2:00 or 1:50

### **Berlin – Kostrzyn – Gorzów – Krzyż**

The medium-term transportation offer concept is based on the status quo, whereby the travel times on the Polish section can be shortened due to the reconstruction of a line. 3 or 8 pairs of trains with the direct connection in 2 variants have been provided. In a long term direct trains will run every two hours. The modernization of the German section and the introduction of RE will shorten travel times between Berlin and Gorzów to about 1:30 compared to 1:50 in 2014.

### **Berlin – Frankfurt – Poznań / Zielona Góra**

In the medium term service improvements due to the available infrastructure are based on the introduction of direct regional express trains<sup>1</sup> with two pairs of trains between Berlin and Warsaw in addition to other long-distance and regional connections. In particular, this will allow one day trips from Poznań to Berlin. In the long-term after the completion of line reconstruction, transportation offer is based on long-distance trains running between Berlin and Warsaw every 2 hours. The RE trains from Berlin to Poznań are not required anymore and the vehicles could be implemented to support the traffic between Berlin and Zielona Góra. Prerequisite for an attractive offer every four hours is the modernization of the CE-59 corridor, which will reduce the travel times to 1:55 (120 km / h) or 1:45.

### **Cottbus – Guben – Zielona Góra**

In the medium-term, the passenger traffic between Cottbus and Zielona Góra can be reactivated but due to the long travel times (1:30) and the planned offer with only two pairs of trains, the demand effect remains small. In the long-term after reconstruction of the line, travel times are reduced by about 15 minutes, but even introduction of trains running every 2 hours doesn't change the fact that demand remains small comparing to the other border crossings.

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<sup>1</sup> Alternatively, two long-distance trains based on the pairs of trains of EC from Berlin to Gdańsk, which should begin operation in summer 2012 and allow the journey from Berlin to Gdańsk with a possibility to return at the same day.

## Berlin – Cottbus – Wrocław

Between Berlin and Wrocław in the short term the introduction of two additional direct trains with a usage of diesel railcars has been proposed. The travel times, depending on the route (via Spremberg - Bielawa Dolna, Spremberg - Görlitz and forestry - Żary) amount to 3:55 - 4:20 and is therefore 1 hour shorter in all variants than the current travel times of EC "Wawel". Additional connecting/disconnecting of trains in Węglińiec allows combining the transportation offers: Berlin-Wrocław and Dresden-Wrocław and make both more profitable.

The first electric powered direct trains between Berlin and Wrocław via Cottbus and Hoyerswerda can be offered from 2016, after completion of the electrification of the section Knappenrode - Horke - Bielawa Dolna. The travel times between Berlin and Wrocław is around 3:45, by further modernization of sections to a max speed of 160 km / h this could be shortened to around 3:30.

## Cottbus – Forst – Żary – Żagań – Legnica

Due to the relocation of long-distance trains in the medium-term on the route via Hoyerswerda, the route via Cottbus - Forst - Żary - Żagań - Legnica would be primarily of (inter)regional importance. Therefore, the introduction of a direct regional express between Cottbus and Legnica is proposed in which the existing line OE 46 Cottbus – Forst would be extended to Legnica. Travel times are about 2:30 at the current state of infrastructure. With the modernization up to 100 km/h travel times can be shortened to about 1:45

## Total vehicle requirements and operating costs (medium and long term)

The regional rail transportation offer concept between Berlin / Brandenburg and Poland includes:

Corridor	Medium-term				Long-term			
	Pairs of trains p.d.	Train kilometre p.a.	Vehicle requirements		Pairs of trains p.d.	Train kilometre p.a.	Vehicle requirements	
			Type	No.			Type	No.
Berlin - Szczecin ( - Kołobrzeg)	9	940.000	DMU-3	5	9	1.940.000	EMU-3	4
Berlin - Kostrzyn - Gorzów - Krzyż	8	1.730.000	DMU-3	6	8	2.440.000	DMU-3	7
Berlin - Frankfurt - Poznań	2	380.000	EMU-3	2	-	-	-	-
Berlin - Frankfurt - Zielona Góra	0	-	-	-	4	520.000	EMU-3	3
Cottbus - Guben - Zielona Góra	2	150.000	DMU-2	2	7	500.000	DMU-2	3
Berlin - Cottbus - Wrocław	2	510.000	DMU-2	2	-	-	-	-
Cottbus - Żary - Legnica	-	-	-	-	8	910.000	DMU-2	3

## Possible synergies with other regional rail networks

Presented above vehicle requirements takes into account all cross-border regional rail lines between Brandenburg and Poland. Furthermore, additional synergies by linking with other cross-border regional rail transportation offers are possible:

- Lübeck / Schwerin – Neubrandenburg – Pasewalk – Szczecin; DMU-2 or DMU-3
- Dresden – Görlitz – Wrocław; DMU-2 or DMU-3
- Dresden – Görlitz – Jelenia Góra; DMU-2 or DMU-3