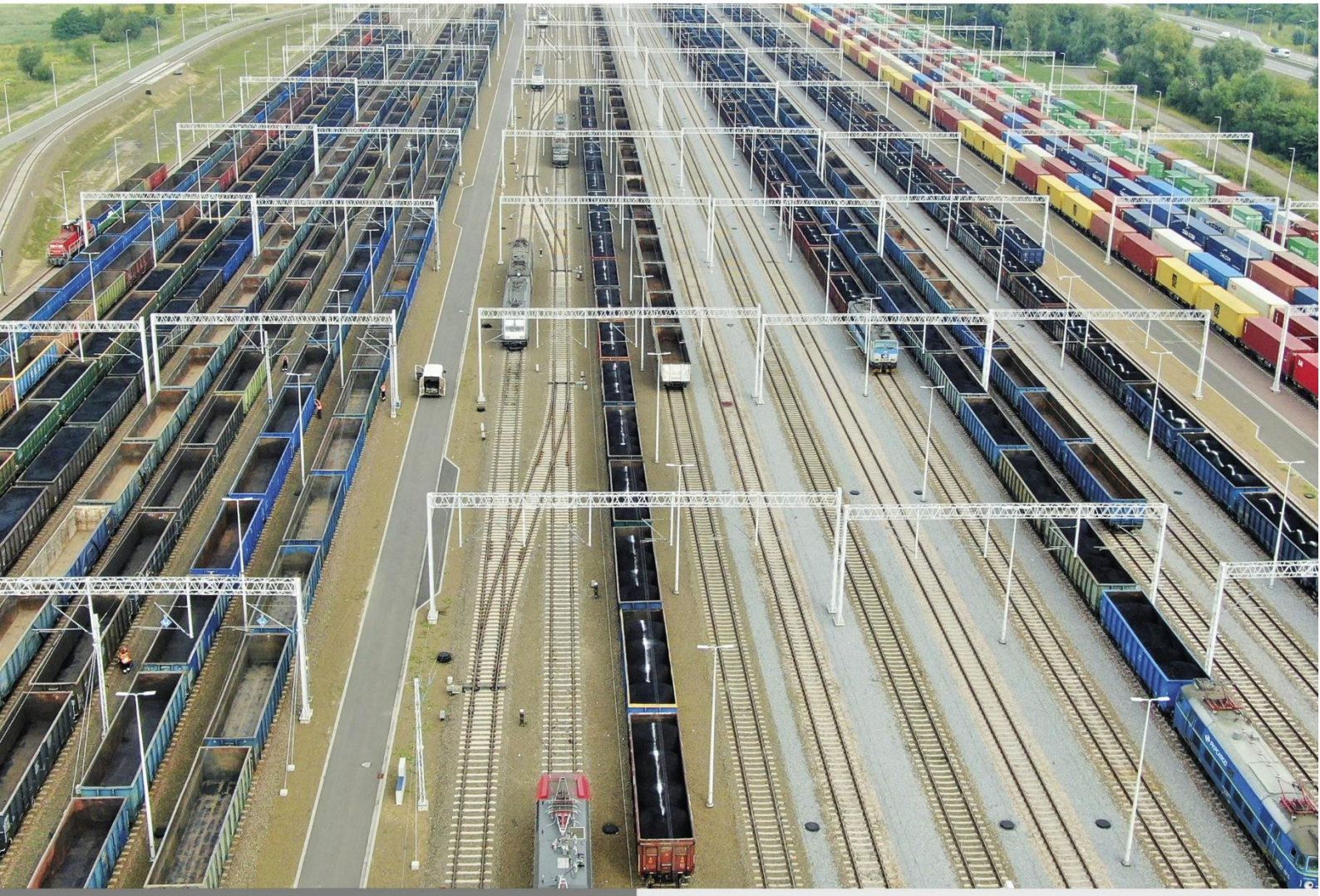
Rail Freight Corridor
North Sea – Baltic



Implementation Plan

Update 2023

Funded by
the European Union

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1.Introduction

Rail Freight Corridor North Sea – Baltic (RFC NS-B) became operational on the 10th of November 2015 according to Regulation (EU) 913/2010 of the European Parliament and of the Council of 22 September 2010 concerning a European rail network for competitive freight (hereinafter: the Regulation). Over the years the Corridor was gradually extended to Riga and Tallinn (October 2020) and to Medyka and the ports of Gent (Terneuzen) and Zeebrugge in January 2022.

The last update of the Implementation Plan dates back to January 2022. This version is a regular update, as foreseen by the Regulation, and not related to any changes in routing. The focus of the update 2023 is on:

- Update of the infrastructure parameters maps,
- Bottleneck analysis and capacity management plan update,
- Setting the corridor objectives with the target values,
- Update of the Investment Plan,
- Update of the ERTMS Deployment Plan.

The update was elaborated by the Management Board according to the RNE Corridor Information Document Common Texts and Structure. It was consulted with the stakeholders and was approved by the Executive Board of RFC NS-B on 13 December 2023.

2. Corridor Description

RFC NS-B runs through 8 Member States of the European Union: starting in the North Sea ports of Zeebrugge, Antwerp[1], North Sea Port (Gent/Terneuzen), Rotterdam, Amsterdam, Wilhelmshaven, Bremerhaven and Hamburg spreading into central Germany through Aachen – Hannover/Magdeburg/Berlin to Warsaw and the Polish-Belarus border in Terespol. A branch leads from Magdeburg to Prague via Falkenberg and Dresden. In Falkenberg starts the Southern branch in Poland to Wrocław, Katowice and Medyka. Another branch leaves from Poznań to Kaunas and to Riga and Tallinn.

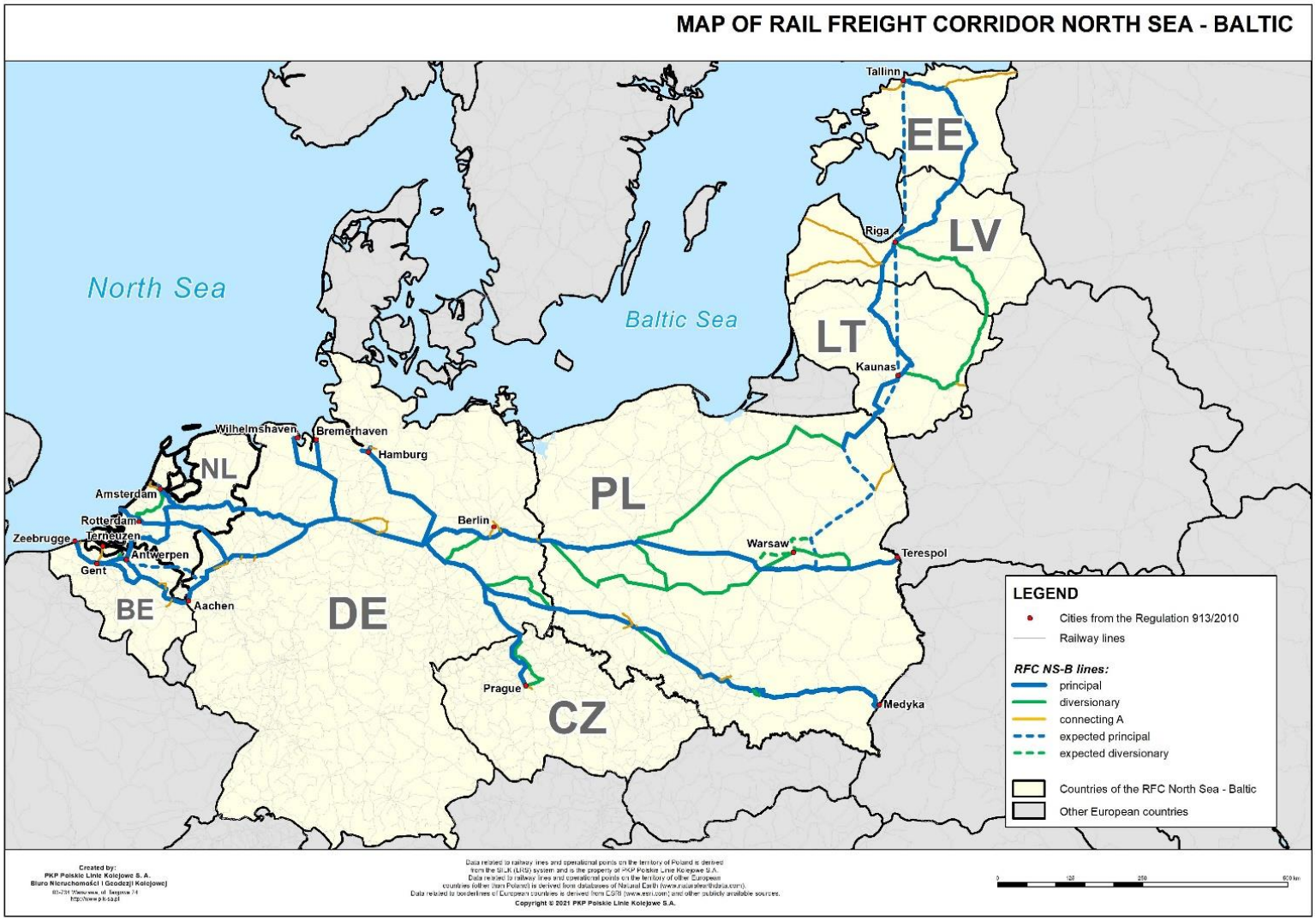
The designated railway lines of RFC NS-B are divided into:

1) Principal lines (on which Pre-arranged Paths (PaPs) are offered);
2) Diversionary lines (on which PaPs may temporarily be considered in case of disturbances, e.g. long-lasting major construction works on the principal lines);
3) Connecting lines: lines connecting the Corridor lines to a terminal (on which PaPs may be offered but without obligation to do so);
4) Expected lines, i.e. any of above-mentioned which either are planned in future or under construction but not yet completely in service. Expected line can also be an existing line which shall be part of the RFC in the future.

The current lines of the Corridor can be seen in Figure 2.1.

[1] In April 2022, the ports of Antwerp and Zeebrugge merged into the port of Antwerp-Bruges.

Figure 2-1: Current map of RFC North Sea – Baltic



Additional extensions are foreseen for the future. A description can be found below.

Proposed extensions

On the request of Latvia, the Management Board analysed and consulted with applicants the proposed extension from Krustpils to Rezekne to be included as principal line and the status change of the line from Riga via Krustpils to Daugavpils, from diversionary to principal line. The Executive Board issued a Letter of Intent on the 28th of January 2021. Until now, no answer was received from the European Commission. These lines are not yet officially part of the routing of RFC NS-B, but are shown in **Figure 2-2** as "proposed extensions".

Operational extensions

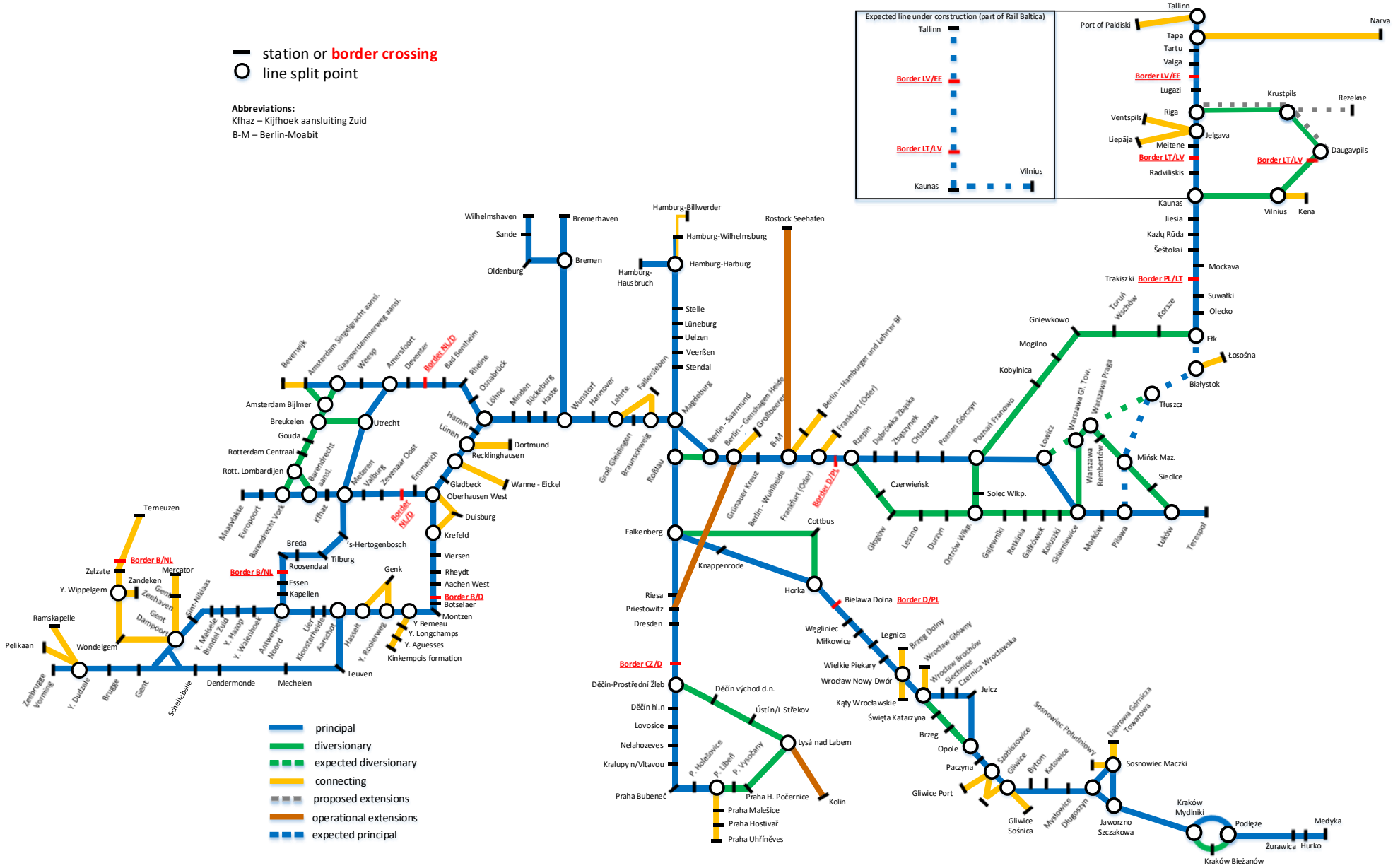
In view of the offer and allocation of capacity on overlapping sections, RFC NS-B decided together with RFC Orient/East-Med on an operational extension of RFC NS-B between Dresden and Rostock and between Lysá na Labem and Kolin.

These operational extension lines are not included into the RFC NS-B routing, but the Corridor One-Stop-Shop (C-OSS) of RFC NS-B is responsible for allocation/capacity management on these sections. These sections can be seen in **Figure 2-2** as "operational extensions", but are not officially part of the Corridor.

Both proposed and operational extensions are shown for information purposes only. In the following chapters of the Implementation Plan these lines will not be shown.

The Iron Rhine is mentioned as an expected principal line of RFC NS-B. In the case (political) decision making on the Iron Rhine is executed, and the Iron Rhine would be reactivated, then the status will be principal line. The projected line is not included in Figure 2-2 nor in the other graphs of the Implementation Plan.

Figure 2-2: Possible future extensions of RFC North Sea-Baltic and operational extension

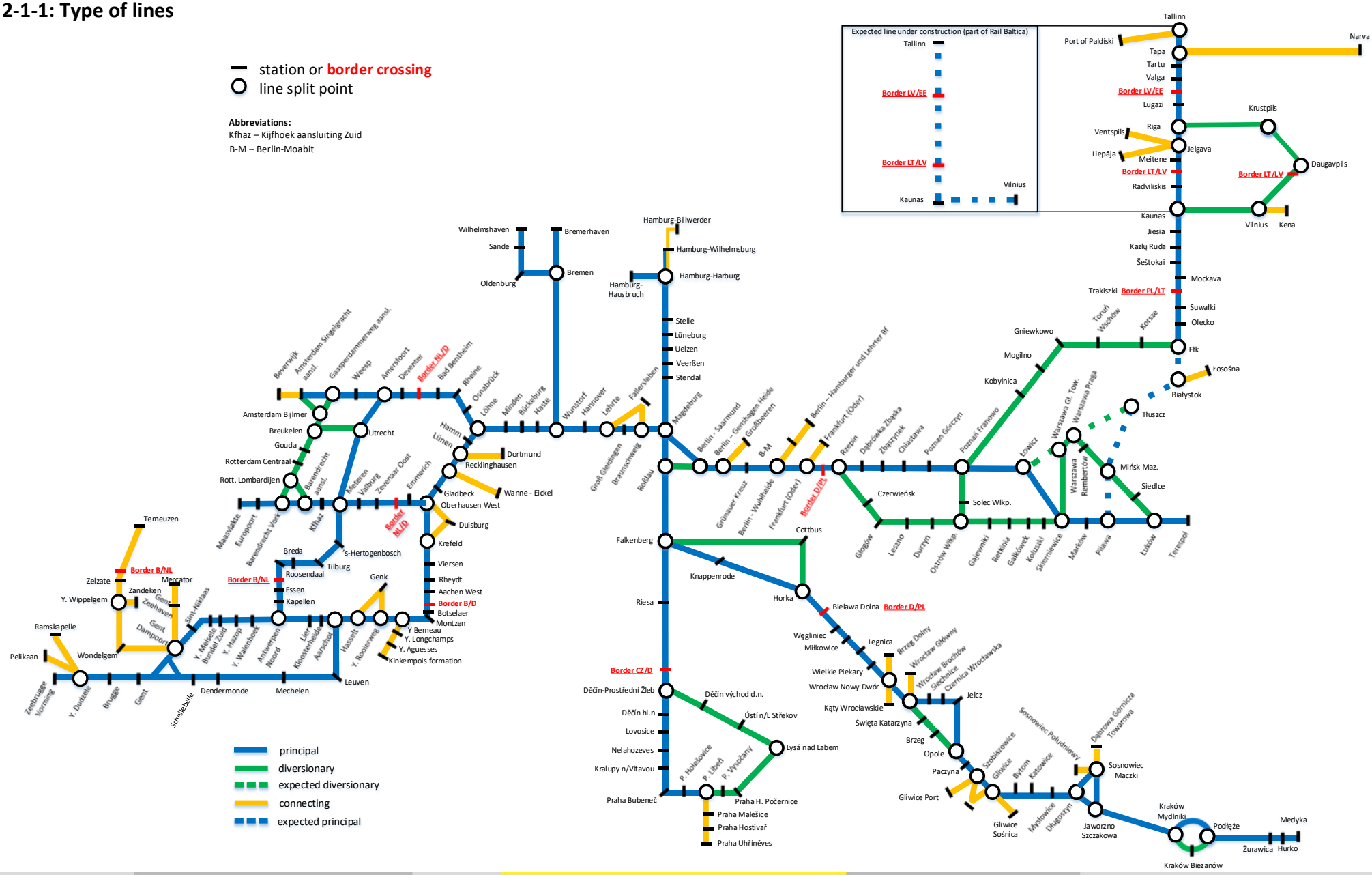


2.1 Key Parameters of Corridor Lines

Figure 2-1-1 shows the type of lines that are currently part of RFC NS-B (without proposed and operational extensions).

RFC NS-B has 9 680,08 km of lines in total, of which 5 252,88 km principal lines, 2 576,30 km diversionary lines, 890,47 km connecting lines and 960,43 km expected principal and expected diversionary lines.

Figure 2-1-1: Type of lines

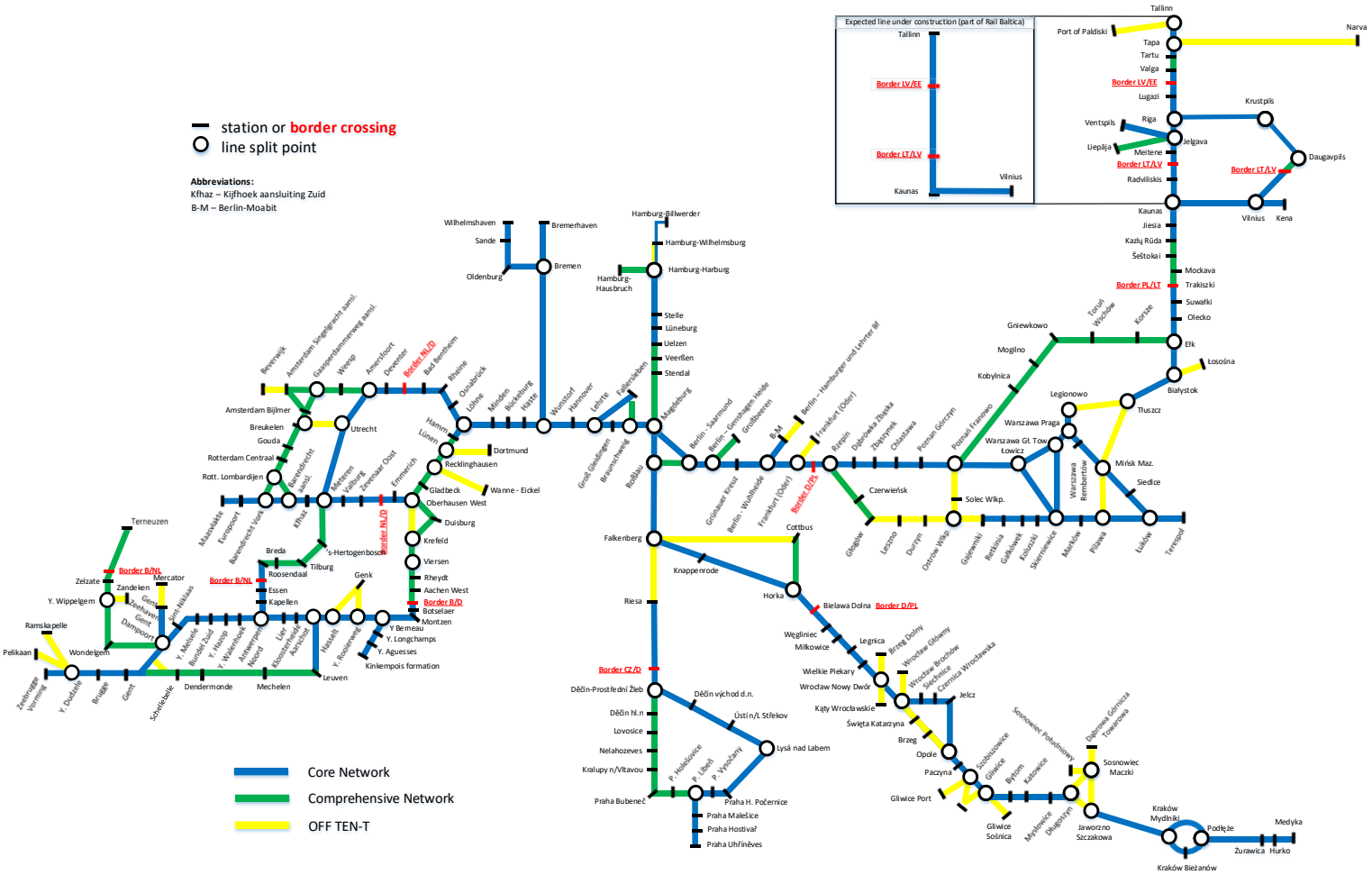


2.1.1 Infrastructure parameters

Figures 2-1-2 to 2-1-8 show several infrastructure parameters of the lines belonging to RFC NS-B (situation June 2023):

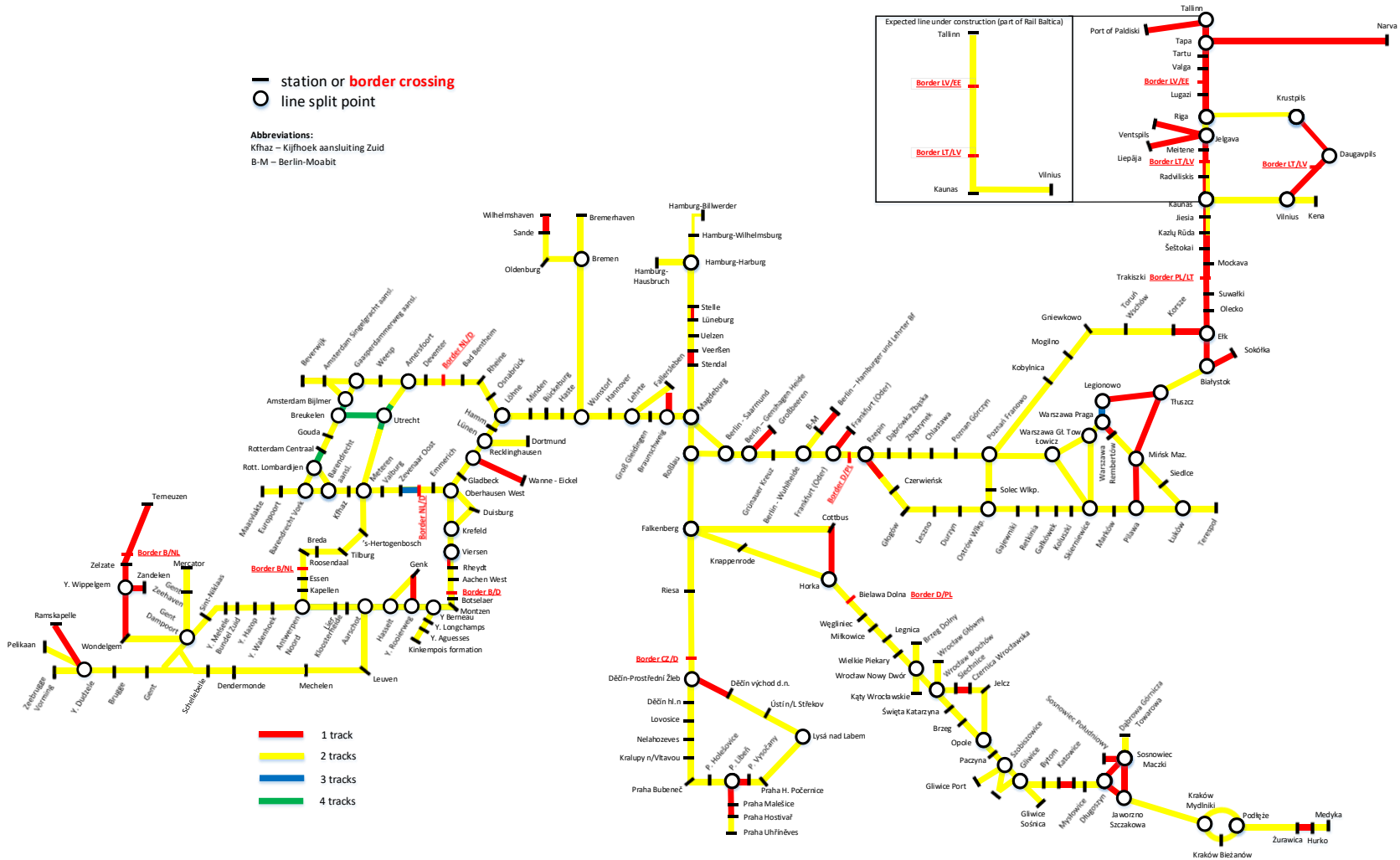
- Type of network (Figure 2-1-2)
- Number of tracks (Figure 2-1-3)
- Type of power source (Figure 2-1-4)
- Max train length (Figure 2-1-5)
- Axle load (Figure 2-1-6)
- Max line speed (Figure 2-1-7)
- Profile and loading gauge (Figure 2-1-8).

Figure 2-1-2: Type of network according to Regulation (EU) 1315/2013



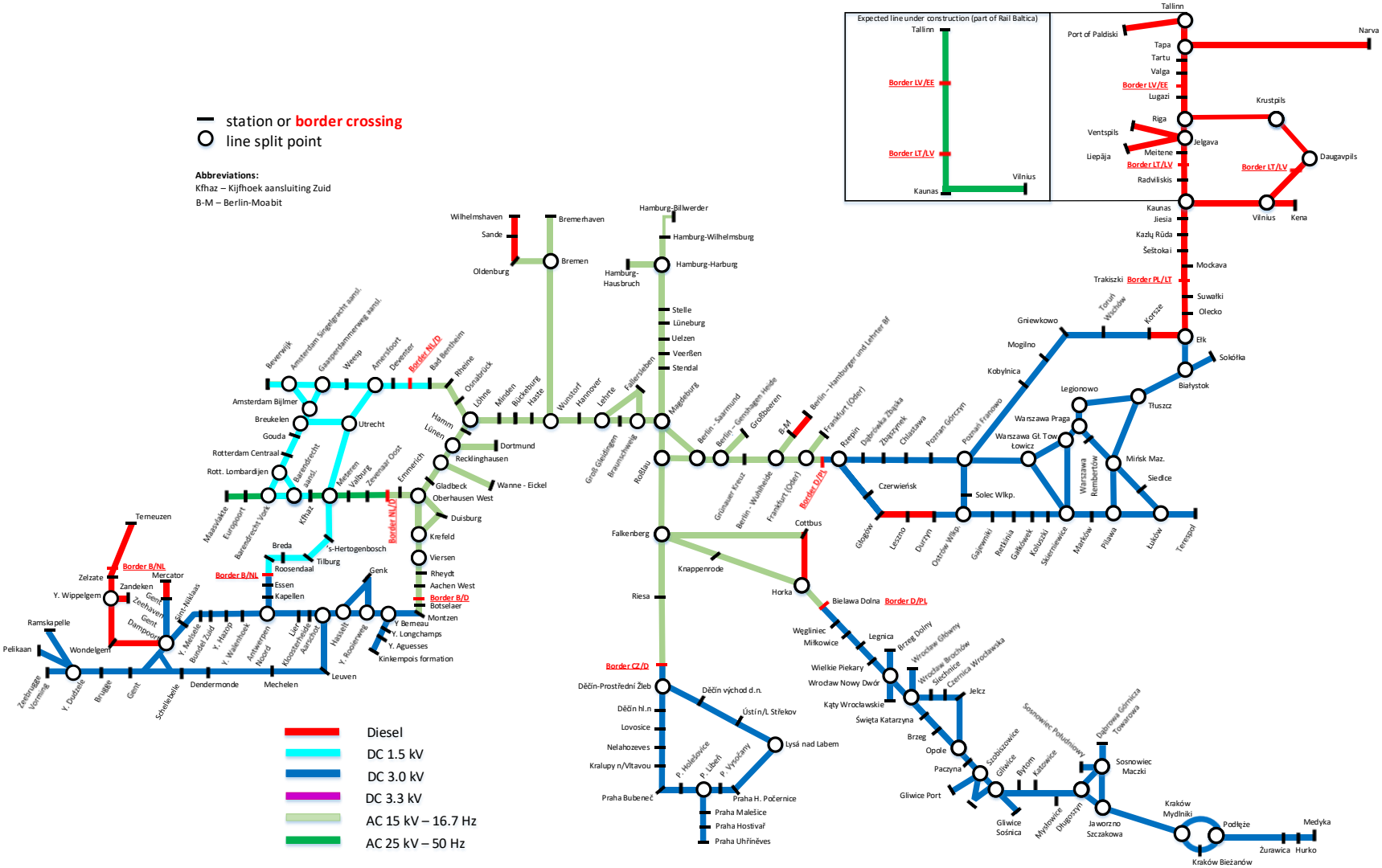
The majority of the corridor lines (principal/diversionary lines) are part of the TEN-T core network. However, there are a number of lines that belong to the TEN-T comprehensive network. In a few cases, the lines are out of the TEN-T network (this mainly concerns connecting lines).

Figure 2-1-3: Number of tracks



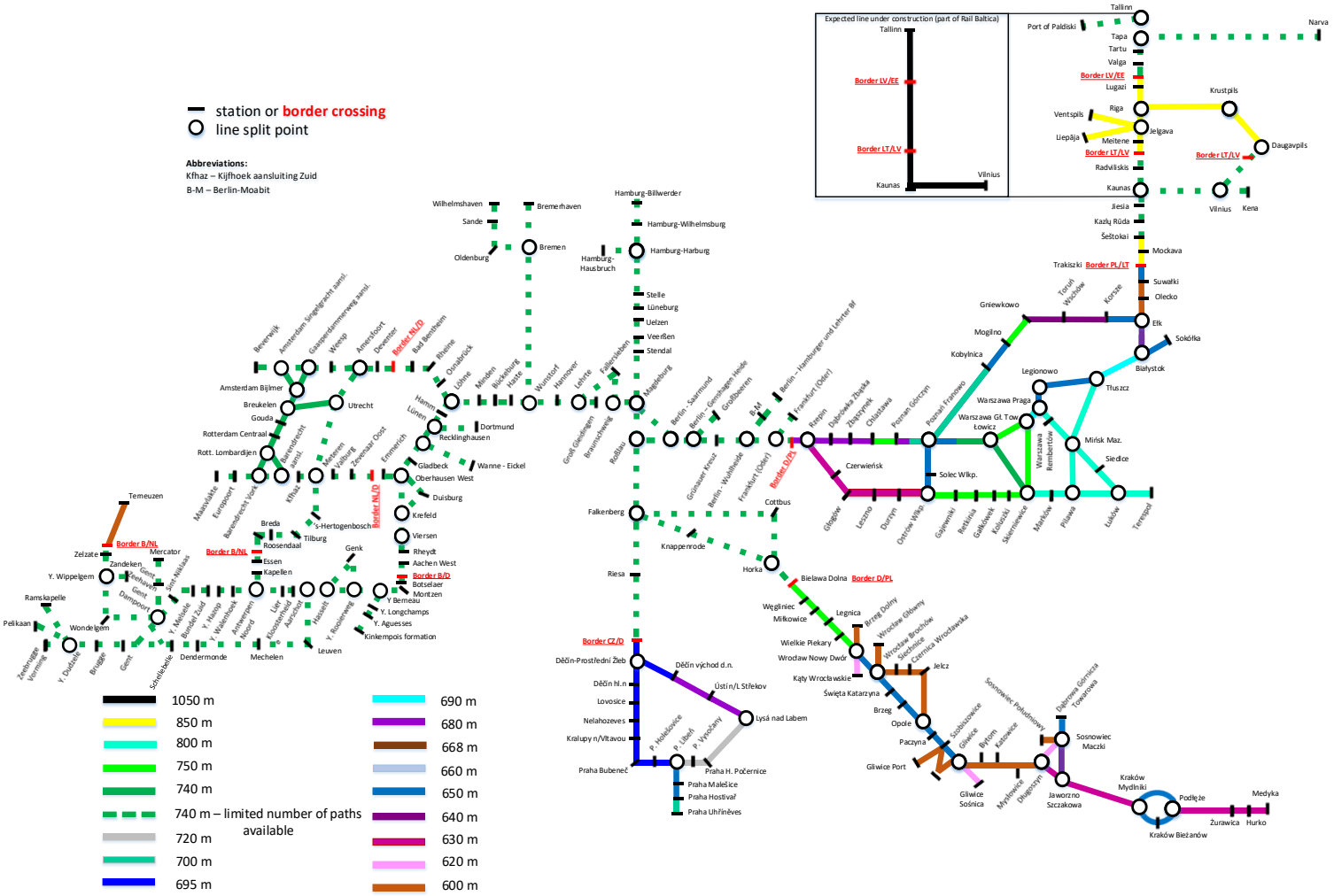
The majority of the corridor lines are double track lines. The biggest part of the 1520mm network is single track.

Figure 2-1-4: Type of power source



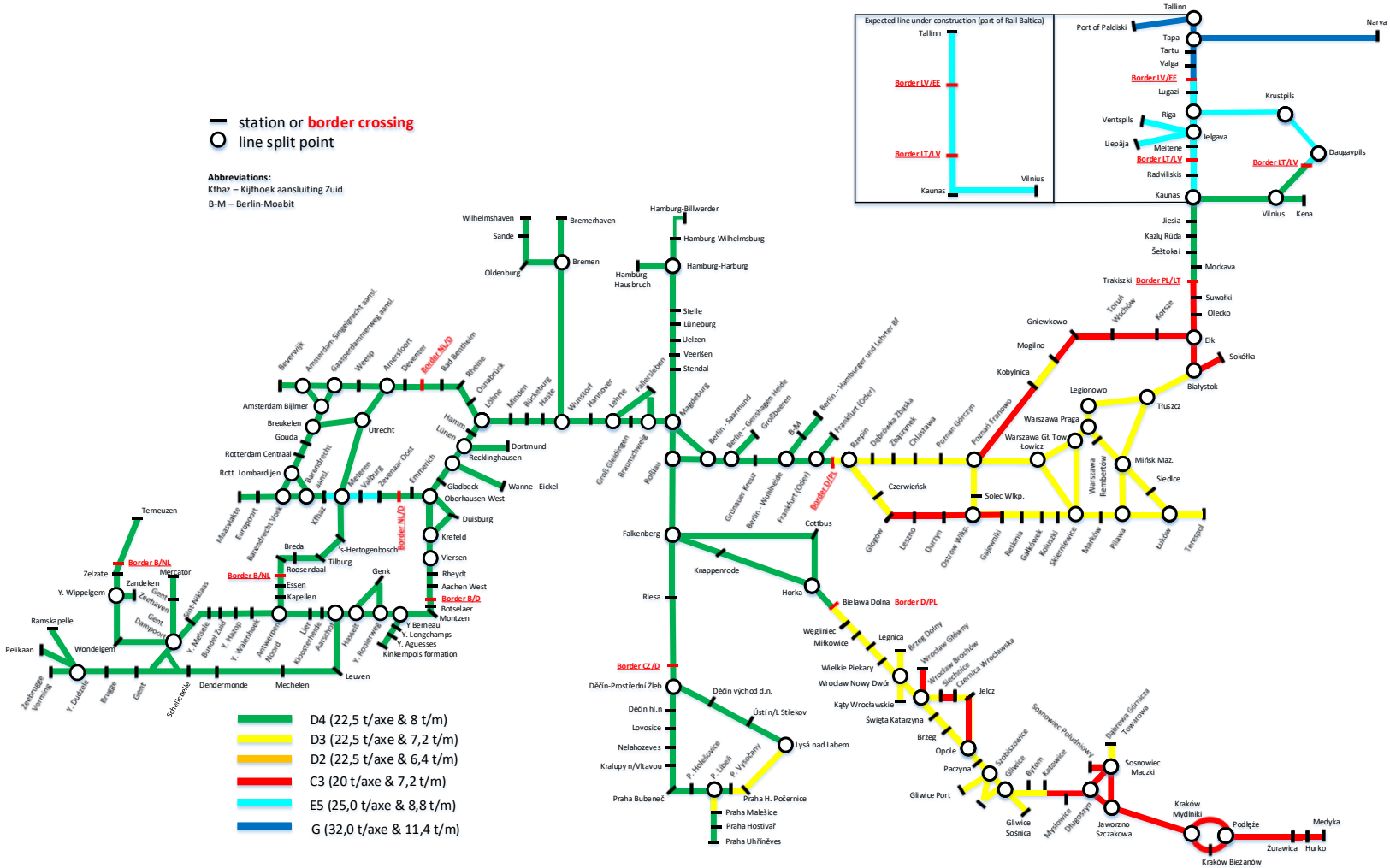
Almost each country has a different voltage and frequency value. The 1520 mm network is not electrified.

Figure 2-1-5: Maximum train length



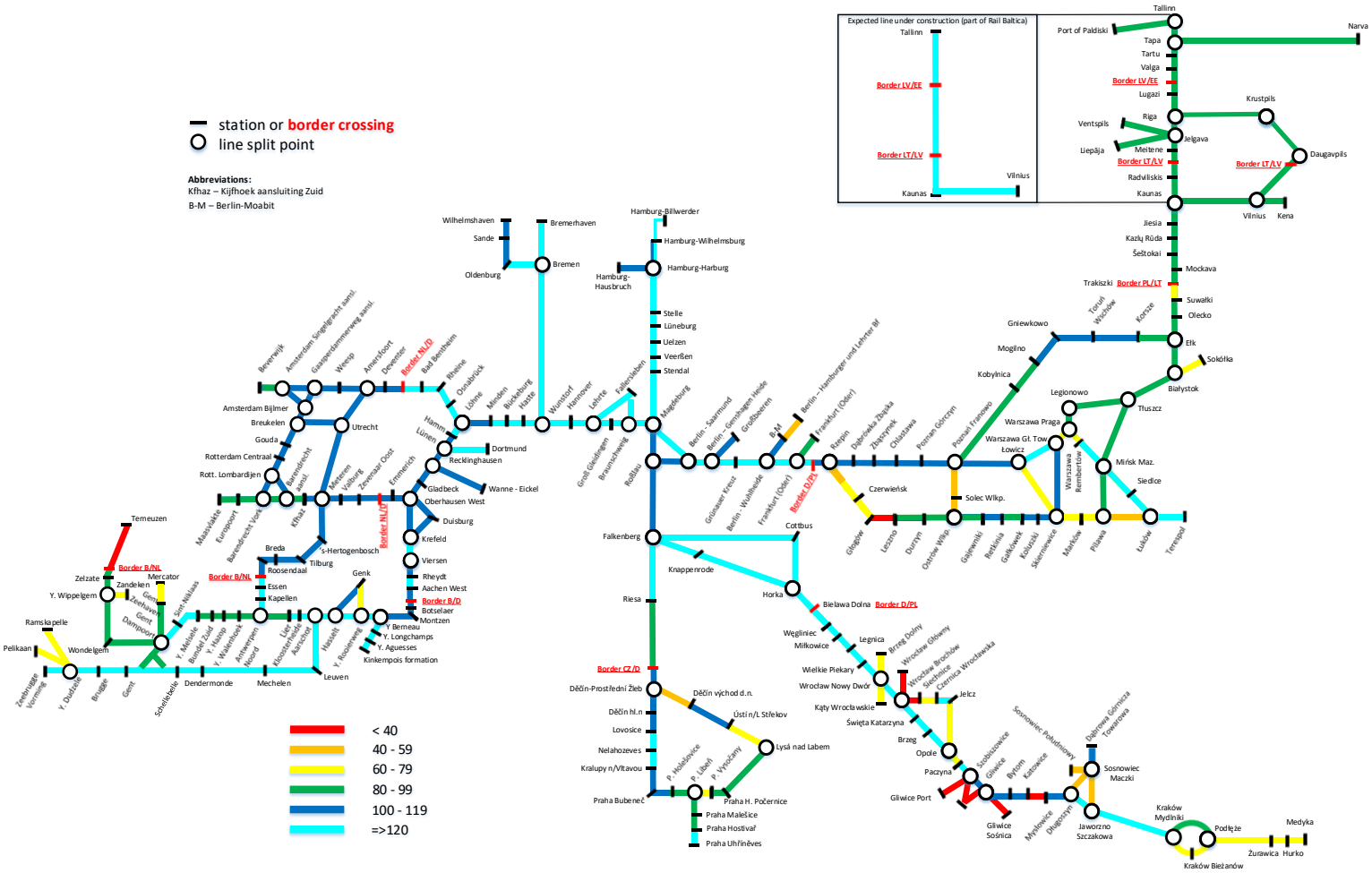
The maximum train length on the corridor lines varies from 1050 m to 600 m. At the moment of writing the Implementation Plan, journeys for 740 m trains on the entire corridor without restrictions are not possible, except for Latvia. In BE, the length of freight trains is limited in principle to 750 m inclusive of traction units. The infrastructure manager's agreement must always be sought for any train longer than 650 m.

Figure 2-1-6: Axle load



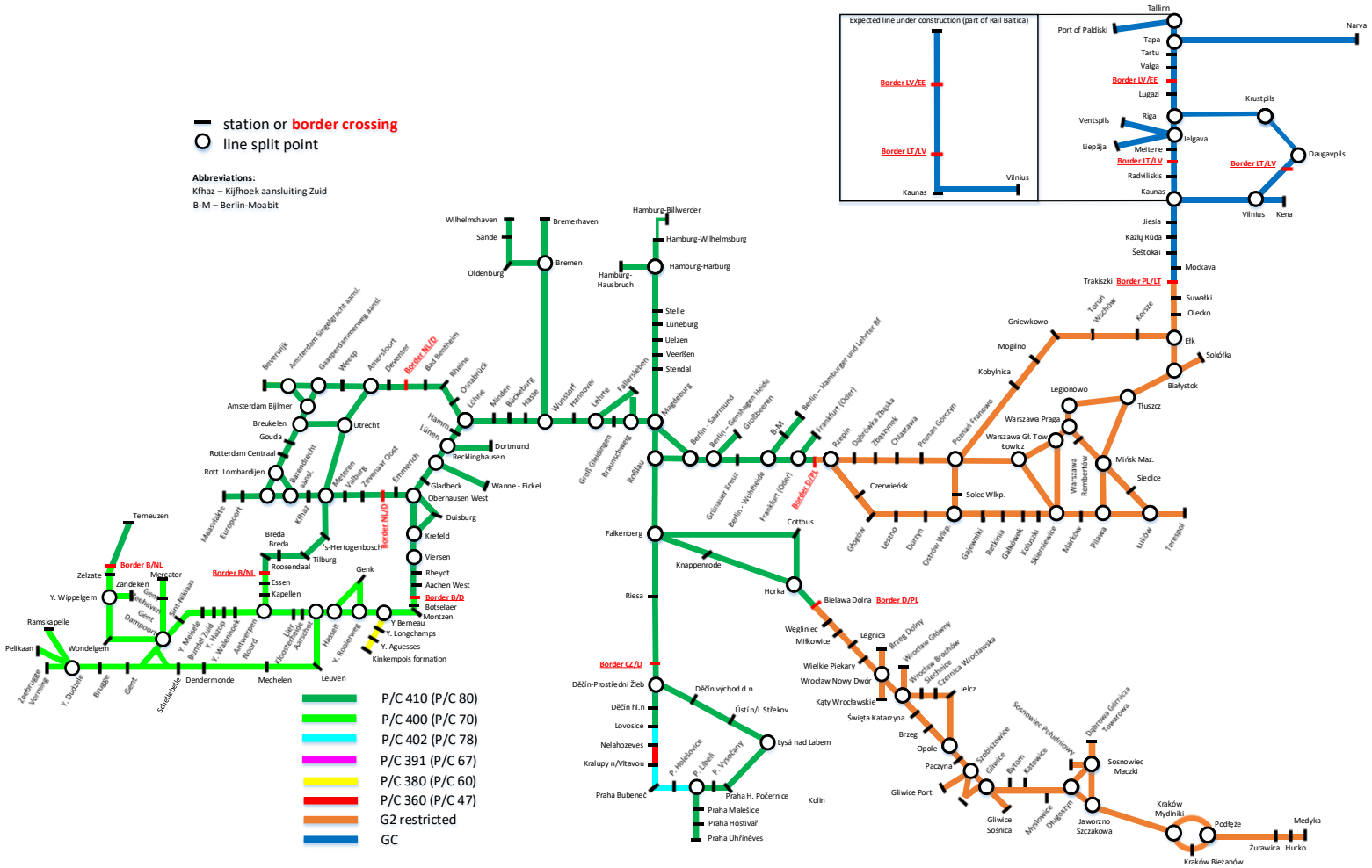
In the major part of the Corridor the allowed axle load is 22.5 t and meter load is 8 t, whereas the possibilities in Poland are more restricted. On the other hand in Latvia the axle load is 25 t and in Estonia even 32 t.

Figure 2-1-7: Max line speed



In the majority of the Corridor, the allowable maximum speed on lines for freight trains is 100 km/h or more except in certain regions where the speed is limited down to 40 km/h. For most of the sections there is no difference between values for odd and even direction apart from certain sections where the difference is relatively small. Maximum speed of freight trains on the 1520mm network is significantly lower than on the 1435mm network, mostly due to single track for mixed train operation (passenger and freight).

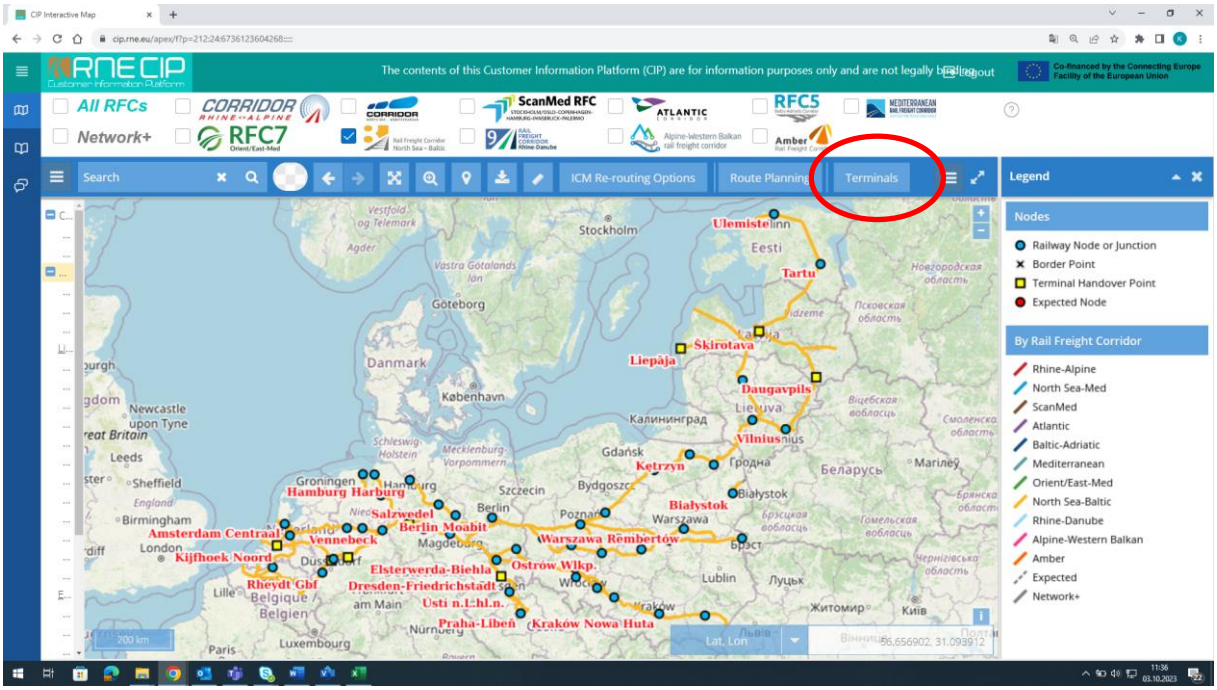
Figure 2-1-8: Profile and loading gauge



For the purpose of describing the loading gauge, the parameters given in the IM network statement were used (except Poland), i.e. Belgium and Germany – the profile parameter, the Netherlands, Lithuania, Latvia and Estonia – the loading gauge parameter.

2.2 Corridor Terminals

According to the requirements of the Regulation, the list of terminals is provided in the Corridor Information Document (CID). The CID is updated annually per TT period. More detailed information on terminals can also be found in the Customer Information Platform (CIP) link.



According to the Commission Implementing Regulation (EU) 2177/2017, rail service facility operators such as terminal operators have the legal obligation to publicly provide detailed information on their infrastructure and services. A possible way to be compliant with this regulation is to provide the required information using the Rail Facilities Portal (link). RNE and RFC NS-B support the use of the Rail Facilities Portal as joint source.

2.3 Bottlenecks

For this update of the Implementation Plan, bottlenecks were identified according to the following methodology provided by the Infrastructure Managers. The investments solving some of the bottlenecks are listed in Chapter 6.2.

Belgium (Infrabel)

Calculation for traffic forecasts:
The development is forecasted based on the expected increase/decrease of freight and passenger traffic. The calculation is based on the current rate of occupancy which is increased/decreased according to the expected traffic development.

For freight, the forecast is based on the assumption that traffic will increase by 50% until 2030.

Freight and passenger traffic are forecasted separately until 2030. No separate forecast for nodes.

Calculation basis for the definition of (potential) bottlenecks:
Rate of occupancy of the lines / nodes and the subsequent remaining capacity. The remaining capacity results from the comparison of the theoretically available capacity and the expected used capacity.
The Infrabel calculation method takes into account all trains (freight and passenger) on the different sections of the network. It makes a mix of all possible variations, determines for each variant the rate of occupancy and calculates the average rate of occupancy.

A section is considered as a bottleneck when the remaining capacity is < 25%.
A node is considered as a bottleneck when the remaining capacity is < 40%.

A section or node is considered to be a potential bottleneck when the remaining capacity is close to the bottleneck threshold (25% for sections, 40% for nodes).

The following **potential** bottlenecks were identified until 2030:

1. Between Antwerp and Gent: section from Sint Niklaas – Lokeren – Y. Bernadette
2. Antwerp region: Y. Driehoekstraat / Y. Schijn / Y. Walenhoek / Y. Holland
   Y. Antwerpen Schijnpoort / Y. Drabstraat
3. Section Y. Aubry – Lier – Y. Nazareth
4. Gent region: Gent Dampoort / Y. Oost Driehoek Ledeberg / Y. West Driehoek Ledeberg
   Y. Noord Driehoek Ledeberg / section Y. Melle – Y. Melle West

5. Aarschot region: section Y. Nazareth - Y. Noord Driehoek Aarschot
   section Y. Noord Driehoek Aarschot - Y Zuid Driehoek Aarschot
   section Y Zuid Driehoek Aarschot – Y. Holsbeek
   section Y. Noord Driehoek Aarschot - Diest
6. Section Tongeren – Y. Rooierweg

As Figure 2.3.1 only shows the current bottlenecks, these potential bottlenecks in 2030 are not shown.

Capacity calculation and forecast for specific parameters

740m trains:

The length of freight trains is limited in principle to 750 m inclusive of traction units. The infrastructure manager's agreement must always be sought for any train longer than 650 m. The allocation of the train path will then be based on the characteristics of the infrastructure and robustness.

In order to comply with the TEN-T requirement of enabling 740m trains to run on the TEN-T core network lines (Art. 39, Regulation 1315/2013) without timetable/operational restrictions by 2030, several projects were already launched, mainly in the frame of larger projects and some of them with CEF support. In addition, Infrabel started in December 2020 a specific study to identify locations where investments in side tracks are essential to allow 740m trains without restrictions. Apart from the existing and already planned side tracks, 12 additional locations were identified and prioritised. These are the minimum side tracks to be provided on the Belgian rail network. Several of these identified locations are also located on RFC NS-B.

The aim is that, if all these projects are realised, a quality train path 24/7 can be offered for 740m trains on the freight lines of the core TEN-T network and some RFC lines. This goal is also supported in the Rail Vision 2040 and the subsequent action plan for rail freight of the Minister of Mobility.

The identified projects were also taken into consideration in the Performance Contract between the Belgian Government and Infrabel, signed in December 2022, and in the Multi-Annual Investment Plan 2023 – 2032.

Influencing factors on infrastructure projects to eliminate (potential) bottlenecks

- Cost benefit analysis
- Availability of funding
- Priorisation according to TEN-T status of line:
  - Stretch on RFC Network and TEN-T core network: obligations for infrastructure development by 2030 (high priority)
  - Stretch on TEN-T comprehensive network: obligations by 2050 (lower priority)

- Stretch does not lie on TEN-T network: reduced priority (lowest priority).

For TT2023, no infrastructure was declared congested on RFC NS-B lines in Belgium.

Netherlands (ProRail)

		ProRail
Definition of (potential) bottlenecks	Calculation basis for the definition of (potential) bottleneck	For dedicated freight nodes, shunting yards and switches: number of overloaded hours For all lines: Do the predicted number of freight trains fit in the Basic Hour Pattern (BUP)

	Evaluation criteria for the definition of (potential) bottleneck	For dedicated freight nodes, SYs and switches: number of overloaded hours
		• Potential bottleneck: 10-25 overloaded hours
		• Bottleneck: > 25 overloaded hours
		
		For all lines: BUP
		• Utilization of the available Cargo Freight paths
		  ○ < 50% - 75% potential bottleneck,
		  ○ >75% bottleneck

Calculation of Traffic Forecast	Principles of traffic forecasts	The initial Netherlands-wide forecast on the development in all sectors including transport is provided by the Central Planning Bureau and the Netherlands Environmental Assessment Agency. The development for cargo trains is presented in a matrix covering the various scenarios. With the NEMO model, the number of trains needed for the transport of the forecasted cargo is calculated. Several scenarios are available for the number of trains on the different routes for several years, e.g. assessment of % of 740 m trains, different routing to the border etc.
	Separate forecasts for passenger and freight traffic available	Yes
	Separate forecasts for capacity on	No

	lines and in nodes available	
	Current time frame for traffic forecasts	2030-2040-2050

Calculation of Available Capacity	Calculation method for determining the available capacity	Calculation of overloaded hour for dedicated freight nodes, SYs and switches: • Demand: Realization data for ± ½-1 year are increased with the forecasts + further factors • Available capacity: infra-layout, headway time calculation; Assessment if number of trains can be processed in 48 min at the railway yard outcome: number of overloaded hours = cargo trains that can‘t be handled in 48 min (80%) + infra-layout Calculation of basic hour pattern (BUP) for all lines (including Havenspoorlijn and Betuweroute A15): • Determination of demanded number of train paths/h (per train type) based on forecast • Construction of BUP • Check of feasibility with simulation model “Open Track” • ProRail adaption proposals if BUP is not feasible • Bottleneck applies, if adaption proposal is not acceptable utilization of the available BUP paths for cargo trains in %; as soon as it exceeds 75%, there is a bottleneck.
	Separate calculation for passenger and freight traffic available	Yes

	Separate calculation for capacity on lines and in nodes available	Yes • All Lines = BUP • Nodes, shunting yards, or switches for freight trains = Overloaded hours

Capacity calculation and forecast for specific parameters	Capacity Calculation and forecast for specific parameters	740m trains: • For every train type ProRail has determined a feasible maximum train length. • The number of tracks on shunting yards are calculated for every type of train based on forecasts of each train type + scenarios with the growth of 740 m trains
Influencing factors on infrastructure projects to eliminate bottlenecks	Influencing factors on infrastructure projects to eliminate bottlenecks	• Social cost-benefit analysis > 1 (most important factor) • International agreements • Legal obligations • Available budget • (Local) government wishes with budget

Germany (DB Netz)

Insufficient operational quality is an expression of excessive charge and is not acceptable in the long term. This range is therefore outside of the performance range to be aimed for. Charged systems that work in this area are an indicator of bottlenecks and possibly to be explained "overloaded railways or future overloaded railways".
“Overloaded railways or future overloaded railways” are defined as local and timely permanent bottlenecks (actually or in future) and have to be defined jointly by IM and Member State. In a next step a plan for increasing capacity has to be worked out and planning and financing must be agreed.

Czech Republic (SZCZ)

Správa železnic considers as a bottleneck every infrastructure parameter, which is non-compliant with the TEN-T requirements and loading profile, which does not meet the value of P400. Správa železnic considers lack of capacity as an operational bottleneck. The requirements are following:

- Electrification,

- Axle load of at least 22.5 t,
- 100 km/h speed,
- Loading profile P400, (especially not met in Nelahozeves´ tunnels).

TEN-T parameters not considered as a bottleneck until 2030:

- Possibility of running trains with a length of 740 m – technically possible, but prohibited by CZ Regulatory Body.
- ERTMS full deployment – implementation ongoing, 2030 deadline to be fulfilled.

In Czech Republic, there is no infrastructure declared congested in 2023 on RFC NS-B and not considered as a bottleneck.

Poland (PLK S.A)

Bottleneck is defined in PLK S.A. as a physical, technical or functional barrier which leads to a system break affecting the continuity of long-distance or cross-border flows and which can be surmounted by creating new infrastructure, or substantially upgrading existing infrastructure, that could bring significant improvements which will solve the bottleneck constraints. According to this definition, all sections that do not meet the TEN-T requirements are bottlenecks.

In Poland, there is no infrastructure declared congested in 2023 on RFC NS-B and not considered as a bottleneck.

Lithuania (LTG Infra)

Bottleneck definition within LTG Infra is driven by the operational usage of the network by the mixed passenger/freight traffic. By assessing the capacity requests from operators the infrastructure manager generates a timetable; any segments where the requested capacity is not accommodated due to timetabling is considered a bottleneck.
The potential capacity assessment for specific routes is done manually on annual basis based on freight operator and passenger service requests, once the traffic is scheduled the bottlenecks are identified and registered.
In Lithuania, there is no infrastructure declared congested in 2023 on RFC NS-B and not considered as a bottleneck.

Latvia (LDz)

The definitions of a bottleneck is considered when at a certain moment it is not possible to pass trains according to the schedule. The number of tracks and the trains on Latvian railways

allows to say that there are no bottlenecks on the Latvian railways. There is a reserve of capacity to handle additional trains.
In Latvia, there is no infrastructure declared congested in 2023 on RFC NS-B and not considered as a bottleneck.

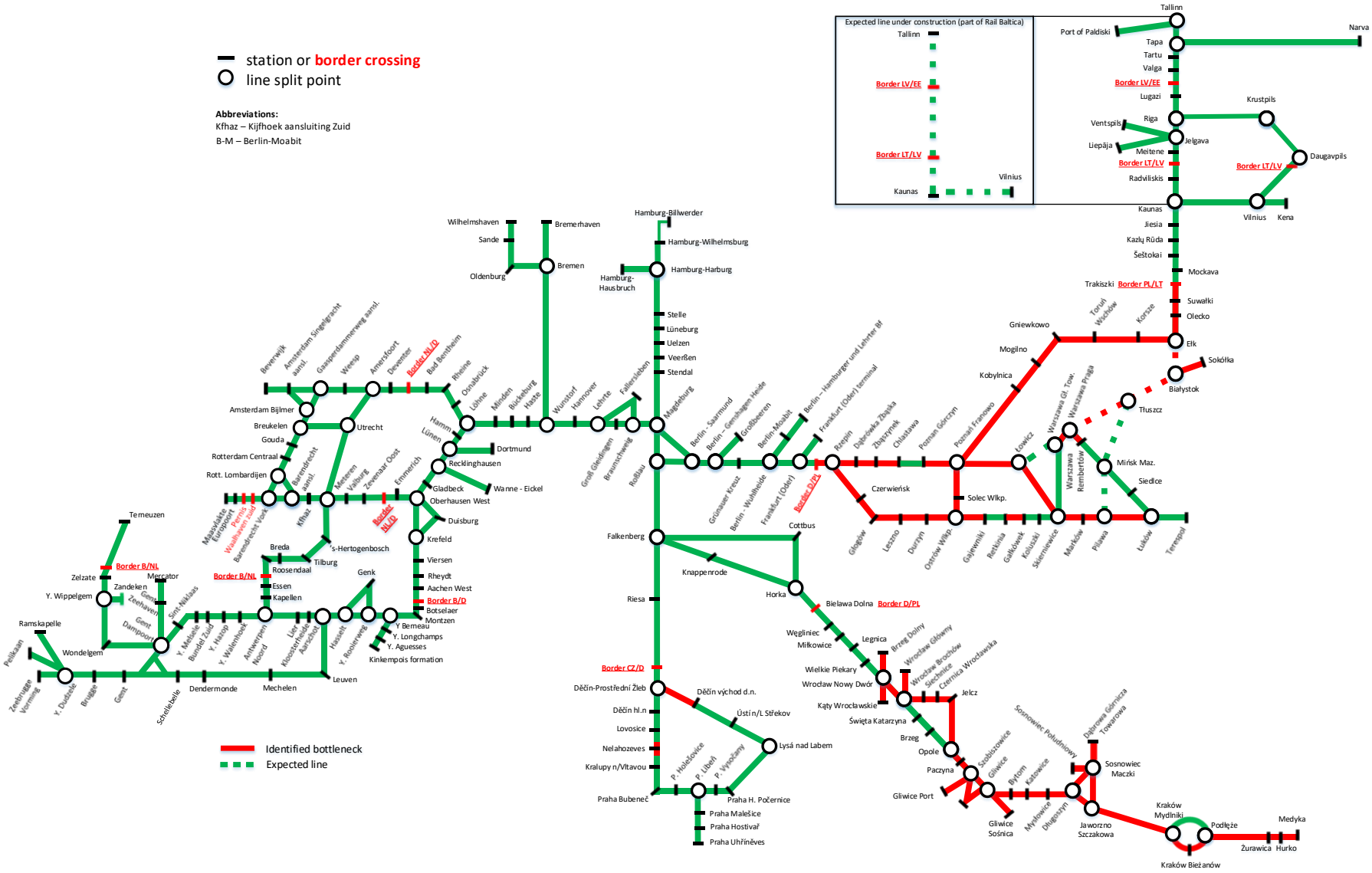
Estonia (EVR)

Bottleneck in Estonia is defined within the Railways Act (§ 92) as the "depletion of railway infrastructure capacity".

The Railways Act (https://www.riigiteataja.ee/en/eli/501042021002/consolide) and the Network Statement (Chapter 4, p. 4.6; https://www.evr.ee/en/business-client) describe the capacity allocation principles and procedures in this case.

There is also a requirement in the Railways Act (§ 93) that the IM should perform a capacity analysis within six months after declaring railway infrastructure capacity to be depleted. Such analysis is performed in order to clarify the reasons for capacity depletion and to determine the financial and technical measures needed for removal of the depletion and creation of additional capacity.

Figure 2-3-1: Bottlenecks on RFC NS-B – actual situation



2.4 RFC Governance

The RFC NS-B governance structure can be found on the website under the following link https://rfc8.eu/corridor/organization/ and in section 1 of the Corridor Information Document.

3. Transport Market Study

There was no update of the TMS since the publication of the previous TMS report in February 2020.

The Executive summary of the TMS Final Report 2020 can be found under the following link: https://rfc8.eu/files/public/Downloads_STUDIES/RFC_NSB_TMS_Report_Executive_Summary.pdf

A TMS update is currently being carried out under the lead of RNE and will be finalised in 2024. The final report will be available in December 2024.

4. List of measures

All measures listed below (4.1 – 4.8) were implemented at the start of RFC NS-B in November 2015. The state of play and further developments regarding concrete measures and procedures are included in Section 4 of the Corridor Information Document.

4.1 Coordination of planned temporary capacity restrictions

All information on the coordination of planned temporary capacity restrictions can be found in Section 4.4 of the CID.

4.2 Corridor One Stop Shop

All information on the Corridor One Stop Shop can be found in Section 4.2 of the CID.

4.3 Capacity Allocation Principles

All information on capacity allocation can be found in Section 4.3 of the CID.

4.4 Applicants

All information on applicants can be found in Section 4.3.2 of the CID.

4.5 Traffic management

All information on traffic management can be found in Section 4.5 of the CID.

4.6 Traffic management in the Event of Disturbance

All information on traffic management in the event of disturbance can be found in Section 4.5.3 of the CID, including the International Contingency Management.

4.7 Quality Evaluation

4.7.1 Performance Monitoring Report

RFC NS-B publishes an annual Performance Monitoring Report on its website in the first half of the following year (see chapter 5.3). The figures are presented to the different stakeholders, such as during RAG and TAG meetings. The report is based on the RNE Guidelines on Key Performance Indicators of the Rail Freight Corridors:

https://rne.eu/wp-content/uploads/2022/10/Guidelines_KPIs_of_RFCs_V4.0.pdf.

RNE also publishes a report on the common KPIs which can be found under the following link: https://rne.eu/corridor-management/rfc-kpis/

More information on KPIs and objectives can be found in Chapter 5 of this Implementation Plan.

4.7.2 User Satisfaction Survey

RFC NS-B conducts a satisfaction survey of the users of the Corridor once a year and publishes the results on its website under the link: https://rfc8.eu/customer/user-satisfaction-survey/.

This year the survey has a new design due to customer wishes, it is shorter and more user friendly. Additionally, customers had the opportunity to choose between answering the online questionnaire (as in the past years) or to be interviewed (in person or online).

4.8 Corridor Information Document

The Corridor Information Document (CID), is published in English every year in January together with the publication of the PaP catalogue.

CID can be found on the website of RFC NS-B, in CIP and also in the Network & Corridor Information (NCI) portal under the link: https://nci-online.rne.eu/

5. Objectives and performance of the Corridor

5.1 Punctuality

Punctuality measurement of an international train is based on the difference between the train's planned timetable time and its actual running time using certain specific measuring points along the journey. The specific measuring points are pre-determined locations on the route where the train running data is collected. The comparison between the planned and actual running time should always be made using an internationally agreed timetable and for the whole train run. The measurement can be made at departure, at arrival or be based on the run through time.
Punctuality is measured by setting a threshold up to which a train is considered as punctual. International punctuality is defined using two thresholds, one is 30 minutes or less and the other is 15 minutes or less. RFC NS-B publishes monthly punctuality reports on its website to inform Corridor users on Corridor punctuality based on the 30 minutes or less threshold.

RUs can always take the opportunity to discuss any punctuality issues bi-laterally with the WG PM&O and during RFC NS-B RAG meetings punctuality topics are often on the agenda. The goal of RFC NS-B is to improve punctuality on the Corridor where necessary. This can be achieved using Train Performance Management. More information on "Train Performance Management" can be found in CID section 4.6.

5.2 Capacity

Pre-arranged Paths (PaPs) for the annual timetable are provided by the IMs/AB to the C-OSS. PaPs are coordinated among the IMs/AB at the borders so to enable for attractive running times. The PaP catalogue is published by the C-OSS in mid-January of each year for the next timetable period. Reserve capacity on the Corridor is available in October of each year, to allow for ad-hoc path applications.
RFC NS-B has defined the following strategic objectives concerning the published PaPs:

- improvement of quality and quantity of the Corridor's offer
- increasing the efficiency and reliability of rail freight traffic
- harmonisation of train paths
- increase of share of requests for international freight paths via the C-OSS.

5.3 KPIs

The KPIs published by RFC NS-B are defined in the "RNE Guidelines on Key Performance Indicators of Rail Freight Corridors" (see 4.7.1) and have been agreed on at RFC level and in the RNE General Assembly.
The KPIs are categorized in:

- Capacity Management
- Operations
- Market Development.

The current set of commonly applicable KPIs can be found on the RNE website https://rne.eu/corridor-management/rfc-kpis/. Information on the KPIs is published in the Performance Monitoring Report https://rfc8.eu/customer/corridor-performance/ as well as on the RFC website and several of the KPIs are part of the Annual Report (see also chapter 4.7).

5.4. Corridor Objectives

The Management Board and Executive Board of RFC NS-B have defined targets for some of the existing KPIs or for some new KPIs based on existing ones. The targets are based on the commitment of the stakeholders to sustainably strengthen quality and resilience on the Corridor as well as also considering the current situation on the Corridor.
Targets have been set for the following:

- Delta between RFC Entry and RFC Exit punctuality
- KPI Number of trains crossing a border along the RFC
- Ratio of capacity requested
- KPI Average planned speed of PaPs.

The progress of the four Corridor objectives will be published in the annual Performance Monitoring Report as well as explanations, if available, on factors that influenced target development. Some of the information can also be taken over in the Annual Report.

5.4.1 Delta between RFC Entry and RFC Exit punctuality

RFC NS-B yearly publishes the KPI for Punctuality measured at RFC Entry and Exit using a threshold of ≤30 minutes and based on information coming from TIS (at present the Baltic States are not included). International freight trains crossing a border of the RFC are considered as RFC trains for the calculation and a target is set for the delta between RFC Entry and RFC Exit Punctuality as this shows better the performance on the Corridor. Entry is defined

as the moment a train enters the Corridor lines; Exit is defined as the moment a train leaves the Corridor lines. Punctuality is further explained in chapter 5.1
The evolution of the KPI Punctuality at RFC Entry and RFC Exit as well as the delta between Entry and Exit is displayed in the table below.
A 5-year scope has been chosen from 2019 to 2024 and the target is to keep the delta between Entry and Exit Punctuality (threshold ≤30 min) stable to achieve 11% in 2024. This allows for the current capacity limits on the corridor lines due to major construction works and future capacity limits expected in the upcoming years.

Evolution of punctuality on RFC North Sea-Baltic (30 min threshold) in %	2019	2020	2021	2022	2024
Entry Punctuality	56	57	50	46	
Exit Punctuality	45	48	41	36	
Delta Entry Punctuality vs Exit Punctuality	-11	-9	-9	-10	**-11**

5.4.2 KPI Number of trains crossing a border along the RFC

This KPI calculates the yearly number of international trains crossing a border along the RFC. The data for calculation is taken from TIS, however not all member states of RFC NS-B are using TIS. For this reason, data from the Baltic states IM's (Lithuania, Latvia and Estonia) is not included in this KPI, except for the Polish-Lithuanian border.
The evolution of number of trains on the RFC fluctuates as the numbers are being influenced each year by various factors like extension of the Corridor, economic growth, re-routing due to works and incidents and impact from natural causes like floods, etc. These factors make it difficult to influence train numbers from the TPM perspective and the goal of RFC NS-B is to observe, monitor and report on the growth or the decrease of the number of trains crossing a border along the RFC.
The border pairs mentioned here below are currently being monitored for this KPI. From 2023 onwards, the new RFC train definition will be used to calculate this KPI. This is especially important for border pairs that overlap with another RFC, as trains will be allocated to one or the other RFC.

- NL-BE: Roosendaal-Essen
- NL-BE: Sas van Gent-Zelzate from 2023
- BE-DE: Aachen-Montzen
- NL-DE: Zevenaar-Emmerich
- NL-DE: Oldenzaal-Bad Bentheim
- DE-PL: Frankfurt Oderbrücke-Kunowice/Rzepin

- DE-PL: Horka-Wegliniec/Bielawa Dolna
- DE-CZ: Bad Schandau-Decin
- PL-LT: Trakiszki-Mockava.

For this KPI a 4-year scope has been chosen from 2021 to 2024 and the target is to keep the current numbers stable and to achieve figures in 2024 of circa 85.872 trains.

Number of trains crossing a border along the RFC NS-B	2021	2022	2024
Total	85.664	86.080	**85.872**
Yearly change 2021-2022		0,5%	

5.4.3 Ratio of capacity requested

It is the objective of RFC NS-B to offer a PaP offer on all Corridor principal lines crossing a border that fits the needs of customers best. To calculate the results of this objective, the volume of requested capacity at X-8 is measured against the volume of offered capacity at X-11. This ratio reflects the interest of customers in the PaP product and indirectly provides an indicator for the customer fit of the product. Cancellations of PaP requests after this period are driven by short-term changes in customer needs and lie outside the IMs' sphere of influence.

It must be mentioned that there is no official KPI defining the ratio of PaP capacity requested to the PaP capacity offered, however each component is an official KPI of the Corridor (see above). To calculate the objective, both KPIs are being collected and set into relation to achieve the KPI "Ratio of capacity requested".

The aim is to improve the Ratio of capacity requested at X-8 to 25 % until 2024 (for TT2025). The table below gives an overview of the volume of offered and requested capacity as well as the ratio of those:

Ratio of capacity requested on RFC NS-B in %

	TT2019	TT2020	TT2021	TT2022	TT2023	**Goal TT2025**
Volume of PaP capacity offered at X-11 (in million path km)	15,8	16,2	14,1	15,8	15,3	-
Volume of PaP capacity requested at X-8 (in million path km)	2,3	1	3	2	3,4	-
Ratio of capacity requested (in %)	15%	6%	22%	13%	22%	**25%**

5.4.4 KPI Average planned speed of PaPs

The goal of RFC NS-B is to be a high quality and fast rail bridge between Eastern and Western Europe. This objective means increasing the efficiency and reliability of end-to-end rail freight traffic, thereby strengthening the railway's competitive position, in line with European freight transport targets. Therefore, it is vital to continue the harmonisation of train paths between the different IMs and ABs.

In general, the KPI Average planned speed of PaPs shows the average of the planned commercial speed of the PaPs in km/h for selected connections. The KPI is calculated by dividing the length of the PaP by the planned travel time. Thus, the average planned speed of PaPs also includes necessary stops on the route, as well as parts with restricted speed (e.g., cities or gauge changes). On RFC NS-B, it is constantly adjusted from year-to-year to better fit the needs of IMs and applicants respectively, for instance considering necessary stops for train drivers or necessary waiting times at borders. Thus, increasing the average planned speed of a PaP is not only dependent on the potential train speed itself but also on the optimization of connected operational processes.

Our goal is to keep the Average planned speed of PaPs on the following sections at least stable until end of 2024 (for TT2026) considering a high number of TCRs that is predicted for the upcoming years. Five PaP sections have been selected for measurement based on available historical data for this KPI and optimal geographical coverage of corridor lines:

Average planned speed of PaPs (in km/h)

	Length of the PaP section	TT2021	TT2022	TT2023	TT2024	**Goal TT2026**
Maasvlakte – Poznań Franowo	1041km	-	49	59	60	**56**
Suwalki – Tallinn (Ülemiste)	882km*	-	26	23	26	**25**
Y.Dudzele – Gliwice	1368km	-	-	54	49	**51,5**
Rostock Seehafen– Kolín	626km	52	51	52	53	**52**
Bremerhaven-Speckenbüttel – Děčín	622km; 615km**	54	45	62	53	**53,5**

*Suwalki – Tallinn (Ülemiste) includes the reloading time (~ 6 hours) in Palemonas from/to 1345mm and 1520mm gauges.

** Two distances for W-E, E-W direction, varying per timetable period

6. Investment Plan

The indicative Investment Plan is without prejudice to the competence of the Member States regarding infrastructure planning and financing. Also, this is without prejudice to any financial commitment of a Member State.

6.1 Capacity Management Plan

For this version of the Implementation Plan, the WG Infrastructure updated the capacity management plan. Individual infrastructure manager definitions of bottlenecks from section 2.3 together with the indicative investment plan and current bottleneck situation jumping jack provide a high-level overview of the bottleneck situation within the Corridor and a list of projects directly and indirectly addressing capacity improvements.

Information within this section should be cross-referenced to individual infrastructure manager bottleneck definitions in section 2.3 while analyzing.

6.2 List of projects

The WG Infrastructure elaborated an indicative investment plan (Figure 6-2), which is based on the national investment plans. It covers the period until 2033. While delivering this input, projects in relation to the needs of capacity enhancement, development of terminals that belong to the RFC NS-B IMs, removal of identified bottlenecks and technical parameters enhancement such as increasing train length, loading gauge or axle load are taken into account. The indicative investment plan is presented in the form of a table providing basic information about the projects:

- Project name
- Benefit
- Go live date
- Description
- Total budget
- Project category
- Decision status
- Financing source.

Country	Project Name	Benefit	Go live date	Description	Budget in mio EUR	Project Category	Decision Status	Financing Source
NL	ERTMS Meteren - Eindhoven	Interoperability	2031-01	Implementing ERTMS between Meteren and Eindhoven. (Go live 2029-2031)		ERTMS	Planned	
	ERTMS OV SAAL oost	Interoperability	2030-12	ERTMS implementation at OV SAAL oost		ERTMS	Planned	
	Redevelopment Waalhaven Zuid freight yard fase 2 (after 2030)		2030-12	Further expansion of Freight Yard Waalhaven Zuid (including 8 additional tracks for 740 m trains) to be decided after 2030		Infrastructure	Study / To be decided	
	ERTMS Roosendaal - Den Bosch	Interoperability	2030-01	Implementing ERTMS between Roosendaal and 's Hertogenbosch. Go live 2028-2030.		ERTMS	Planned	
	4 tracks 's Hertogenbosch - Vught aansl. and dive-under Vught	Capacity	2029-12	Adding a fourth track between 's Hertogenbosch and Vught aansluiting Construction of a Dive-under at Vught aansluiting		Infrastructure	Realisation	
	ERTMS Utrecht - Meteren	Interoperability	2029-01	Implementing ERTMS between Utrecht Centraal and Betuweroute Meteren. Go live 2028-2029		ERTMS	Planned	
	Dive-under at Amsterdam Dijksgracht	Capacity	2028-12	Free entrance to Amsterdam Westhaven		Infrastructure	Realisation	
	ERTMS Kijfhoek - Roosendaal grens	Interoperability	2028-01	Implementing ERTMS between Kijfhoek and Roosendaal border. Go live 2026-2028		ERTMS	Planned	
	Hengelo 740 m	Train length	2028-01	Extend track 301 in Hengelo to 740 m		Infrastructure	Study / To be decided	

	Redevelopment Waalhaven Zuid freight yard fase 1	Train length	2027-07	Construction of 5 tracks for 740 m trains + expansion of locomotive parking capacity	60.00	Infrastructure	Planned	
	Rail Ghent Terneuzen study (NL side)	Capacity	2026-12	The Rail Ghent Terneuzen project consists of three possible rail developments. These three components together ensure optimum capacity, reliability and efficiency of the rail network in and around the North Sea Port port area. 1) New connection Axel and Zelzate (East bank) 2) New south-east Curve Sluiskilbrug (East-side) 3) Expansion to the north Kluizendok ('Zandeken')		Infrastructure	Realisation	
	Roosendaal 2 tracks for 740 m trains	Train length	2026-12	Construction of 2 tracks for reversing freight trains of 740 m.		Infrastructure	Study / To be decided	
	Electrification 2 tracks Europoort	Capacity	2026-01	Electrification 2 tracks Europoort		Infrastructure	Study / To be decided	
	Rail terminal Gelderland (RTG Valburg)	Capacity	2025-12	Construction of a new terminal + changes to CUP Valburg yard		Infrastructure	Planned	
	R'dam Noord Goederen 740 m	Train length	2025-09	Extend waiting track for 740 m trains Rotterdam Noord Goederen		Infrastructure	Planned	
	Additional track SY A'dam Aziëhavenweg	Capacity	2025-05	Construction of additional arrival and departure track for 740 m trains		Infrastructure	Realisation	
	Harbourline - 25 kV connection Betuweline	Interoperability	on hold	On hold Change the voltage on the catenary from 1500 V DC to 25.000 V AC between				

				Barendrecht Vork - Kijfhoek - and Sophiatunnel. Project on hold.				
BE*	Adapting several TEN-T line sections to civilian-defence dual use by improving the infrastructure for 740m trains**	Train length	2027-12	Construction of side tracks 750m at Dendermonde, Lokeren, Merelbeke, Saint Vincent, Gedinne, Stockem and Lobbes	55.42	Infrastructure	Secured	Public
	Third track Brugge - Dudzele	Capacity	> 2032	Construction of a third track between Brugge and Dudzele (L51, L51A and L51C)	2.57	Infrastructure	Planned	Public
	Junction Oude Landen	Capacity	2033-12	Construction of junction at Oude Landen (L27A) to provide a better access to the port of Antwerp	52.76	Infrastructure	Planned	Public
	Second track Neerpelt - Balen Werkplaatsen	Capacity	2026-12	Construction of a second track on line 19 between Neerpelt and Balen Werkplaatsen	49.78	Infrastructure	Planned	Public + European
	Second access to the Port of Antwerp	Capacity	2025-12	Study on construction of new line between Antwerp North and Lier to provide a better access to the Port of Antwerp	1.76	Infrastructure	Realisation	Public (federal + region)
	Masterplan port of Zeebrugge	Capacity	2028-12	Extension and modernisation of Zeebrugge (with a new hub of 24 tracks in Zwankendamme and a fan of sidings in Zeebrugge and the removal of the level crossing in Lissewege)	5.02	Infrastructure	Realisation	Public (federal + SPV)
	Third and 4th track Gent - Brugge	Capacity	2030-12	Construction of a 3rd and 4th track between Brugge and Gent (L50A)	130.08	Infrastructure	Realisation	Public + European
	Level crossing removal	Capacity	2026-12	Elimination of level crossings on L59 (Lokeren, Lochristi, Beveren Waas), L35 (Rotselaar) and L15 (Lier, Herentals)	18.45	Infrastructure	Realisation	Public + European

	North Sea Port development	Capacity	2025-12	Capacity increase within the Port of Ghent: Mercatordok (750m tracks), Zandeken, renovation bundles and access tracks	20.04	Infrastructure	Realisation	Public (incl. BRP) + European (RRF)
	Development of the Port of Antwerp	Capacity	2027-12	Several works in the port area of Antwerp, including electrification and doubling of L11, signalling works L223 and L221, extension bundle tracks Pelikaan	69.00	Infrastructure	Realisation	Public
	3rd track between Lokeren and Sint Niklaas (L59)	Capacity	2027-12	Studies and first works related to the construction of a third track between Lokeren and Sint-Niklaas and the removal of level crossings	6.17	Infrastructure	Realisation	Public (federal + region)
	Masterplan Hasselt	Capacity	2030-12	Masterplan Hasselt	19.00	Infrastructure	Realisation	Public
	Pioneers project	Quality	2026-12	Pioneers project: IT track platform (port area of Antwerp)	0.97	Infrastructure	Realisation	EU (Horizon 2020)
	Renewal works between Antwerpen - Leuven	Capacity	2024-12	Renewal works between Mechelen - Leuven and Antwerp	19.59	Infrastructure	Realisation	Public (BRP)
	Rail Ghent Terneuzen Study	Capacity	2026-12	Upgrade of the cross-border railway connection Ghent (BE) and Terneuzen (NL) - Integrated Preparating phase	3.07	Infrastructure	Realisation	Public + European
	Increase of line speed	Capacity	2024-12	Increase of line speed (100 km/h) on L24 between Glons - BE/DE border	0.10	Infrastructure	Realisation	Public + European
	Spartacus project	Capacity	2025-12	Elimination of 9 level crossings on L34 between Diepenbeek and Bilzen	25.55	Infrastructure	Realisation	Public (Federal + SPV)

	Rail Port of Antwerp	Capacity	2026-12	Upgrade and electrification aiming to increase capacity and performance as well as cost reductions for rail operators and terminals on the Right Bank of Port of Antwerp (L223, bundle South, bundle Oorderen, MY)	61.51	Infrastructure	Realisation	Public + European
	Line 24 - 4 long tracks 750m at Montzen	Train length	2024-12	Construction of 4 side tracks of 750m	3.48	Infrastructure	Realisation	Public + European
	ETCS equipment Belgium **	Interoperability	2025-12	Equipment of the remaining part of the Belgian network	495.06	ERTMS	Realisation	Public + European
	Side tracks 750m **	Train length	2027-12	Construction of side tracks 750m at Bruges, Kortrijk, Tilly and Aubange	15.64	Infrastructure	Secured	Public
DE	ABS Emmerich Border NL/D - Oberhausen ETCS deployment	Interoperability	2029-12	ERTMS equipment existing line A relevant date/year for going-live can only be given once the building legislation is existent	2341	ERTMS	Planned	Public, Regional, European
	ABS Uelzen - Stendal	Capacity	2031-12	Completion of double track-line	1 394	Infrastructure	Planned	Public, European
	Berlin - Frankfurt (O) - Gr. DE/PL	Capacity, Quality	2024-12	Speed-upgrade to 160 km/h	979	Infrastructure	Secured	Public, European
	Border Emmerich - Oberhausen	Capacity	2026-12	ABS 3rd track A relevant date/year for going-live can only be given once the building permission has been approved	3 192	Infrastructure	Planned	Public, Regional, European
	ETCS Deployment on RFC North Sea-Baltic lines	Interoperability	2030-12	ETCS Deployment on RFC North Sea-Baltic lines (connections to Poland and Czech Republic)		ERTMS	Study / To be decided	

	ETCS Realisierung Köln - Aachen/Venlo	Interoperability	2029-12	Implementation of ETCS on tracks of DB Netz between Cologne and the border to Belgium (Aachen) and The Netherlands in Kaldenkirchen/Venlo. Project also covers lines of RFC North Sea - Baltic.		ERTMS	Realisation	
	ETCS Realisierungszentrum West Anteil RFC North Sea - Baltic	Interoperability	2030-12	ETCS deployment on RFC North Sea-Baltic lines in DB Netz Region West. Project also covers lines of RFC Rhine-Alpine.		ERTMS	Secured	
CZ	Double-track line Hrdlořezy - Praha-Malešice - Praha-Hostivař	Capacity	2031-12	Modernisation and 2nd track		Infrastructure	Planned	
	ETCS Deployment Kralupy n.Vlt. - Praha - Kolín	Interoperability	2023-12	ETCS Deployment Praha - Kolín		ERTMS	Realisation	
	ETCS Deployment Kralupy nad Vltavou - Děčín state border	Interoperability	2026-12	ETCS Deployment Kralupy nad Vltavou - Děčín state border		ERTMS	Planned	
	ETCS Milovice - Praha hl.n.	Interoperability	2026-12	ETCS deployment in line Milovice - Lysá nad Labem - Praha-Vysočany - Praha hl.n.		ERTMS	Planned	
	Increasing capacity of the Freight line Praha-Libeň – Praha-Malešice	Capacity	2027-12	Reconstruction, modernization of the track (2nd track, a new tunnel, higher capacity).		Infrastructure	Planned	
	Modernisation of the line Kolín - Všetaty - Děčín východ (except)	Capacity	2033-12	Complex line reconstruction (3rd track between Libice nad Cidlinou - Odb. Babín, Nymburk hl.n. - Lysá nad Labem, and Všetaty - Mělník; reconstruction of signalling and interlocking equipment on segments Mělník – Litoměřice and Ústí		Infrastructure	Planned	

			nad Labem Střekov – Děčín východ; prolongation of tracks for freight trains of 740m in some stations; construction of direct connection to Hradec Králové).				
Optimization of the line Lovosice - Prackovice nad Labem - Ústí nad Labem	Capacity	2028-12	Overal optimization of the line, preparation for ETCS and for conversion of traction system to 25kV.		Infrastructure	Planned	
Optimization of the line Praha-Vysočany - Čelákovice	Capacity	2025-12	Reconstruction, modernization of the track - techonologic state, higher max. speed.		Infrastructure	Realisation	
Reconstruction of Nalahozeves tunnels	Capacity	2029-12	Reconstruction of section Kralupy nad Vltavou - Nelahozeves with aim to meet UIC GC gauge and code P/C 80/410 for combined transport.		Infrastructure	Planned	
Reconstruction of bridges in km 518,498 a 518,962 of the line Praha Masarykovo n. - Děčín hl. n.	Capacity	2024-12	Reconstruction of bridges in premises of railway station Ústí nad Labem sever.		Infrastructure	Realisation	
Reconstruction of the line Praha-Libeň - Praha-Holešovice	Capacity	2026-12	Reconstruction of trucks and bridges, establishment of new signalling equipment and traction lines.		Infrastructure	Planned	
Rekonstruction of the raiway station Děčín východ dolní nádraží	Capacity	2028-12	Overal recontruction of the railway station, optimization of the number of tracks, release of certain areas. It will enable operation of trains with length up to 740m, easify works related to the change of operators in border crossing station and allow creation of a new industrial zone.		Infrastructure	Planned	

PL	Improvement of the capacity of E 20 railway line section Warsaw - Mińsk Mazowiecki, stage I	Capacity	2023-12	The action covers improvement of safety of transported goods/loads; The axle load of 221 kN will be assured.		Infrastructure	Secured	
	Safety improvement of level crossing - stage IIa - construction of bridges	Capacity	2024-12	Construction of bridges to replace 4 level crossings on the section		Infrastructure	Secured	
	Works on C-E 65 railway line, section Chorzów Batory - Tarnowskie Góry - Karsznice - Inowrocław - Bydgoszcz - Maksymilianowo, stage I	Capacity	2024-12	The project includes the modernization of railway lines:131 (km 5,900 – 29,000), 161 (km 11,550 – 12,975); 132 (km 16,912 – 18,920); 145 (km 16,733 – 18,033); 127 (km 26,922 – 29,000); 128 (km 26,939 – 29,000); 131 (km 66,800 – 137,500); 686 (km -0,540 – 2,173); 687 (km 0,003 – 2,219); 704 (km 0,277 – 2,155); 181 (km -0,319 – 1,221); 146 (km 47,390 – 49,145); 131 (km 137,500 – 170,212); 542 (km 3,537 – 7,434); 739 (km -0,301 – 4,059). In implementation "PiB contract" (Design and Build contract) for the sections Kalina (lk. 131 km 66,800) – Rusiec Łódzki (lk. 131 km 137,500) oraz odcinka Rusiec Łódzki (lk. 131 km 137,500) – Zduńska Wola Karsznice (lk. 131 km 170,212).		Infrastructure	Secured	
	Works on E 30 railway line, section Kędzierzyn Koźle – Opole Zachodnie	Capacity	2025-12	The action covers adjustment of the line for 750 m. train length and increasing of the construction speed on particular sections up to 120 km/h for freight trains.		Infrastructure	Secured	

	Works on E 75 railway line, section Czyżew-Białystok	Capacity	2025-12	The action covers increasing the speed up to 120 km/h for freigt trains; The axle load of 221 kN will be assured.		Infrastructure	Secured	
	Works on Line E75 Białystok - Suwałki-Trakiszki (state border), stage I section Białystok- Ełk	Capacity	2025-12	The action covers increasing of maximum speed up to 100 km/h for freight trains; The axle load of 221 kN will be assured; adjustment of the line for 740 m. train length		Infrastructure	Secured	
	Works on railway line no. 38 section Ełk - Giżycko including electrification	Capacity	2024-12	The action covers increasing of maximum speed up to 100 km/h for freight trains; The axle load of 221 kN will be assured; electrification of the line		Infrastructure	Realisation	
	Works on lines no. 132, 147, 161, 180, 188, 654, 655, 657, 658 sections Gliwice - Bytom, Chorzów Stary - Mysłowice Dor. - Mysł. Brzezinka	Capacity	2024-12	The goal of this project is to restore the functional properties of the transit route, improving rail transport from Silesian mines and steelworks. This string, covering sections: Maciejów Pln. - Zabrze Biskupice - Bytom - Chorzów Stary - Mysłowice - Oświęcim, is an important complemant to the CE30 freight line. The construction works are related to lines 132 and 188 track no. 1 together with Zabrze Biskupowice station and the section of the 147 km line 0.702-0.816, line 147 on the route Zabrze Biskupowice - Maciejów Northern and reconstruction of railway traffic control devices at the Bytom-Bobrek station		Infrastructure	Secured	

	Works on railway line Warszawa Włochy-Grodzisk Mazowiecki (line no. 447)	Capacity	2024-12	The axle load of 221 kN will be assured; removal of two bottelnecks near Brwinów; increasing the efficiency of CCS		Infrastructure	Secured	
	Works on railway line no. 6 section Białystok – Sokółka – Kuźnica Białostocka (state border)	Capacity	2030-12	The action covers increasing the maximum speed up to 100 km/h for freight trains; The axle load of 221 kN will be assured.		Infrastructure	Secured	
	Works on railway lines no. 14, 811 section Łódź Kaliska-Zduńska Wola-Ostrów Wlkp.,stage I: Łódź Kaliska-Zduńska	Capacity	2024-12	The action covers increasing of maximum speed up to 100 km/h for freight trains; The axle load of 221 kN will be assured; adjustment of the line for 750 m. train length		Infrastructure	Secured	
	Works on the E 20 railway line, Siedlce-Terespol section, stage III - LCS Terespol	Capacity	2025-12	The action covers increasing of maximum speed for freight trains up to 120 km/h, adjustment of the line for 740 m. train length; shortening of travel time for freight trains about 19 min on Siedlce-Terespol section		Infrastructure	Secured	
	Works on the E 20 railway line, Warsaw-Poznan section - remaining works, Sochaczew - Swarzedz section	Capacity	2025-12	The action covers increasing the speed up to 120 km/h for freight trains; increasing of capacity. The axle load of 221 kN will be assured.		Infrastructure	Secured	
LV	Centralised Traffic Control – CTC modernization	Interoperability	2025-12	RFC8 principal line (Čiekurkalns - Lugaži) Beam system "NEVA" replacement	20.00	Signalling	Study / To be decided	LDz
	Modernisation of infrastructure for increasing speed: contract No. L-2658/2022	Capacity	2023-12	RFC8 principal line (Rīga - Jelgava)	49.11	Infrastructure	Realisation	Cohesion (85%) + LDz

	Modernisation of infrastructure for increasing speed: contract No. L-2691/2022	Capacity	2023-12	RFC8 diversion line (Lielvārde - Skrīveri)	1.355	Infrastructure	Realisation	Cohesion (85%) + LDz
	Modernisation of microprocessor centralisation systems contract No. L-1026/2023	Interoperability	2023-12	RFC8 principal line (Rīga -Jelgava) and diversion line (Lielvārde - Skrīveri)	1.019	Signalling	Realisation	Cohesion (85%) + LDz
EE	Tallinn - Port of Muuga, electrification of the line	Capacity	2028-12	construction of catenary and traction stations 25 kV/AC	22.00	infrastructure	planned	EU, public
	Tallinn - Port of Muuga, upgrade of the CCS system	Capacity	2025-12	modernisation of control command and signalling system (CCS), precondition for ERTMS	7.50	ERTMS	Realisation	public
	Tallinn - Tapa, reconstruction of the line	Capacity	2024-12	track renewal and speed upgrade to 160 km/h	17.00	infrastructure	Realisation	EU, public
	Tallinn - Tapa, electrification of the line	Capacity	2025-12	construction of catenary and traction stations 25 kV/AC	62.00	infrastructure	Realisation	EU, public
	Tallinn - Tapa, upgrade of the CCS system	Capacity	2025-12	modernisation of control command and signalling system (CCS), precondition for ERTMS	20.00	ERTMS	Realisation	public
	Tapa - Tartu, reconstruction of the line	Capacity	2024-12	track renewal and speed upgrade to 160 km/h	48.50	infrastructure	Realisation	EU, public
	Tapa - Tartu, electrification of the line	Capacity	2024-12	construction of catenary and traction stations 25 kV/AC	108.00	infrastructure	Realisation	EU, public
	Tapa - Tartu, upgrade of the CCS system	Capacity	2024-12	modernisation of control command and signalling system (CCS), precondition for ERTMS	34.00	ERTMS	Realisation	public
	Tartu - Valga, reconstruction of the line	Capacity	2026-12	track renewal	12.00	infrastructure	secured	EU (mil.mobility), public

	Tartu - Valga, electrification of the line	Capacity	2028-12	construction of catenary and traction stations 25 kV/AC	57.00	infrastructure	planned	n.a.
	Tartu - Valga, upgrade of the CCS system	Capacity	2026-12	modernisation of control command and signalling system (CCS), precondition for ERTMS	16,00	ERTMS	Realisation	public
	Tallinn - Port of Muuga, electrification of the line	Capacity	2028-12	construction of catenary and traction stations 25 kV/AC	22.00	infrastructure	planned	EU, public
	Tallinn - Port of Muuga, upgrade of the CCS system	Capacity	2025-12	modernisation of control command and signalling system (CCS), precondition for ERTMS	7.50	ERTMS	Realisation	public
	Tallinn - Tapa, reconstruction of the line	Capacity	2024-12	track renewal and speed upgrade to 160 km/h	17.00	infrastructure	Realisation	EU, public
	Tallinn - Tapa, electrification of the line	Capacity	2025-12	construction of catenary and traction stations 25 kV/AC	62.00	infrastructure	Realisation	EU, public
	Tallinn - Tapa, upgrade of the CCS system	Capacity	2025-12	modernisation of control command and signalling system (CCS), precondition for ERTMS	20.00	ERTMS	Realisation	public
	Tapa - Tartu, reconstruction of the line	Capacity	2024-12	track renewal and speed upgrade to 160 km/h	48.50	infrastructure	Realisation	EU, public
	Tapa - Tartu, electrification of the line	Capacity	2024-12	construction of catenary and traction stations 25 kV/AC	108.00	infrastructure	Realisation	EU, public
	Tapa - Tartu, upgrade of the CCS system	Capacity	2024-12	modernisation of control command and signalling system (CCS), precondition for ERTMS	34.00	ERTMS	Realisation	public
	Tartu - Valga, reconstruction of the line	Capacity	2026-12	track renewal	12.00	infrastructure	secured	EU (mil.mobility), public

	Tartu - Valga, electrification of the line	Capacity	2028-12	construction of catenary and traction stations 25 kV/AC	57.00	infrastructure	planned	n.a.
	Tartu - Valga, upgrade of the CCS system	Capacity	2026-12	modernisation of control command and signalling system (CCS), precondition for ERTMS	16.00	ERTMS	Realisation	public

*** for all Belgian projects: costs as from 2023 (in million €2022)**
**** No split per RFC**

Figure 6-2: Indicative Investment Plan

6.3 Deployment Plan regarding interoperable systems

6.3.1. ETCS Deployment Plan

The following text describes the national implementation strategies of the IMs along the Corridor.

6.3.1.1. The Netherlands

In the Netherlands, the deployment started on the Betuweroute between Kijfhoek and Zevenaar, which was inaugurated in 2007 as a dedicated freight line only equipped with ETCS B2, SRS 2.3.0d. Between 2007 and 2015 the connection to the Port of Rotterdam (Havenspoorlijn) with ETCS L1 and from Zevenaar Oost to the German border have been added. No class B systems are available on the lines equipped with ETCS, which makes ERTMS equipment on the vehicle indispensable. Since 2018, the challenge is that the vehicles using the Betuweroute have to be updated to a newer baseline (Baseline 3 release 2), which is the current standard for future ETCS installations. The planning of ERTMS deployment on the other main railway lines is decided by the Parliament (May 2019). The Dutch strategy includes the immediate removal of the class B system on lines equipped with ERTMS. The national ERTMS roll-out plan includes early On-board Unit (OBU) transition to ERTMS B3 enabling ERTMS only roll-out on the infrastructure. Therefore, ERTMS OBU roll-out is prepared in a separate programme. The Dutch ERTMS Programme will implement ERTMS on the 7 corridors within the scope of the programme. The section Amsterdam – Oldenzaal border of RFC NS-B will not be equipped with ERTMS before 2030, so ERTMS only operations for international locos will not be possible before 2030.

6.3.1.2. Belgium

In Belgium, the outlined ERTMS implementation of the Corridor lines is part of a country-wide migration program by 2025, with the aim to improve the safety level on the whole network. This program is called the ETCS Master Plan.

All vehicles in Belgium have to be operable with ERTMS by 2025, whereby ETCS Level 1 and Level 2 Full supervision (Baseline 2 and Baseline 3) tracks shall be equipped with System Version 1.x to allow Baseline 2 and Baseline 3 locos. On the other hand, ETCS Level 1 Limited Supervision (Baseline 3) tracks shall be equipped with System Version 2.x in order to allow the operation in Limited Supervision by the Baseline 3 locos. Consequently, in order to permit Baseline 2 vehicles to still run on those lines, the TBL1+ system will be kept until all RUs running on those lines will have migrated to Baseline 3 as well (until end of 2025).

Since December 2016, the class B system Memor/Crocodile is put out of service on the lines equipped with ETCS Level 1 FS version 2.3.0d, allowing only trains equipped with ETCS Level 1 or TBL1+ to run on these tracks.

A Royal Decree published in 2018 with the latest revision on 6 December 2020 has extended the decommissioning of the Memor/Crocodile class B system on the main tracks equipped with any level of ETCS. Moreover, this royal Decree foresees at 14/12/2025 the decommissioning of the TBL1+ system. All main tracks in Belgium will become ETCS only.

Railway operators are strongly encouraged to equip their rolling stock with baseline 3 to accommodate as much as possible future upgrades of the infrastructure.

6.3.1.3. Germany

A study commissioned by the German Federal Ministry for Digital and Infrastructure has concluded that the rail network in Germany should be digitalized. Digitalization could raise capacity for rail passenger and rail freight transport by up to 20%, laying the foundation necessary to handle growing traffic volumes in Germany. With the Digital Rail for Germany program, the entire German rail sector aims to equip every one of the 33000 km in the German rail network with the European Train Control System (ETCS) and digital signaling technology.

According to the study, digital rail would have a positive impact on the German economy. Specifically, it would:

- **Make the rail system more reliable** by offering new technology and systems to foster high service quality and punctuality
- **Raise rail capacity,** enabling the network to handle growing traffic volumes and to absorb more traffic from the roads
- **Raise energy efficiency and lower carbon emissions** by making energy efficient network management possible and by shifting traffic to rail
- **Lower operating costs** for maintenance and operations
- **Equip the industry to handle demographic change** by giving employers tools to deal with lower operational staffing numbers resulting from retirement and employee turnover
- **Foster seamless international rail traffic** by ensuring that European systems are interoperable.

Projects proposed for 2020 to 2025 would have a major impact

For the initial phase from 2020 to 2025, the study recommends three specific projects that would have a rapid impact on infrastructure capacity and service quality:

- **Equipping the Scandinavian-Mediterranean Corridor** from the North and Baltic Seas through central Germany and Bavaria to the northern access route to the Brenner Base tunnel

- **Equipping core routes in the German rail network:** specifically, the Cologne–Rhine/Main high-speed line which is already under construction

- **Digitalizing urban rail:** digitalizing the S-Bahn network in Stuttgart

According to the authors of the study, these projects would involve infrastructure investments of some EUR 1.7 billion between now and 2025.

The German government will now review and assess the proposals. All the parties involved agree that digitalization will play a decisive role in making rail fit for the future.

6.3.1.4. Czech Republic

Most of the main lines of the conventional network in Czech Republic are equipped with the national system LS. It is a system using the continuous transmission of the aspects by means of coded track circuits. In case of transmission of restrictive or prohibitive aspects, it controls the specified reaction of a person driving the rail vehicle. According to TSI CCS 2023 annex 2 (List of Class B train protection systems) it is national train protective equipment of the Class B and according to Czech law is used for maximum speed up to 160 km/h.

As is mentioned in the currently valid National Implementation Plan for ERTMS (approved by Czech ministry of transport in 2017) the main goal is to achieve full interoperability of the selected national railway network (TEN-T lines and RFC network). In this plan is expected deployment of ETCS L2 baseline 3 in relationship to the RFC NS-B railway lines (mainly Praha - Lovosice - Děčín hl.n. - Prostřední Žleb - Shöna DB) with expected realization 2019 - 2026. All RFC NS-B lines are already equipped with GSM-R system.

Migration strategy in the ETCS system is based on use of dual equipment on the track enabling concurrent operation of the vehicles equipped with ETCS and the vehicles equipped with national LS system only where the national LS system may have the important role as a backup system for cases of ETCS system outage and no later than the end of the LS system technical life cycle. Implementation strategy is based on the fact that the ETCS system will be implemented markedly slower than the GSM-R system. The implementation rate is limited first of all by the accessible volume of financial means, not only in the track part area, but above all in the area of vehicles equipment with the mobile part of the system. After the whole section ETCS system completion, only this ETCS system on line Praha - Lovosice - Děčín hl.n. - Prostřední Žleb - state Border Germany (Shöna) is supposed for railway operation.

6.3.1.5. Poland

Currently in Poland almost the entire railway network is equipped with CCS class B systems – train control system called SHP – Samoczynne Hamowanie Pociągu (eng. Automatic Train Braking) and analog radio communication system using 150 MHz band for voice transmission. There are no plans to decommission national SHP system. The Polish NIP assumes that SHP will be operational at least for the next 20 years, while 150 MHz radio communication system will be turned off after equipment over 15000 km of railway lines with the GSM-R system.

Implementation strategy of ETCS in Poland by 2050 is specified by NIP. The timetable covers the requirements of both the TEN-T network (core and comprehensive) and Regulation No 913/2010 (freight Corridors).

The SRS 2.3.0d specification (which corresponds to the system version 1.0) was used for completed and ongoing trackside ETCS implementation projects. For later projects a higher version of SRS (at least 3.4.0) will be used, while both the SRS version and the system version are to be decided.

6.3.1.6. Lithuania

Current situation on rail gauge of 1520 mm from Lithuanian station Kaunas to station Mockava is equipped with local older generation “PAB-GTSS” railway signalling system (only signals), current situation on rail gauge of 1435 mm from Lithuanian station Kaunas to station Šeštokai no signalling systems, from station Šeštokai to station Mockava is equipped with local older generation “PAB-GTSS” railway signalling system (only signals), and from station Mockava to Polish border railway is integrated with „PAB-EAP” system on the track (only signals). Current situation on rail gauge 1520 mm from Kaunas to station Kena and from Kaunas to LT/LV border is equipped with ALSN. From Vilnius to LT/LV border is equipped with local older generation “PAB-GTSS” railway signalling system (only signals). In Lithuania up to 2025 is expected to include level 2 ERTMS system between Polish and Lithuanian border on new rail gauge of 1435 mm where the speed is expected to be up to 249 km/h for passenger trains and up to 120 km/h for freight trains. Further information about the project path and routes will be provided when “Rail Baltica” will have completed the feasibility study.

The ERTMS system at existing rail gauge of 1520 mm is not foreseen.

6.3.1.7. Latvia

All the main lines of the conventional network in the Republic of Latvia are equipped with the class “B” national control command and signalling system ALSN. It is a system using the continuous transmission of the aspects by means of coded track circuits and according to law is used for maximum speed up to 120 km/h.

As is mentioned in the currently valid National Implementation Plan for ERTMS (notified to European Commission by Latvian ministry of transport in 2017) the main goal is to maintain full interoperability with the neighbouring countries in Lithuania and Estonia of 1,520mm railway track gauge network. In this plan is expected deployment of GSM-R not earlier than 2030 and no expectations to deployment of ETCS in 1,520mm track network until the maximum speed of line remains up to 120 km/h.

The foreseen building of the new Rail Baltica line with a 1,435mm gauge European standard is a project to integrate the Republic of Latvia into the European rail network. The project's basic design guidelines foresee the deployment of the Level 2 baseline 3 ETCS system. Decision regarding the mobile radio communications system will be taken at a later stage of the project.

6.3.1.8. Estonia

In Estonia, there are two IMs in the public 1520mm railway network: Estonian Railways Ltd (company is in charge of railway administration) and Edelaraudtee Infrastruktuuri AS (a private IM).

Main lines of the conventional network are equipped with Class B train protection system ALSN as mentioned in ERA/TD/2011-11, v3.0. Maximum speed is 120km/h (passenger trains) and there are ongoing preparations for increasing passenger trains speed until 135 km/h. According to estimations, this is the maximum speed that is possible to allow by using national Class B train protection system.

Estonian Railways Ltd's aim is to make railway transport more attractive to users and to offer a competitive and safe alternative to road transportation. In order to achieve this goal, it is essential to increase the speed, and this requires an upgrade of CCS systems. During the period from 2020 to 2024, the entire rail network of Estonian Railways Ltd is going to be upgraded to a modern CCS system and a TMS (Traffic Management System) will be introduced. The planning of train timetables will be taken to an automated level.

In 2019 a market research was carried out in order to analyse suitable ETCS technologies for Estonian infrastructure. As a result of the study it was decided that in the upper mentioned modernization period there will be made preconditions for introduction of ETCS L1 technologies. Interoperability inside Baltic States and between Russia stays unchanged because Class B systems will remain as a alternative train protection system for cross-border sections.

The decommissioning of Class B systems on the public network will be carried out gradually. This means that in parallel with the introduction of ETCS systems for passenger trains also remain unchanged old Class B systems for freight trains. The implementation of ETCS L1 technologies is planned to be carried out in the period from 2025 - 2027.

Estonian second infrastructure manager Edelaraudtee Infrastruktuuri AS has so far planned to continue to use the Class B train protection systems and for that reason there will be double on board equipment needed to achieve interoperability between two infrastructures in near future.

Information regarding the 1435mm infrastructure development is available on the Rail Baltica official website and technologically there is foreseen the Level 2 baseline 3 ETCS system. In Estonia there will be 1520mm and 1435mm infrastructure that will run partly very close to each other and will have different technical parameters (beside standing catenary 3000V DC/ 25 000V AC 50Hz, Class B train protection).

6.3.1.9. Overview of Corridor deployment

On the following pages, a visual summary of the state of play regarding the deployment of interoperable systems on the Corridor can be found.

The information is provided in the form of 7 different Figures:

- ERTMS deployment :
    - 2023 (Figure 6-3-1)
    - 2030 (Figure 6-3-2)
- Baseline:
    - Actual situation (Figure 6-3-3)
    - 2030 (Figure 6-3-4)
- System version:
    - Actual situation (Figure 6-3-5)
    - 2030 (Figure 6-3-6)
- Overview of the Class A/Class B systems in 2030 (Figure 6-3-7)

Figure 6-3-1: ETCS Deployment – situation 2023

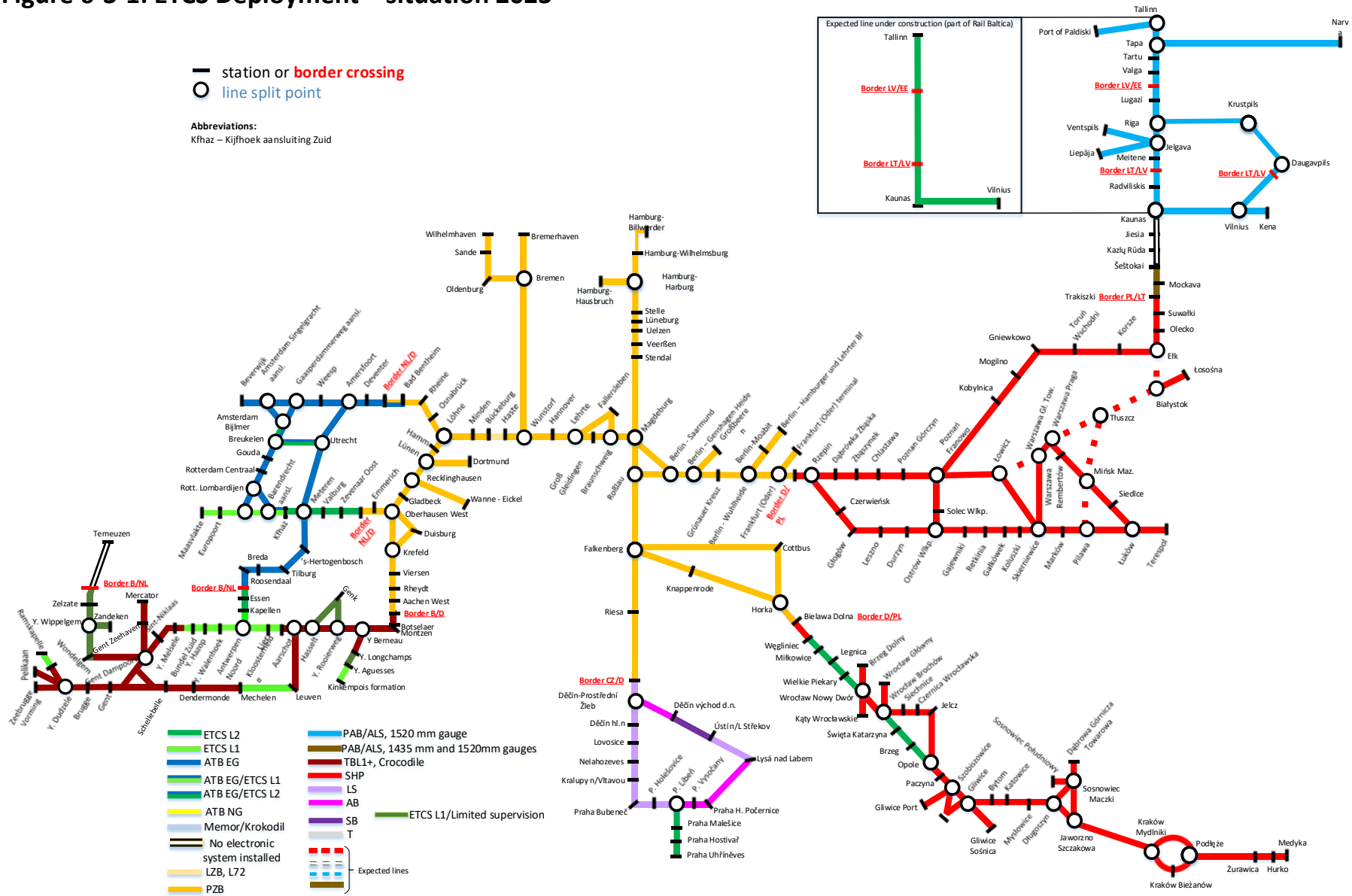


Figure 6-3-2: ETCS Deployment – situation 2030

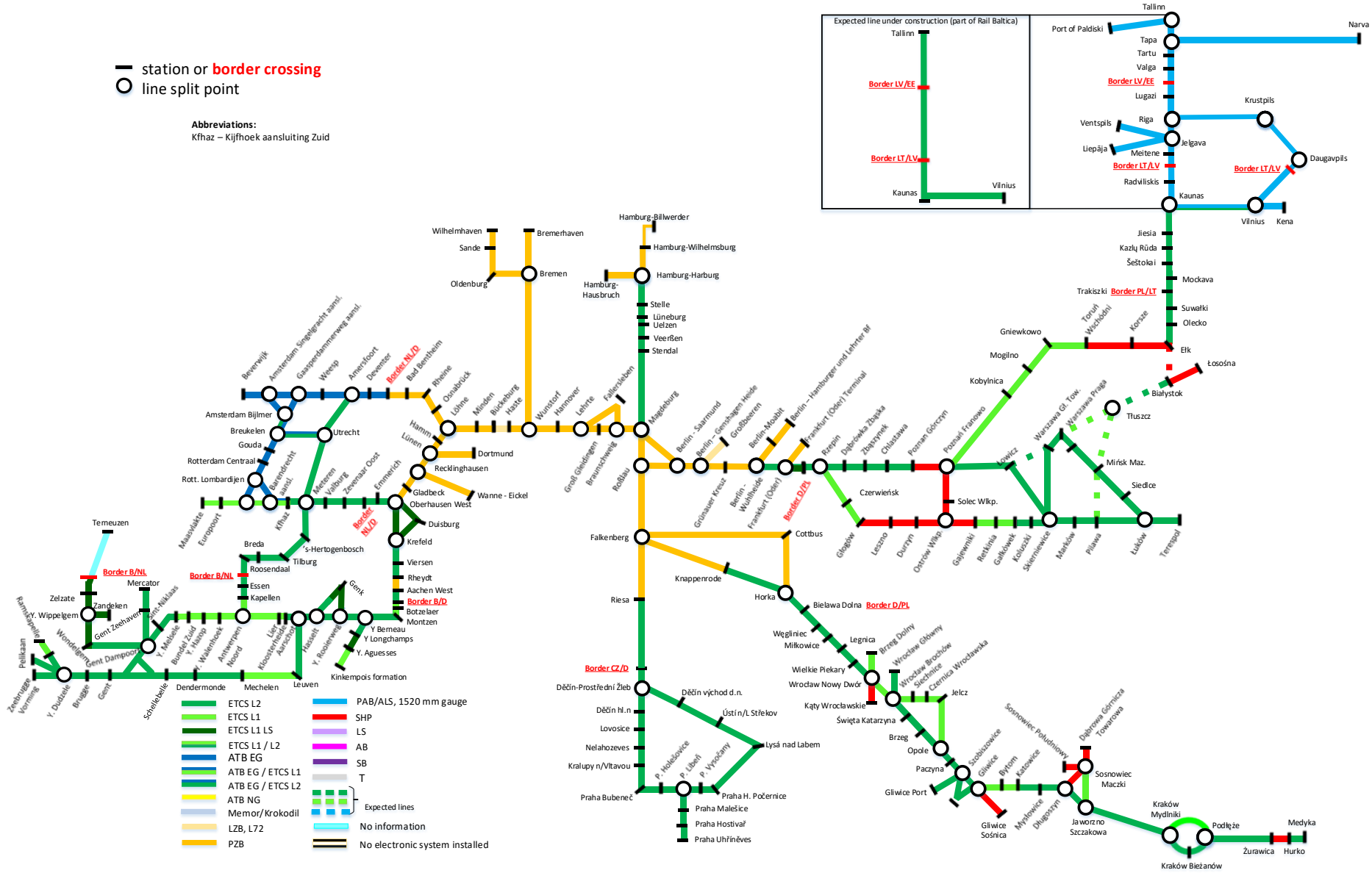


Figure 6-3-3: Baseline – actual situation (2023)

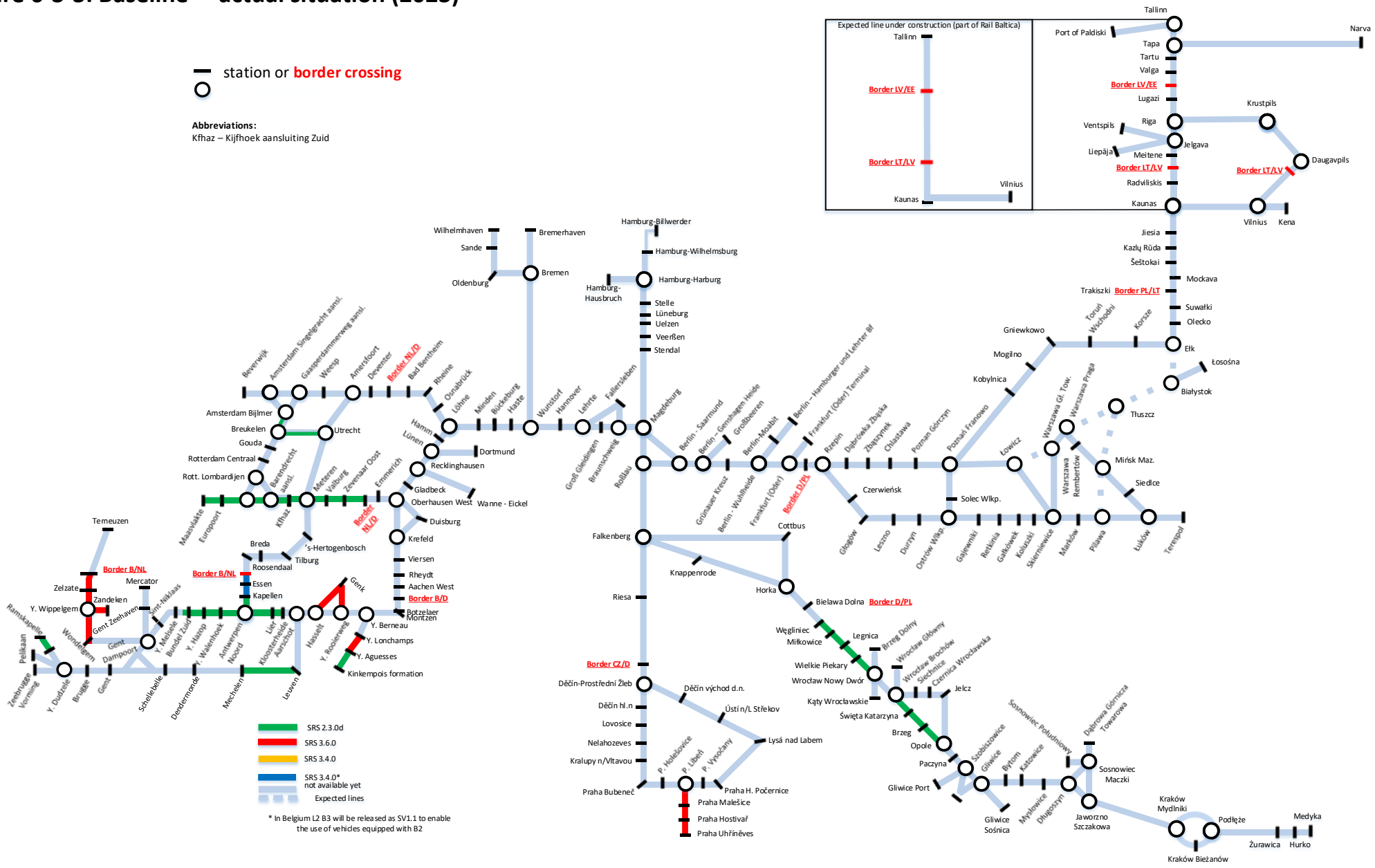


Figure 6-3-4: Baseline - situation 2030

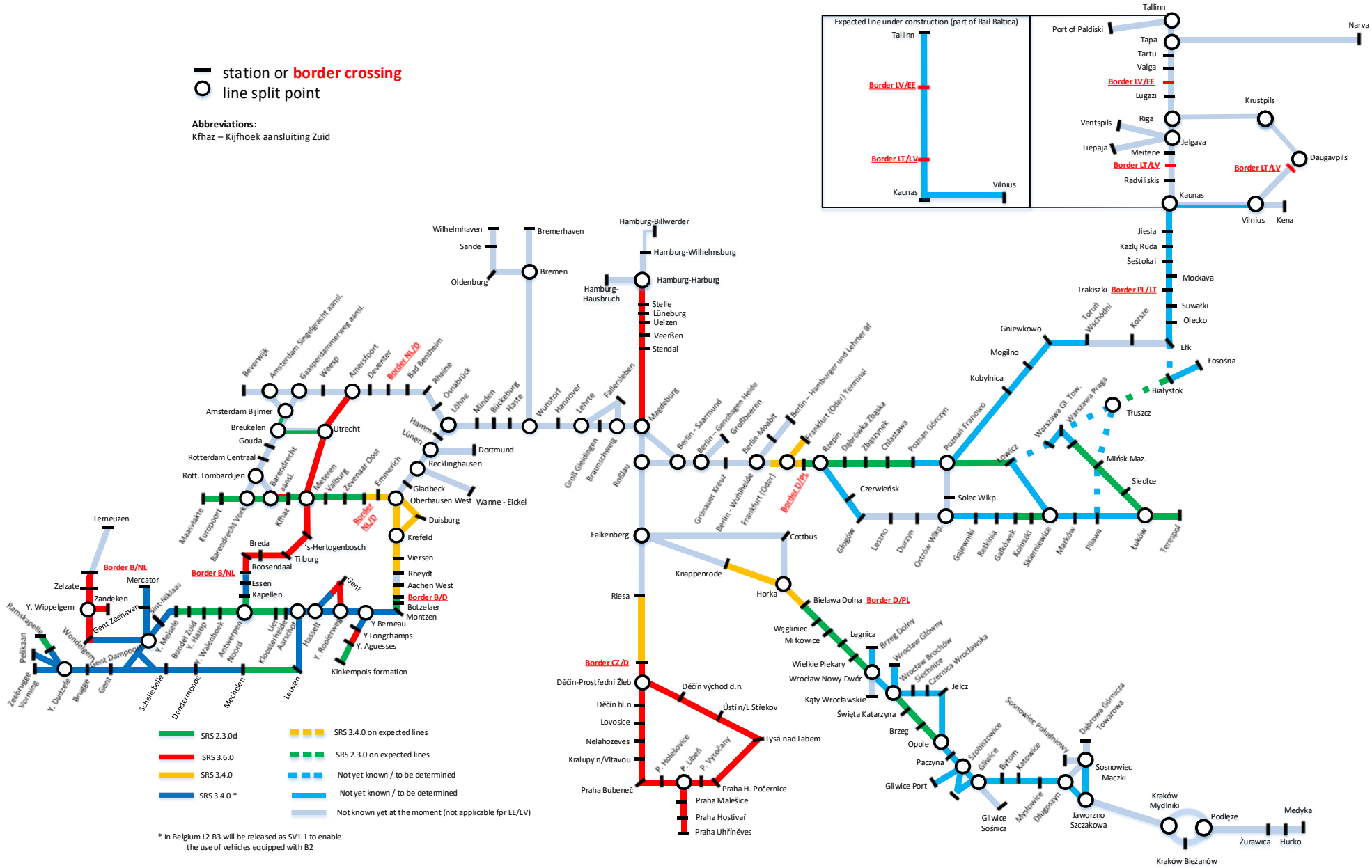


Figure 6-3-5: System version – actual situation (2023)

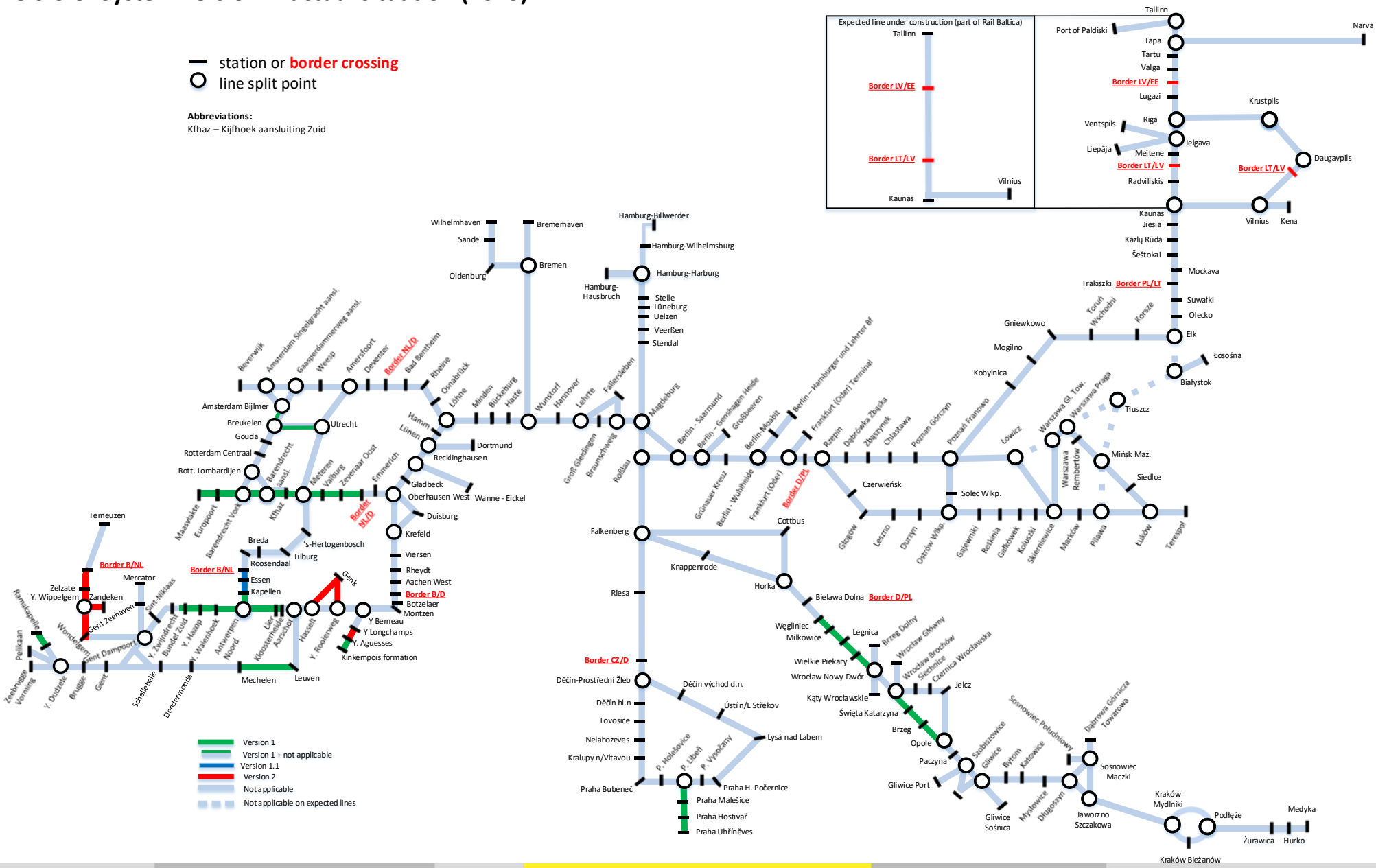


Figure 6-3-6: System version – situation 2030

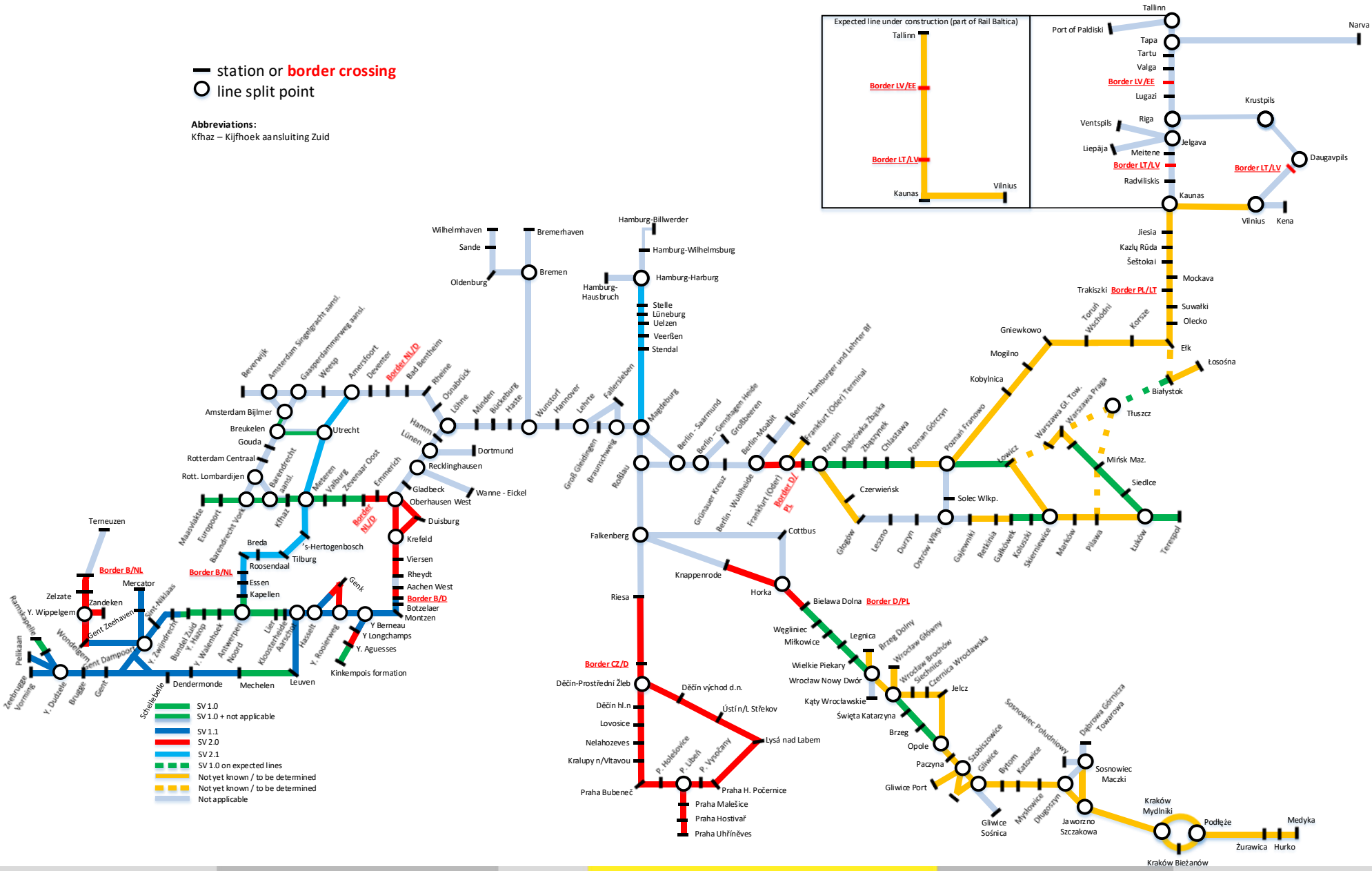
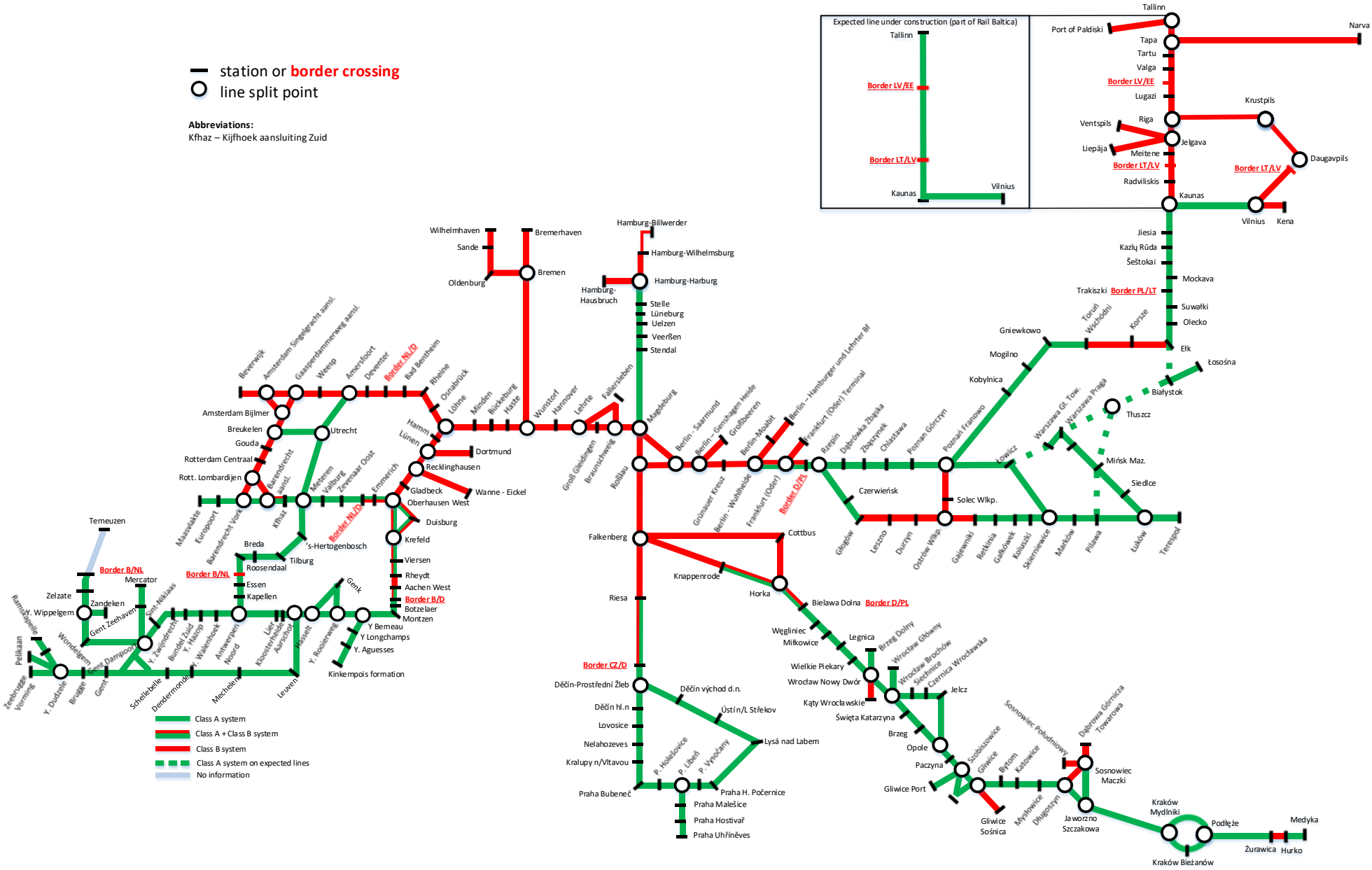


Figure 6-3-7: Class A system vs Class B system – situation 2030



6.3.2. GSM-R

In 1994, ETSI GSM standard was selected by UIC as the bearer for the first Digital Railway Radio Communication System. Needs of railways were captured in dedicated specifications named EIRENE, including both functional and system aspects. These specifications were reinforced as GSM-R within ETSI/3GPP international standards.

The first operational implementation of GSM-R targeting the set-up of this new technology was launched in 1999, and the first country-wide GSM-R operation started in 2004. In parallel, the EU Directives officially adopted the GSM-R as the basis for mobile communication between train and track for voice (train radio) and control-command and signalling data (ETCS), with the aim to form a worldwide standard, the European Rail Traffic Management System, the now well-known ERTMS.

Some of the clear objectives of ERTMS were to create a full homogeneity in the European railway networks, to optimize the global investments for train operations, and at the same time to guarantee the interoperability between national networks and commercial vehicles everywhere. This interoperability is regulated through the European Directives and the Technical Specifications for Interoperability of Control Command and Signalling (CCS TSI), published by the EU and supervised by the European Union Agency for Railways (ERA).

GSM-R has been a great success not only in Europe where more than 100,000 km of railway tracks are daily operated through GSM-R but also worldwide, and this number will double within the next years due to the on-going installations of this technology all over the world.

Nevertheless, on one side the needs of the railways are constantly evolving, and on the other side the telecom standards evolution remains dependent of the telecom industry evolution cycles, with an end of support for GSM-R planned from 2030 onwards.

These considerations led UIC, as soon as 2012, to launch the first studies for a successor to GSM-R, pertinently named Future Rail Mobile Communication System (FRMCS).

FRMCS has the objective to become the worldwide standard, conforming to European regulation as well as responding to the needs and obligations of rail organizations outside of Europe. As such, the UIC FRMCS project duly associates non-European members and is a first concrete application of the UIC strategy to build a Global Rail Traffic Management System for the whole rail industry.

The following text describes the GSM-R situation in the countries along the Corridor.

6.3.2.1. The Netherlands

The network is fully equipped with GSM-R.

6.3.2.2. Belgium

The network is fully equipped with GSM-R.

6.3.2.3. Germany

The network is fully equipped with GSM-R.

6.3.2.4. Czech Republic

The network is fully equipped with GSM-R.

6.3.2.5. Poland

In Poland, the plan is to use GSM-R as the train communication system, except for networks that are functionally separate from the rail system and to which the requirements concerning the interoperability of the rail system and shunting communications do not apply. The goal is to equip over 15000 km of railway lines with the GSM-R system (GSM-R network project 'Construction of ERTMS/GSM-R system infrastructure on PKP PLK S.A. railway lines under the KPW ERTMS' with other, line projects). Most of the GSM-R infrastructure will be installed as part of the GSM-R network project by 2025.

Until 2023, the VHF 150 MHz analog system (Polish class B system) will be used for voice communications. There is no plan for the VHF 150 MHz system to operate in parallel with the GSM-R system on the Polish railway network. After completion of the network GSM-R project and achieving full operation, the migration from the VHF 150 MHz to the GSM-R system will be carried out following the 'Day Zero' approach, i.e. the whole of the network will migrate from the VHF 150 MHz to the GSM-R system on the scheduled date.

6.3.2.6. Lithuania

The network is fully equipped with GSM-R.

6.3.2.7. Latvia

According to the Latvian national implementation plan of ERTMS, the deployment of GSM-R is expected not earlier than in 2030 for the 1520 mm railway track gauge network. The current project's design guidelines foresee the deployment of the Level 2 baseline 3 ETCS system, but may be revised, taking into account the latest developments. Decision regarding the mobile radio communications system will be taken at a later stage of the project, when the requirements for FRMCS will be formalised.

6.3.2.8. Estonia

According to the valid Estonian national implementation plan of ERTMS, the deployment of GSM-R is not expected to be implemented on the 1520 mm railway track gauge network.

Preparation regarding the mobile radio communications system will be taken at a later stage, when the requirements for FRMCS will be formalised. A cross-border cooperation platform for the Baltic States and Finland is under preparation to harmonise the region.

The ongoing design and construction of the new 1435 mm gauge European standard Rail Baltica line, aimed to integrate the Republic of Estonia into the European rail network, provides deployment of the ERTMS for the entire line. The current project's design guidelines foresee the deployment of the Level 2 baseline 3 ETCS system, but may be revised, taking into account the latest developments. Decision regarding the mobile radio communications system will be taken at a later stage of project, when the requirements for FRMCS will be formalised.

6.3.2.9. Overview of GSM-R deployment on the Corridor

Figures 6-3-8 and 6-3-9 show the GSM-R actual deployment on the Corridor and the 2030 deployment.

Figure 6-3-8: GSM-R – current situation

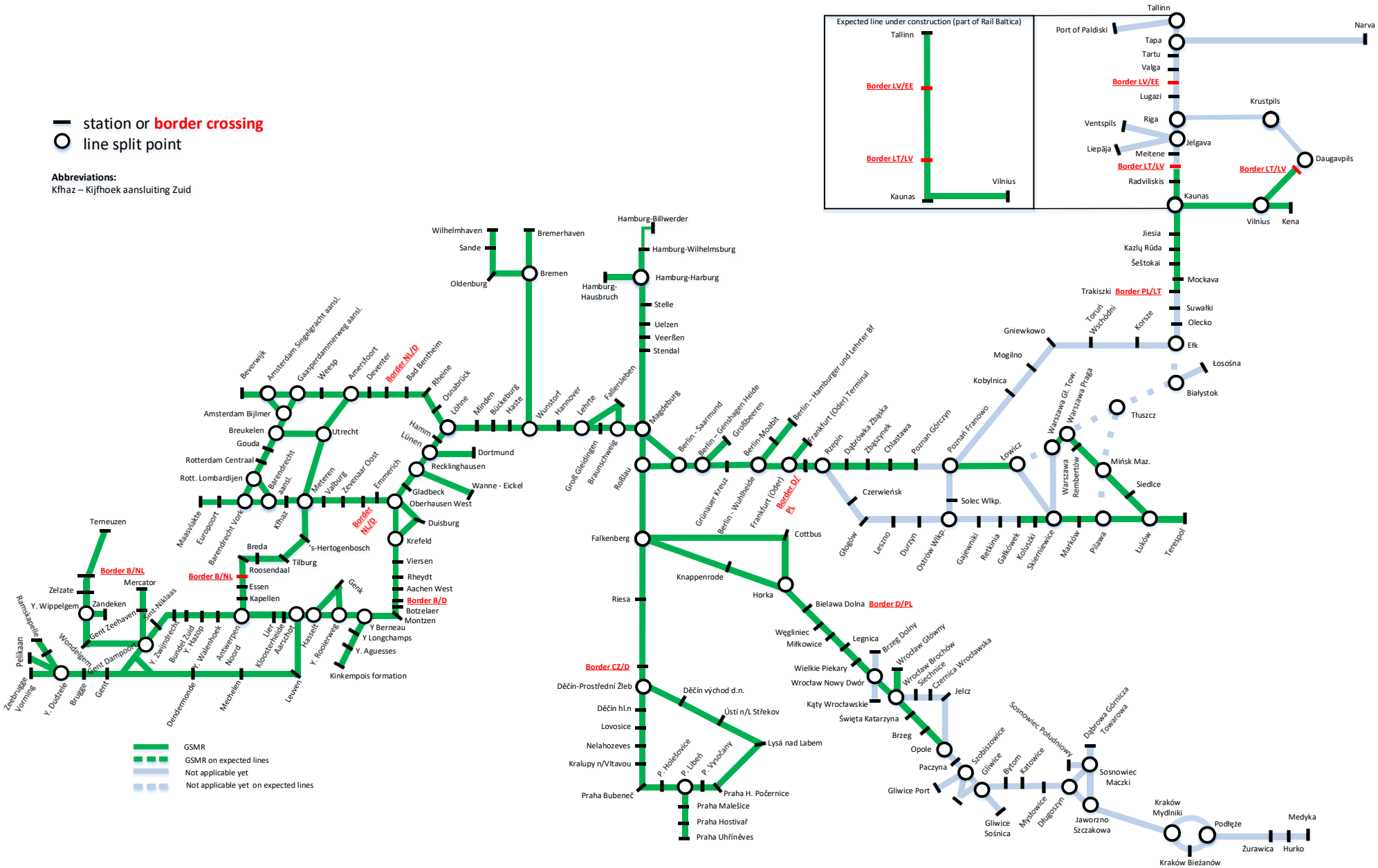
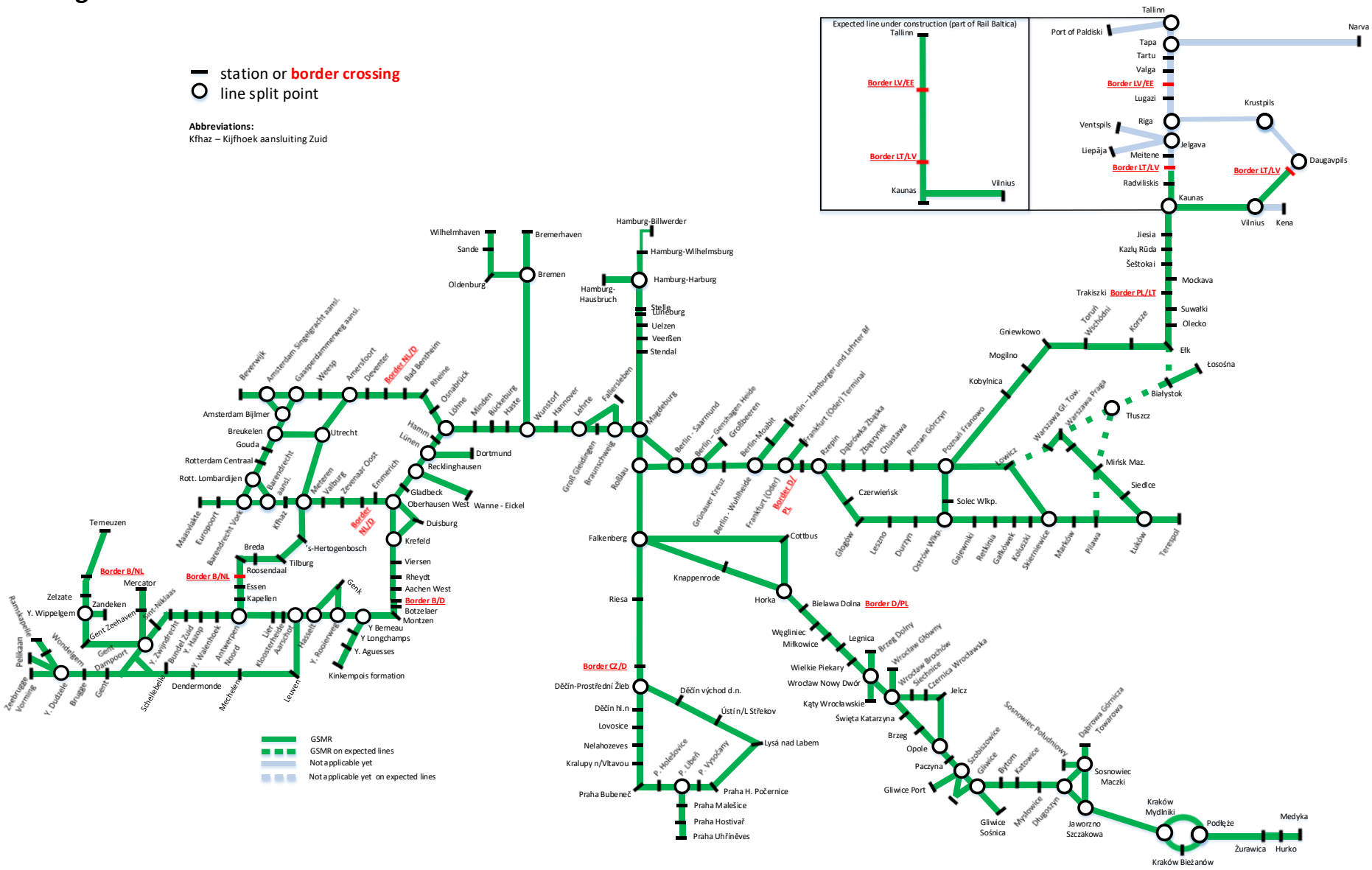


Figure 6-3-9: GSM-R – situation 2030



In BE, Infrabel will implement FRMCS in due time according to the future development of the tool but a precise date still needs to be determined.

6.3.3. Border descriptions

Today's existing ERTMS trackside installations in Europe are mostly implemented and managed by one infrastructure manager without crossing borders. On RFC NS-B, ERTMS will be applied and operated internationally, including border crossings. However, the installation and authorisation of the trackside part is still in the hands of each Member State. The currently available ERTMS specifications, product developments as well as authorisation rules will be proven on RFC NS-B in an international Corridor environment. On the cross-border sections the interaction is far more complex due to different national technical requirements and different operational rules. An overview of the cross-border solutions can be found in Annex 2.

6.4 Reference to Union Contribution

RFC NS-B has been benefiting from European co-financing for several years.

At the moment the Corridor benefits from a grant under the CEF II programme – Technical Assistance for the years 2022-2024 (21-PL-CEF-TA-2021-RFC_NS-B).

Annex 1: List of lines

Country	Line section	Length of section (km)	Type of line	Track gauge
NL	Maasvlakte - Zevenaar grens			
NL	Maasvlakte - Europoort	13,8	principal	1435 mm
NL	Europoort - Botlek	10,6	principal	1435 mm
NL	Botlek - Pernis	4,7	principal	1435 mm
NL	Pernis - Waalhaven Zuid	5,3	principal	1435 mm
NL	Waalhaven Zuid - Barendrecht Vork	5,3	principal	1435 mm
NL	Barendrecht Vork - Barendrecht aansluiting	2,9	principal	1435 mm
NL	Barendrecht aansluiting - Kijfhoek aansluiting Zuid	5,3	principal	1435 mm
NL	Kijfhoek aansluiting Zuid - Meteren West	48	principal	1435 mm
NL	Meteren West - Meteren	1	principal	1435 mm
NL	Meteren - Valburg	49	principal	1435 mm
NL	Valburg - Zevenaar Oost	21	principal	1435 mm
NL	Zevenaar Oost - Zevenaar grens	3	principal	1435 mm
NL	Kijfhoek - Weesp			
NL	Barendrecht Aansluiting - Rotterdam Lombardijen	3,2	diversionary	1435 mm
NL	Barendrecht Vork - Rotterdam Lombardijen	0,7	diversionary	1435 mm
NL	Rotterdam Lombardijen - Rotterdam Centraal	5,5	diversionary	1435 mm
NL	Rotterdam Centraal - Gouda	24	diversionary	1435 mm
NL	Gouda - Woerden	16	diversionary	1435 mm
NL	Woerden - Harmelen	4	diversionary	1435 mm
NL	Harmelen - Breukelen	8	diversionary	1435 mm
NL	Breukelen - Amsterdam Bijlmer	18	diversionary	1435 mm
NL	Amsterdam Bijlmer - Gaasperdammerweg	4	diversionary	1435 mm
NL	Breukelen-Utrecht	12	diversionary	1435 mm
NL	Amsterdam Bijlmer - Amsterdam Singelgrachtaansluiting	12	diversionary	1435 mm
NL	Beverwijk - Oldenzaal grens			
NL	Beverwijk - Haarlem	11,5	connecting	1435 mm
NL	Haarlem - Amsterdam Singelgracht aansluiting	17	connecting	1435 mm
NL	Amsterdam Singelgracht aansluiting - Gaasperdammerweg	9	principal	1435 mm
NL	Gaasperdammerweg - Weesp	4	principal	1435 mm
NL	Weesp - Hilversum	15	principal	1435 mm
NL	Hilversum - Amersfoort	16	principal	1435 mm
NL	Amersfoort - Deventer	58	principal	1435 mm

NL	Deventer - Hengelo	27	principal	1435 mm
NL	Hengelo - Oldenzaal grens	18	principal	1435 mm
NL	Roosendaal grens - 's Hertogenbosch			
NL	Roosendaal grens - Roosendaal	8,5	principal	1435 mm
NL	Roosendaal - Breda	22,5	principal	1435 mm
NL	Breda - Tilburg	21	principal	1435 mm
NL	Tilburg - 's Hertogenbosch	22,5	principal	1435 mm
NL	's Hertogenbosch - Amersfoort			
NL	's Hertogenbosch - Meteren Zuid	20	principal	1435 mm
NL	Meteren Zuid - Meteren	2	principal	1435 mm
NL	Meteren Zuid - Meteren Noord	2	principal	1435 mm
NL	Meteren Noord - Utrecht	27	principal	1435 mm
NL	Utrecht - Amersfoort	21	principal	1435 mm
NL	Zeeuws-Vlaanderen			
NL	NL/B Border- Sluiskil aansluiting	9,14	connecting	1435 mm
NL	Sluiskil aansluiting - Terneuzen Zuidzijde	1,78	connecting	1435 mm
NL	Terneuzen Zuidzijde - Terneuzen	4,2	connecting	1435 mm
NL	Terneuzen Zuidzijde - Axel aansluiting	2,48	connecting	1435 mm
BE	Antwerpen Noord (Y. Schijn) - Montzen Border			
BE	Antwerpen Noord (Y. Schijn) - Y. Driehoekstraat	1,1	principal	1435 mm
BE	Y. Driehoekstraat - Antwerpen Berchem	11,8	principal	1435 mm
BE	Antwerpen Berchem - Lier	11,75	principal	1435 mm
BE	Lier - Kloosterheide	3,3	principal	1435 mm
BE	Kloosterheide - Y. Noord Driehoek Aarschot	23,2	principal	1435 mm
BE	Y. Noord Driehoek Aarschot - Y. Oost Driehoek Aarschot	0,8	principal	1435 mm
BE	Y. Oost Driehoek Aarschot - Hasselt	36,1	principal	1435 mm
BE	Hasselt - Y. Rooierweg	14,6	principal	1435 mm
BE	Y. Rooierweg - Glons	16,86	principal	1435 mm
BE	Glons - Y. Berneau	14,64	principal	1435 mm
BE	Y. Berneau - Montzen Gril Q	18,14	principal	1435 mm
BE	Montzen Gril Q - Botzelaer	5,6	principal	1435 mm
BE	Botzelaer - Montzen Border	1,1	principal	1435 mm
BE	Y. Oost Driehoek Aarschot - Leuven (Y. Holsbeek) - Zeebrugge vorming			
BE	Y. Oost Driehoek Aarschot - Y. Zuid Driehoek Aarschot	1,2	principal	1435 mm
BE	Y. Zuid Driehoek Aarschot - Leuven (Y. Holsbeek)	13	principal	1435 mm
BE	Leuven (Y. Holsbeek) - Mechelen	22,65	principal	1435 mm
BE	Mechelen - Dendermonde	27,2	principal	1435 mm
BE	Dendermonde - Y. Oost Driehoek Ledeberg	26,28	principal	1435 mm
BE	Y. Oost Driehoek Ledeberg - Gent Sint Pieters	3,4	principal	1435 mm
BE	Gent-Sint Pieters - Brugge	5,3	Principal	1435 mm
BE	Brugge - Y. Dudzele	6,8	Principal	1435 mm

BE	Y. Dudzele - Zeebrugge Vorming	6,21	Principal	1435 mm
BE	Essen Border - Gent Sint Pieters			
BE	Essen Border - Kapellen	17,97	principal	1435 mm
BE	Kapellen - Y. Sint Mariaburg	2,46	principal	1435 mm
BE	Y. Sint Mariaburg - Y. Driehoekstraat	0,9	principal	1435 mm
BE	Y. Driehoekstraat - Antwerpen Noord (Y. Schijn) -	1,1	principal	1435 mm
BE	Antwerpen Noord (Y. Schijn) - Y. Walenhoek	7,6	principal	1435 mm
BE	Y. Walenhoek - Y. Hazop	15,93	principal	1435 mm
BE	Y. Hazop - Bundel Zuid	1,1	principal	1435 mm
BE	Bundel Zuid - Y. Kattestraat	7,1	principal	1435 mm
BE	Y. Kattestraat - Y. Melsele	1,36	principal	1435 mm
BE	Y. Melsele - Sint Niklaas	11,31	principal	1435 mm
BE	Sint Niklaas - Lokeren	13,1	principal	1435 mm
BE	Lokeren - Gent Dampoort	20,21	principal	1435 mm
BE	Gent Dampoort - Gent Sint Pieters	6,43	principal	1435 mm
BE	Gent Zeehaven - Y. Oost Driehoek Ledeberg			
BE	Gent Zeehaven - Gent Dampoort	1,21	principal	1435 mm
BE	Gent Dampoort - Y. Noord Driehoek Ledeberg	3	principal	1435 mm
BE	Y. Noord Driehoek Ledeberg - Y. Oost Driehoek Ledeberg	0,7	principal	1435 mm
BE	Gent Zeehaven - (bundel) Mercator			
BE	Gent Zeehaven - (bundel) Mercator	2,49	connecting	1435 mm
BE	Gent Dampoort - Zelzate grens			
BE	Gent Dampoort - Wondelgem	5,32	connecting	1435 mm
BE	Wondelgem - Y. Wippelgem	6,87	connecting	1435 mm
BE	Y.Wippelgem - Zelzate grens	8,74	connecting	1435 mm
BE	Y. Wippelgem - (bundel) Zandeken			
BE	Y. Wippelgem - (bundel) Zandeken	0,69	connecting	1435 mm
BE	Y. Dudzele - (bundel) Pelikaan / (bundel) Ramskapelle			
BE	Y. Dudzele - Y. Pelikaan	3,65	connecting	1435 mm
BE	Y. Pelikaan - (bundel)Pelikaan	1,28	connecting	1435 mm
BE	Y. Pelikaan - Y. Eivoorde	0,66	connecting	1435 mm
BE	Y. Eivoorde - (bundel) Ramskapelle	2,73	connecting	1435 mm
BE	Hasselt - Genk Goederen			
BE	Y West Driehoek Hasselt - Y. Zonhoven	2,6	connecting	1435 mm
BE	Y. Zonhoven - Genk Goederen	13,2	connecting	1435 mm
BE	Y. Rooierweg - Genk Goederen			
BE	Y. Rooierweg - Genk Goederen	13,8	connecting	1435 mm
BE	Y. Rooierweg - Genk Zuid			
BE	Y. Rooierweg - Genk Zuid	8,0	connecting	1435 mm
BE	Y Berneau - Kinkempois			
BE	Y Berneau - Visé	3,6	connecting	1435 mm
BE	Visé - Froidmont	16,0	connecting	1435 mm

BE	Froidmont - Kinkempois formation	2,0	connecting	1435 mm
BE	Lier - Hamont Border BE/NL			
BE	Lier - Debiest	3,2	Expected principal	1435 mm
BE	Debiest - Herentals	22,6	Expected principal	1435 mm
BE	Herentals - Olen	15,3	Expected principal	1435 mm
BE	Olen - Mol	23,0	Expected principal	1435 mm
BE	Mol - Neerpelt	8,8	Expected principal	1435 mm
BE	Neerpelt - Hamont	0,9	Expected principal	1435 mm
BE	Hamont - Hamont border BE/NL	9,7	Expected principal	1435 mm
DE	Aachen Border BE/DE - Oberhausen West			
DE	Aachen Border BE/DE - Aachen West (Strecke 2552)	5,4	Principal	1435 mm
DE	Aachen West - Rheydt Hbf (Strecke 2550)	55,5	Principal	1435 mm
DE	Rheydt Hbf - Viersen Hbf (Strecke 2550, 2520)	12,5	Principal	1435 mm
DE	Rheydt (Gbf) - Viersen-Helenabrunn (Strecke 2522)	11,7	Connecting	1435 mm
DE	Viersen Hbf - Krefeld (Strecke 2520)	15,5	Principal	1435 mm
DE	Krefeld - Meerbeck - Oberhausen West (Strecken 2505, 2340, 2330, 2331)	40,8	Principal	1435 mm
DE	(Krefeld -) Duisburg - Oberhausen West (Strecke 2505, 2323, 2320)	17,9	Connecting	1435 mm
DE	Border NL/DE - Emmerich - Oberhausen-Osterfeld			
DE	Border NL/DE - Emmerich - Ob.-Sterkrade - Ob.-Osterfeld (Strecke 2270, 2206)	75,7	Principal	1435 mm
DE	Oberhausen West - Löhne			
DE	Oberhausen West - Oberhausen-Osterfeld - Gladbeck W (Str. 2206, 2320, 2250)	19,3	Principal	1435 mm
DE	Gladbeck West - Recklinghausen Ost (Strecke 2250)	18,6	Principal	1435 mm
DE	Recklinghausen Ost - Wanne-Eickel (Strecke 2250)	9,3	Connecting	1435 mm
DE	Recklinghausen - Hamm Rbf (Strecke 2250)	43,6	Principal	1435 mm
DE	Lünen Hbf - Dortmund Hbf (Strecke 2100)	13,9	Connecting	1435 mm
DE	Hamm - Löhne (Strecke 2990)	92,2	Principal	1435 mm
DE	Hamm - Löhne (Strecke 1700)	90,9	Diversionary	1435 mm
DE	Border NL/DE - Bad Bentheim - Löhne			
DE	Border NL/DE - Bad Bentheim - Osnabrück (Strecke 2026, 2931, 2992)	77,0	Principal	1435 mm
DE	Osnabrück - Löhne (Strecke 2992)	47,3	Principal	1435 mm
DE	Löhne - Wunstorf			
DE	Löhne - Minden (Strecke 2990)	23,4	Principal	1435 mm

DE	Löhne - Minden (Strecke 1700)	20,9	Diversionary	1435 mm
DE	Minden - Haste (Strecke 1700)	43,0	Principal	1435 mm
DE	Wilhelmshaven - Bremen			
DE	Wilhelmshaven - Sande (Strecken 1522, 1540, 1552)	15,7	Principal	1435 mm
DE	Sande - Oldenburg (Strecke 1522)	45,0	Principal	1435 mm
DE	Oldenburg - Bremen (Strecke 1500)	44,3	Principal	1435 mm
DE	Bremerhaven - Bremen - Wunstorf			
DE	Bremerhaven - Bremen (Strecke 1740)	72,7	Principal	1435 mm
DE	Bremen - Wunstorf (Strecke 1740)	100,8	Principal	1435 mm
DE	Wunstorf - Hannover-Linden/Hannover Hbf - Lehrte - Magdeburg			
DE	Wunstorf - Hannover-Linden - Lehrte (Strecke 1750)	43,3	Principal	1435 mm
DE	Wunstorf - Hannover Hbf - Lehrte (Strecke 1700, 1730)	37,7	Diversionary	1435 mm
DE	Lehrte - Groß Gleidingen (Strecke 1730)	36,8	Principal	1435 mm
DE	Lehrte - Fallersleben (Strecke 6107)	52,9	Connecting	1435 mm
DE	Groß Gleidingen - Magdeburg Hbf (Strecke 1730, 1900, 6400, 6110)	91,4	Principal	1435 mm
DE	Groß Gleidingen - Braunschweig Rbf (Strecke 1910, 1911, 1912, 1913, 1914)	22,4	Connecting	1435 mm
DE	(Braunschweig -) Weddel - Fallersleben (Strecke 1956)	20,5	Connecting	1435 mm
DE	Hamburg - (Magdeburg) Brücke			
DE	Hamburg-Hausbruch - Hamburg-Harburg (Strecke 1720)	5,7	Principal	1435 mm
DE	Hamburg Süd - Hamburg-Harburg (Strecke 1255)	11,8	Principal	1435 mm
DE	Hamburg-Billwerder - Hamburg-Harburg (Strecke 1280)	16,5	Connecting	1435 mm
DE	Hamburg-Harburg - Stelle (Strecke 1280/1284)	11,4	Principal	1435 mm
DE	Hamburg-Harburg - Stelle (Strecke 1720)	11,2	Connecting	1435 mm
DE	Stelle - Uelzen (Strecke 1720)	61,8	Principal	1435 mm
DE	Stelle - Lüneburg (Strecke 1153)	24,9	Principal	1435 mm
DE	Uelzen - Stendal (Strecke 6899)	107,3	Principal	1435 mm
DE	Stendal - (Magdeburg) Brücke (Strecke 6402, 6406, 6408)	55,8	Principal	1435 mm
DE	Madgeburg - Berlin-Saarmund			
DE	Magdeburg Hbf - Saarmund (Strecke 6110, 6112, 6116)	122,1	Principal	1435 mm
DE	(Madgeburg -) Biederitz - Roßlau (Elbe) - Falkenberg			
DE	Biederitz -Rodleben (Strw. 6411-6415) (Strecke 6410, 6411)	46,2	Principal	1435 mm
DE	Rodleben (Strw. 6411-6415) - Roßlau (Elbe) (Strecke 6411)	1,4	Connecting	1435 mm
DE	Rodleben (Strw. 6411-6415) - Falkenberg (Strecke 6415, 6417, 6207)	83,9	Principal	1435 mm
DE	Roßlau (Elbe) - Bft Roßlau (Elbe) Aw (Strecke 6207)	4,3	Connecting	1435 mm
DE	Falkenberg - Knappenrode - Horka - Border DE/PL			
DE	Falkenberg - Knappenrode (Strecke 6207)	82,5	Principal	1435 mm

DE	Knappenrode - Horka - Border DE/PL (Strecke 6207)	53,7	Principal	1435 mm
DE	Falkenberg - Cottbus - Horka			
DE	Falkenberg - Cottbus (Strecke 6345)	79,3	Diversionary	1435 mm
DE	Cottbus - Horka (Strecke 6142, 6208)	73,9	Diversionary	1435 mm
DE	Roßlau - Berlin - Frankfurt (Oder) - Border DE/PL			
DE	Roßlau - Saarmund (Strecke 6414, 6118, 6124, 6122, 6117)	84,5	Diversionary	1435 mm
DE	Saarmund - Berlin-Eichgestell (Strecke 6126)	35,6	Principal	1435 mm
DE	Berlin-Genshagener Heide - Großbeeren (Strecke 6065, 6127, 6129, 6130)	9,7	Connecting	1435 mm
DE	Berlin-Eichgestell - Frankfurt (O) - Border DE/PL (Strecke 6080, 6148, 6153, 6155)	77,0	Principal	1435 mm
DE	Falkenberg - Bad Schandau - Border CZ/DE			
DE	Falkenberg - Zeithain Bogendreieck (Riesa) (Strecke 6133)	30,5	Principal	1435 mm
DE	Röderau - Riesa (Strecke 6254)	3,5	Connecting	1435 mm
DE	Röderau Bogendreieck - Zeithain Bogendreieck (Strecke 6363)	3,6	Connecting	1435 mm
DE	Zeithain Bogendr. - Bad Schand. - Bord. CZ/DE (Str. 6241, 6363, 6248, 6249, 6240, 6244)	98,0	Principal	1435 mm
DE	Terminal at Frankurt (Oder)			
DE	Frankfurt (Oder) Pbf - Terminal Frankfurt (Oder) (Strecke 6156)	1,7	Connecting	1435 mm
DE	Terminal at Berlin Westhafen			
DE	Berlin-Stadtforst - Berlin-Moabit (Strecke 6153, 6140, 6170)	21,3	Connecting	1435 mm
DE	Berlin-Moabit - Berlin-Hamburger und Lehrter Bf (Strecke 6106)	2,3	Connecting	1435 mm
CZ	Praha Libeň - Praha Holešovice	5,186	principal	1435 mm
CZ	Praha Holešovice - Praha Bubeneč	1,523	principal	1435 mm
CZ	Praha Bubeneč - Kralupy n/Vltavou	22,051	principal	1435 mm
CZ	Kralupy n/Vltavou - Nelahozeves	5,408	principal	1435 mm
CZ	Nelahozeves - Lovosice	52,473	principal	1435 mm
CZ	Lovosice - Děčín hl.n.	44,581	principal	1435 mm
CZ	Děčín hl.n. - Děčín Prostřední Žleb	3,288	principal	1435 mm
CZ	Děčín Prostřední Žleb - state border Germany	8,052	principal	1435 mm
CZ	Praha Libeň - Praha Vysočany	1,229	diversionary	1435 mm
CZ	Praha Vysočany - Praha H.Počernice	8,572	diversionary	1435 mm
CZ	Praha H.Počernice - Lysá n/Labem	20,53	diversionary	1435 mm
CZ	Lysá n/Labem - Ústí n/L Střekov	93,511	diversionary	1435 mm
CZ	Ústí n/L Střekov - Děčín východ d.n.	25,759	diversionary	1435 mm
CZ	Děčín východ d.n. - Děčín Prostřední Žleb	2,755	diversionary	1435 mm
CZ	Praha Libeň - Praha Malešice	3,884	connecting	1435 mm
CZ	Praha Malešice - Praha Hostivař	3,869	connecting	1435 mm

CZ	Praha Hostivař - Praha Uhříněves	4,831	connecting	1435 mm
PL	Border D/PL - Poznań - Terespol (Border PL/Belorussia)			
PL	Kunowice (Border D/PL) - Rzepin	17,317	Principal	1435 mm
PL	Rzepin - Chlastawa	78,258	Principal	1435 mm
PL	Chlastawa - Poznań Górczyn	73,599	Principal	1435 mm
PL	Poznań Górczyn - Poznań Starołęka PSK	2,674	Principal	1435 mm
PL	Poznań Starołęka PSK - Poznań Starołęka	1,177	Principal	1435 mm
PL	Poznań Starołęka - Pokrzywno	2,560	Principal	1435 mm
PL	Pokrzywno - Poznań Franowo PFA	4,888	Principal	1435 mm
PL	Poznań Franowo PFA - Swarzędz	5,817	Principal	1435 mm
PL	Swarzędz - Barłogi	124,637	Principal	1435 mm
PL	Barłogi - Kutno	40,204	Principal	1435 mm
PL	Kutno - Łowicz Główny	45,254	Principal	1435 mm
PL	Łowicz Główny - Placencja	3,500	Principal	1435 mm
PL	Placencja - Skierniewka	1,876	Principal	1435 mm
PL	Placencja - Skierniewka	14,726	Principal	1435 mm
PL	Skierniewka - Skierniewice	1,616	Principal	1435 mm
PL	Skierniewice - Marków	9,275	Principal	1435 mm
PL	Skierniewice - Marków	15,780	Principal	1435 mm
PL	Marków - Czachówek Zachodni	39,690	Principal	1435 mm
PL	Czachówek Zachodni - Czachówek Wschodni	2,782	Principal	1435 mm
PL	Czachówek Wschodni - Jaźwiny (Pilawa)	29,278	Principal	1435 mm
PL	Pilawa - Poważe	58,403	Principal	1435 mm
PL	Poważe - Łuków	3,385	Principal	1435 mm
PL	Łuków - Biała Podlaska	52,415	Principal	1435 mm
PL	Biała Podlaska - Małaszewicze	28,712	Principal	1435 mm
PL	Małaszewicze - Terespol	7,705	Principal	1435 mm
PL	Terespol - Terespol (Boder PL/Belorussia)	2,377	Principal	1435 mm
PL	Ełk - Trakiszki (Border PL/LT)			
PL	Ełk - Olecko	28,486	Principal	1435 mm
PL	Olecko - (Gw)	16,457	Principal	1435 mm
PL	(Gw) - Papiernia	20,700	Principal	1435 mm
PL	Papiernia - Suwałki	5,745	Principal	1435 mm
PL	Suwałki - Trakiszki	25,690	Principal	1435 mm
PL	Trakiszki - Trakiszki (Border PL/LT)	3,432	Principal	1435 mm
PL	Poznań - Stary Staw			
PL	(Poznań Gł.) P. Starołęka Psk - Poznań Krzesiny	5,556	Diversionary	1435 mm
PL	Poznań Krzesiny - Kórnik	8,622	Diversionary	1435 mm
PL	Kórnik - Solec Wlkp.	32,84	Diversionary	1435 mm
PL	Solec Wlkp. - Jarocin	16,586	Diversionary	1435 mm
PL	Jarocin - Franklinów	26,747	Diversionary	1435 mm
PL	Franklinów - Stary Staw	1,466	Diversionary	1435 mm

PL	Rzepin - Skierniewice			
PL	Rzepin - Jerzmanice Lubuskie	6,628	Diversionary	1435 mm
PL	Jerzmanice Lubuskie - Czerwieńsk	50,018	Diversionary	1435 mm
PL	Czerwieńsk - Głogów	67,45	Diversionary	1435 mm
PL	Głogów - Leszno	46,782	Diversionary	1435 mm
PL	Leszno - Kąkolewo	11,874	Diversionary	1435 mm
PL	Kąkolewo - Osusz	56,262	Diversionary	1435 mm
PL	Osusz - Durzyn	5,289	Diversionary	1435 mm
PL	Durzyn - Ostrów Wielkopolski	26,322	Diversionary	1435 mm
PL	Ostrów Wielkopolski - Gajewniki	96,279	Diversionary	1435 mm
PL	Gajewnik - Retkinia	37,492	Diversionary	1435 mm
PL	Retkinia - Łódź Kaliska Towarowa	1,752	Diversionary	1435 mm
PL	Łódź Kaliska Towarowa - Łódź Chojny	5,161	Diversionary	1435 mm
PL	Łódź Chojny - Łódź Olechów	7,979	Diversionary	1435 mm
PL	Łódź Olechów - Gałkówek	9,302	Diversionary	1435 mm
PL	Gałkówek - Koluszki	7,203	Diversionary	1435 mm
PL	Koluszki - Skierniewice	39,265	Diversionary	1435 mm
PL	Łowicz - Warszawa - Łuków			
PL	Łowicz - Warszawa Główna Towarowa	72,281	Expected diversionary	1435 mm
PL	Warszawa Główna Towarowa - Warszawa Gdańska	9,175	Diversionary	1435 mm
PL	Warszawa Gdańska - Warszawa Praga	3,963	Diversionary	1435 mm
PL	Warszawa Targówek - Warszawa Michałów	1,211	Diversionary	1435 mm
PL	Warszawa Michałów - Warszawa Wschodnia Tow.	1,559	Diversionary	1435 mm
PL	Warszawa Wschodnia Tow. - Warszawa Rembertów	3,923	Diversionary	1435 mm
PL	Warszawa Rembertów - Stojadła	27,262	Diversionary	1435 mm
PL	Stojadła - Mińsk Mazowiecki	1,58	Diversionary	1435 mm
PL	Mińsk Mazowiecki - Siedlce	52,099	Diversionary	1435 mm
PL	Siedlce - Łuków	27,754	Diversionary	1435 mm
PL	Piława - Tłuszcz			
PL	Pilawa - Tłuszcz	59,595	Expected principal	1435 mm
PL	Warszawa Praga - Tłuszcz - Białystok - Ełk			
PL	Warszawa Praga - Tłuszcz	44,271	Expected diversionary	1435 mm
PL	Tłuszcz - Czyżew	74,036	Expected principal	1435 mm
PL	Czyżew - Białystok	65,467	Expected principal	1435 mm
PL	Białystok - Ełk	103,236	Expected principal	1435 mm
PL	Skierniewice - Warszawa Główna Towarowa			
PL	Skierniewice - Pruszków	50,038	Diversionary	1435 mm

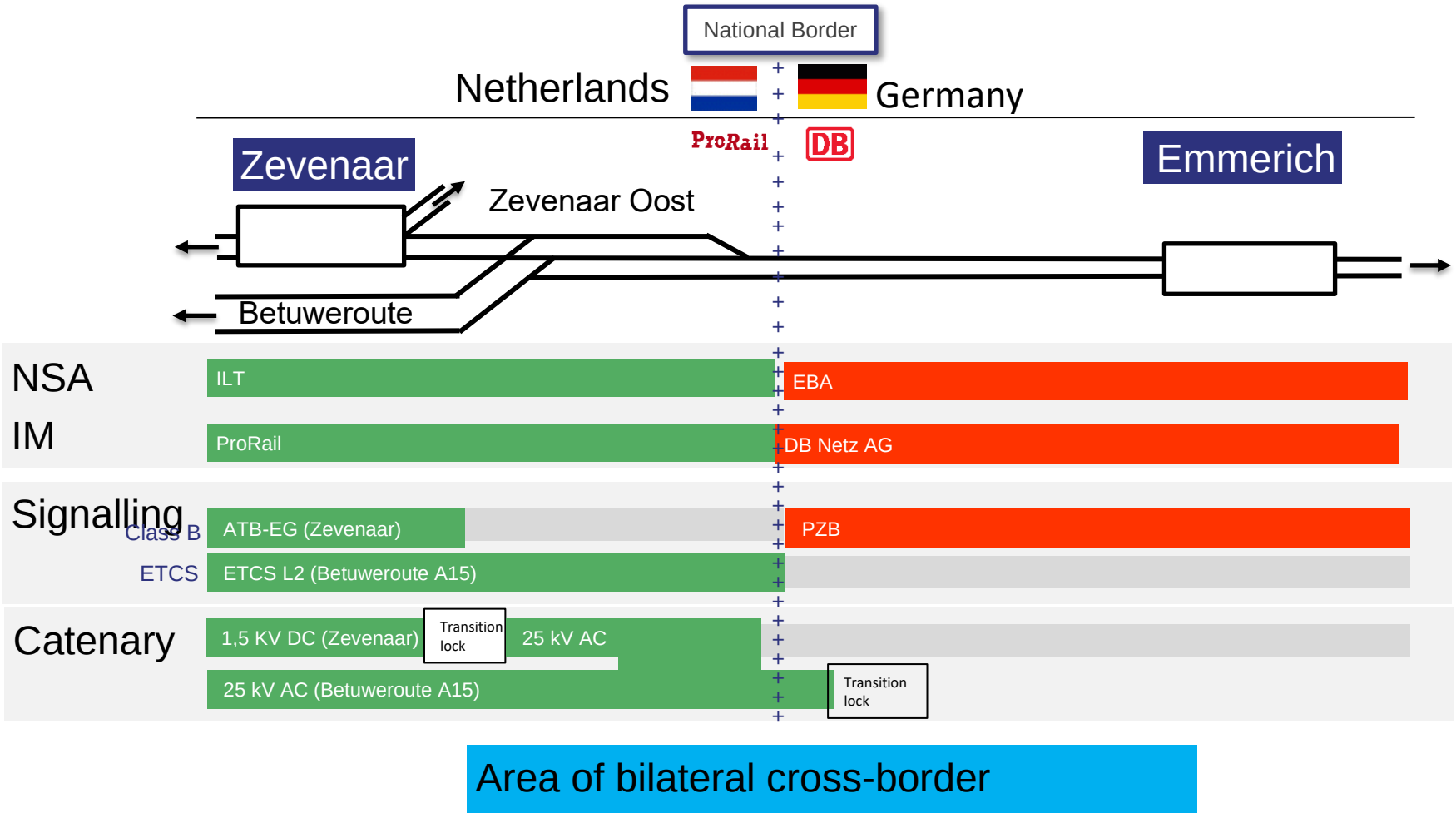
PL	Pruszków - Józefinów Podg	3,435	Diversionary	1435 mm
PL	Warszawa Główna Towarowa - Józefinów	5,161	connecting	1435 mm
PL	Warszawa Główna Towarowa - Warszawa Główna Towarowa	1,094	connecting	1435 mm
PL	Białystok - Sokółka			
PL	Białystok - Sokółka	41,222	connecting	1435 mm
PL	Poznań - Ełk			
PL	Poznań Franowo - Kobylnica	7,901	Diversionary	1435 mm
PL	Kobylnica - Mogilno	63,91	Diversionary	1435 mm
PL	Mogilno - Gniewkowo	35,39	Diversionary	1435 mm
PL	Gniewkowo - Toruń Wschód	15,2	Diversionary	1435 mm
PL	Toruń Wschód - Korsze	353	Diversionary	1435 mm
PL	Ełk - Korsze	98,808	Diversionary	1435 mm
PL	Wrocław Brochów - Wrocław Główny			
PL	Wrocław Brochów - Wrocław Główny	2,43	connecting	1435 mm
PL	Bielawa Dolna (Border D/PL) - Jaworzno Szczakowa.			
PL	Bielawa Dolna (Border D/PL) - Węgliniec	12,902	Principal	1435mm
PL	Węgliniec - Miłkowice	62,099	Principal	1435 mm
PL	Miłkowice - Legnica	9,459	Principal	1435 mm
PL	Legnica - WROCŁAW NOWY DWÓR	58,215	Principal	1435 mm
PL	Wrocław Nowy Dwór - Wrocław Muchobór	1,858	Principal	1435 mm
PL	Wrocław Muchobór - Wrocław Stadion	3,357	Principal	1435 mm
PL	Wrocław Stadion - Wrocław Brochów	8,01	Principal	1435 mm
PL	Wrocław Brochów - Siechnica	6,590	Principal	1435 mm
PL	Siechnica - Czernica Wrocławska	6,884	Principal	1435 mm
PL	Czernica Wrocławska - Jelcz Miłoszyce	5,235	Principal	1435 mm
PL	Jelcz Miłoszyce - Biskupice Oławskie	17,261	Principal	1435 mm
PL	Biskupice Oławskie - Opole Groszowice	54,261	Principal	1435 mm
PL	Opole Groszowice - Strzelce Opolskie	28,838	Principal	1435 mm
PL	Strzelce Opolskie - Paczyna	22,128	Principal	1435 mm
PL	Paczyna - Pyskowice	5,232	Principal	1435 mm
PL	Pyskowice - Gliwice Łabędy	6,097	Principal	1435 mm
PL	Gliwice Łabędy - Gliwice	5,286	Principal	1435 mm
PL	Szobiszowice - Gliwice Port	1,760	connecting	1435 mm
PL	Gliwice - Szobiszowice	0,900	connecting	1435 mm
PL	Gliwice - Gliwice Sośnica	0,900	connecting	1435 mm
PL	Gliwice - Zabrze Biskupice	13,630	Principal	1435 mm
PL	Zabrze Biskupice - Bytom	6,8	Principal	1435 mm
PL	Bytom - Chorzów Stary	6,3	Principal	1435 mm
PL	Chorzów Stary - Katowice Szopienice Północne	12,054	Principal	1435 mm
PL	Szabelnia - Katowice Szopienice Północne	1,359	Principal	1435 mm
PL	Katowice Szopienice Północne - Stawiska Podg	9,651	Principal	1435 mm

PL	Stawiska Podg - Stawiska Podg	0,466	Principal	1435 mm
PL	Stawiska - Mysłowice	1,815	Principal	1435 mm
PL	Mysłowice - Szabelnia	3,305	Principal	1435 mm
PL	Mysłowice - Długoszyn	9,359	Principal	1435 mm
PL	Jaworzno Szczakowa JSB - Długoszyn Podg	1,941	Principal	1435 mm
PL	Długoszyn Podg - Sosnowiec Maczki	1,863	Principal	1435 mm
PL	Sosnowiec Maczki - Sosnowiec Maczki	1,076	Principal	1435 mm
PL	Sosnowiec Maczki - Jaworzno Szczakowa	2	Principal	1435 mm
PL	Jaworzno Szczakowa - Medyka			
PL	Długoszyn – Jaworzno Szczakowa	1,885	Principal	1435 mm
PL	Jaworzno Szczakowa – Kraków Mydlniki	47,494	Principal	1435 mm
PL	Kraków Mydlniki – Podłęże	34,589	Principal	1435 mm
PL	Kraków Mydlniki – Kraków Bieżanów	16,168	Diversionary	1435 mm
PL	Kraków Bieżanów – Podłęże	10,004	Diversionary	1435 mm
PL	Żurawica – Hurko	12,959	Diversionary	1435 mm
PL	Podłęże – Medyka (Polish – Ukrainian border and EU – Ukrainian border)	239,85	Principal	1435 mm
PL	Wrocław - Opole			
PL	Wrocław Brochów - Święta Katarzyna	6,591	Diversionary	1435 mm
PL	Święta Katarzyna - Brzeg	31,527	Diversionary	1435 mm
PL	Brzeg - Opole Groszowice	43,678	Diversionary	1435 mm
PL	Wrocław - Brzeg Dolny			
PL	Wrocław Nowy Dwór - Wrocław Gądów	1,321	connecting	1435 mm
PL	Wrocław Gądów - Wrocław Kuźniki	1,798	connecting	1435 mm
PL	Wrocław Kuźniki - Brzeg Dolny	23,137	connecting	1435 mm
PL	Wrocław - Kąty Wrocławskie			
PL	Wrocław Gądów - Wrocław Zachodni	5,401	connecting	1435 mm
PL	Wrocław Zachodni - Kąty Wrocławskie	15,164	connecting	1435 mm
PL	Sosnowiec Maczki - Sosnowiec Południowy			
PL	Sosnowiec Maczki - Sosnowiec Kazimierz SKZ1	3,669	connecting	1435 mm
PL	Sosnowiec Kazimierz SKZ1 - Sosnowiec Kazimierz SKZ2	0,956	connecting	1435 mm
PL	Sosnowiec Kazimierz SKZ2 - Sosnowiec Południowy	9,124	connecting	1435 mm
PL	Sosnowiec Maczki - Dąbrowa Górnicza Towarowa			
PL	Sosnowiec Maczki - Dorota	2,575	connecting	1435 mm
PL	Dorota - Dąbrowa Górnicza Towarowa	12,317	connecting	1435 mm
LT	Trakiszki (Border PL/LT) - Mockava	14,3	Principal	1435 mm
LT	Mockava - Šeštokai	7,48	Principal	1435 mm
LT	Šeštokai - Kazlų rūda	57	Principal	1520 mm
LT	Kazlų rūda - Jiesia	28,54	Principal	1520 mm
LT	Jiesia - Kaunas/Palemonas	8,21	Principal	1520 mm
LT	Kaunas/Palemonas- Radviliškis	137,57	Principal	1520 mm
LT	Radviliškis (Border LT/LV)- Meitene	79,33	Principal	1520 mm

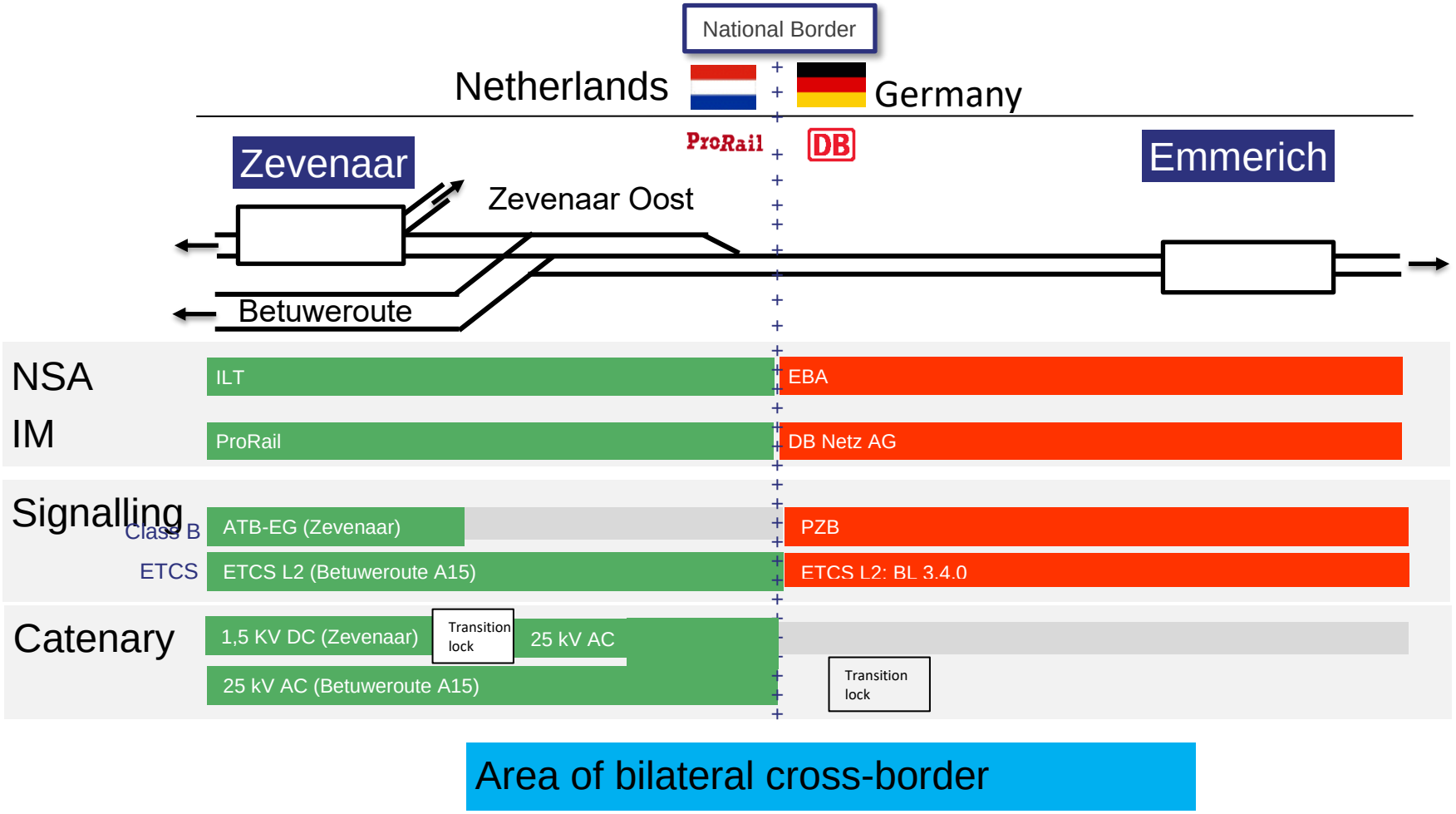
LT	Kaunas/Palemonas- Vilnius	103,41	Diversionary	1520 mm
LT	Vilnius (Border LT/LV)- Daugavpils	138,92	Diversionary	1520 mm
LT	Vilnius- Kena	29,13	Connecting	1520 mm
LT	Exact Rail Baltica line (expected as principal line 1435mm) routing not known yet	0	Expected principal	1435 mm
LV	BorderLT/LV-Meitene-Jelgava	33	Principal	1520 mm
LV	Jelgava-Riga	43	Principal	1520 mm
LV	Riga-Lugazi-Border LV/EE	166	Principal	1520 mm
LV	Krustpils-Riga	129	Diversionary	1520 mm
LV	BorderLT/LV-Daugavpils	25	Diversionary	1520 mm
LV	Daugavpils-Krustpils	89	Diversionary	1520 mm
LV	Jelgava- Liepaja	180	Connecting	1520 mm
LV	Jelgava-Ventspils	178	Connecting	1520 mm
LV	Border EE/LV - Upeslejas junction	116,7	Expected principal	1435 mm
LV	Upeslejas junction - Riga Central Station - Riga airport - Misa junction	70,3	Expected principal	1435 mm
LV	Riga bypass (Upeslejas junction - Salaspils freight station - Misa junction)	28,1	Expected principal	1435 mm
LV	Misa junction - Border LV/LT	47,5	Expected principal	1435 mm
EE	Valga - Tartu	84,812	Principal	1520 mm
EE	Tartu - Tapa	112,534	Principal	1520 mm
EE	Tapa - Tallinn	69,608	Principal	1520 mm
EE	Tallinn - Muuga	17,462	Principal	1520 mm
EE	Tallinn-Rapla	47,1	Expected principal	1435 mm
EE	Rapla-Pärnu	54,7	Expected principal	1435 mm
EE	Pärnu-EE/LV border	93,7	Expected principal	1435 mm
	Total length	**9 680,08**		
	Principal		5 252,88	
	Diversionary		2 576,30	
	Connecting		890,47	
	Expected principal and diversionary		960,43	

Annex 2: Overview of the cross-border solutions

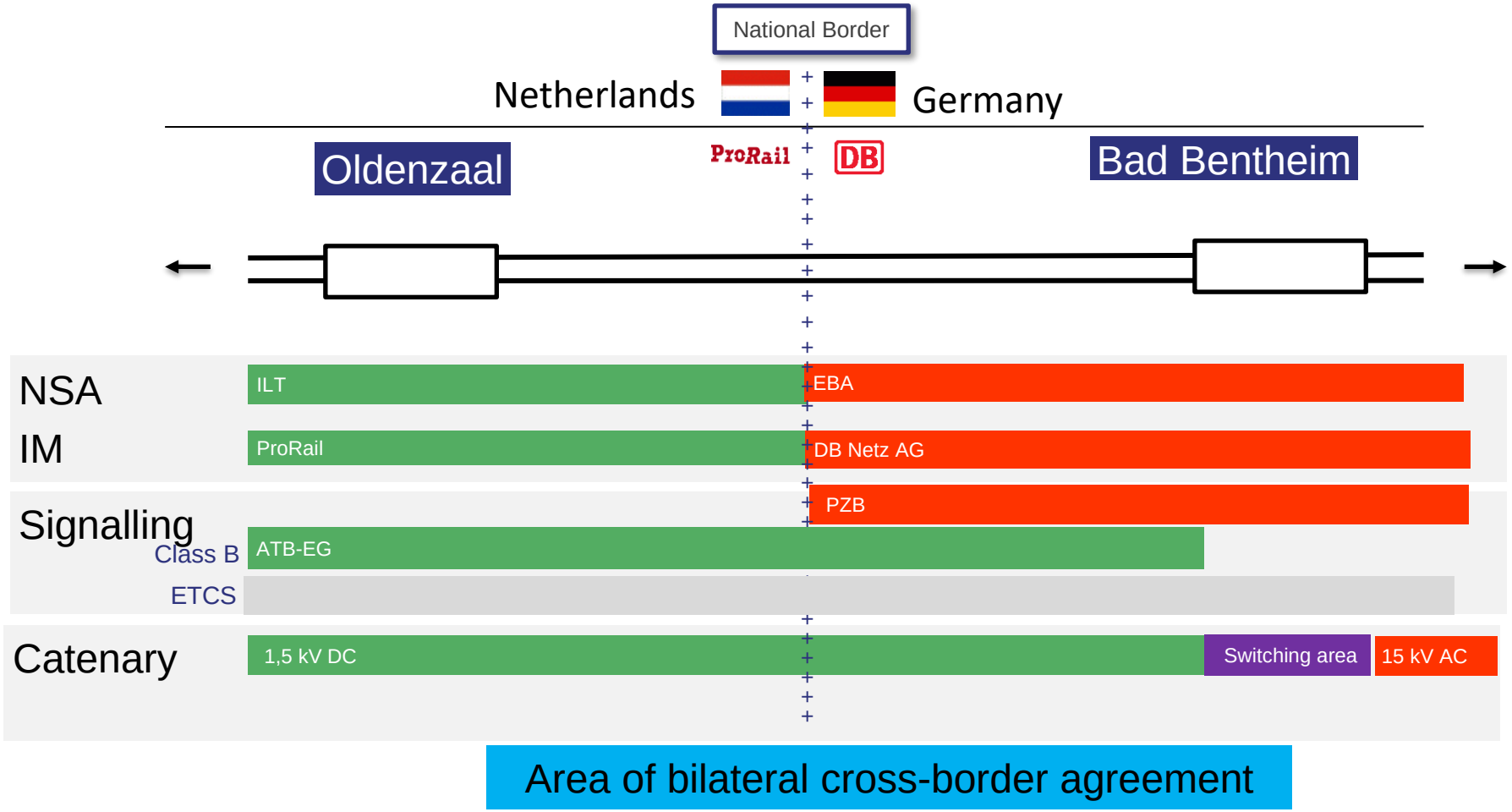
Cross-border schematic overview Zevenaar - Emmerich (2023)



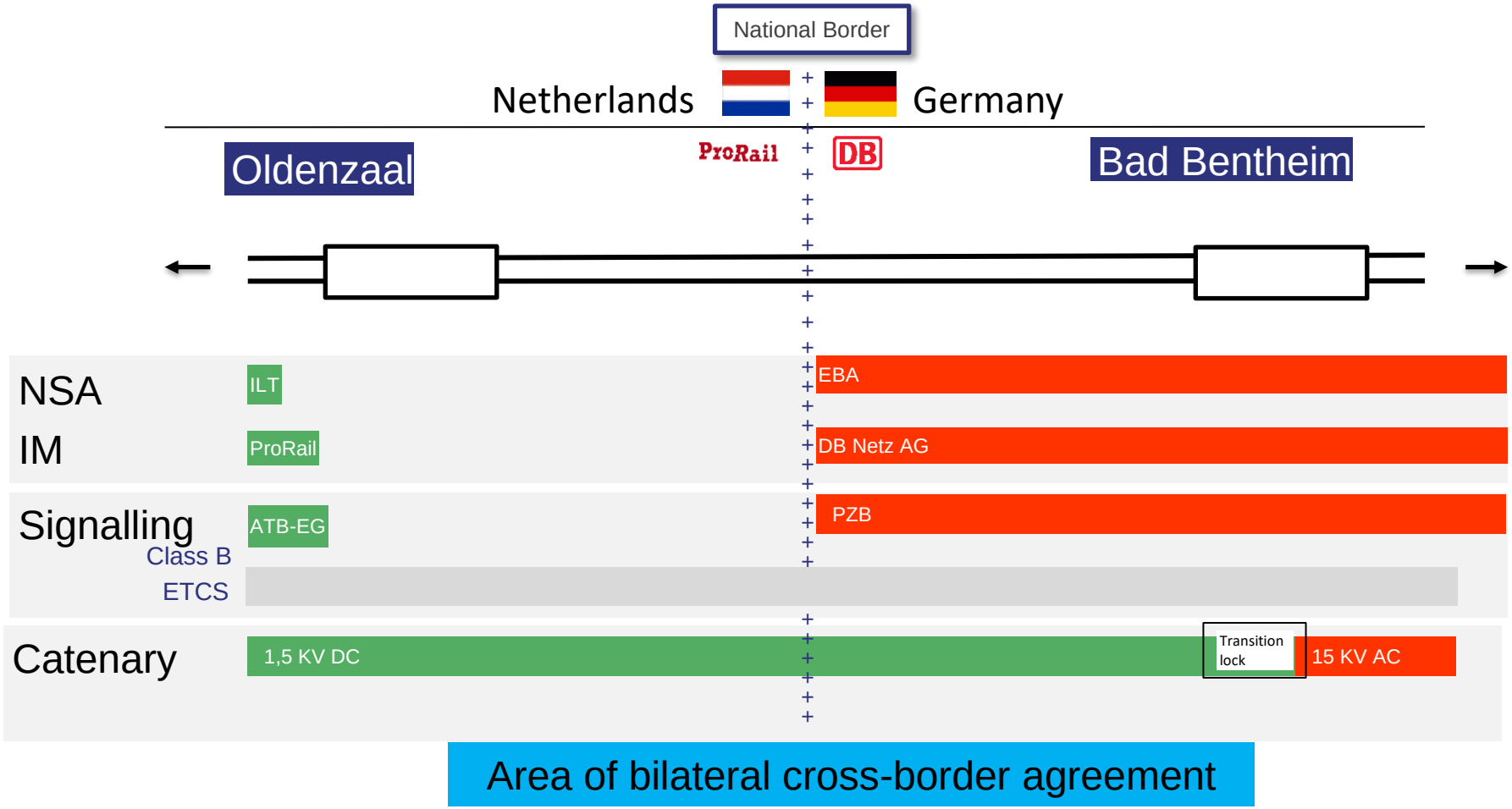
Cross-border schematic overview Zevenaar - Emmerich (20xx)



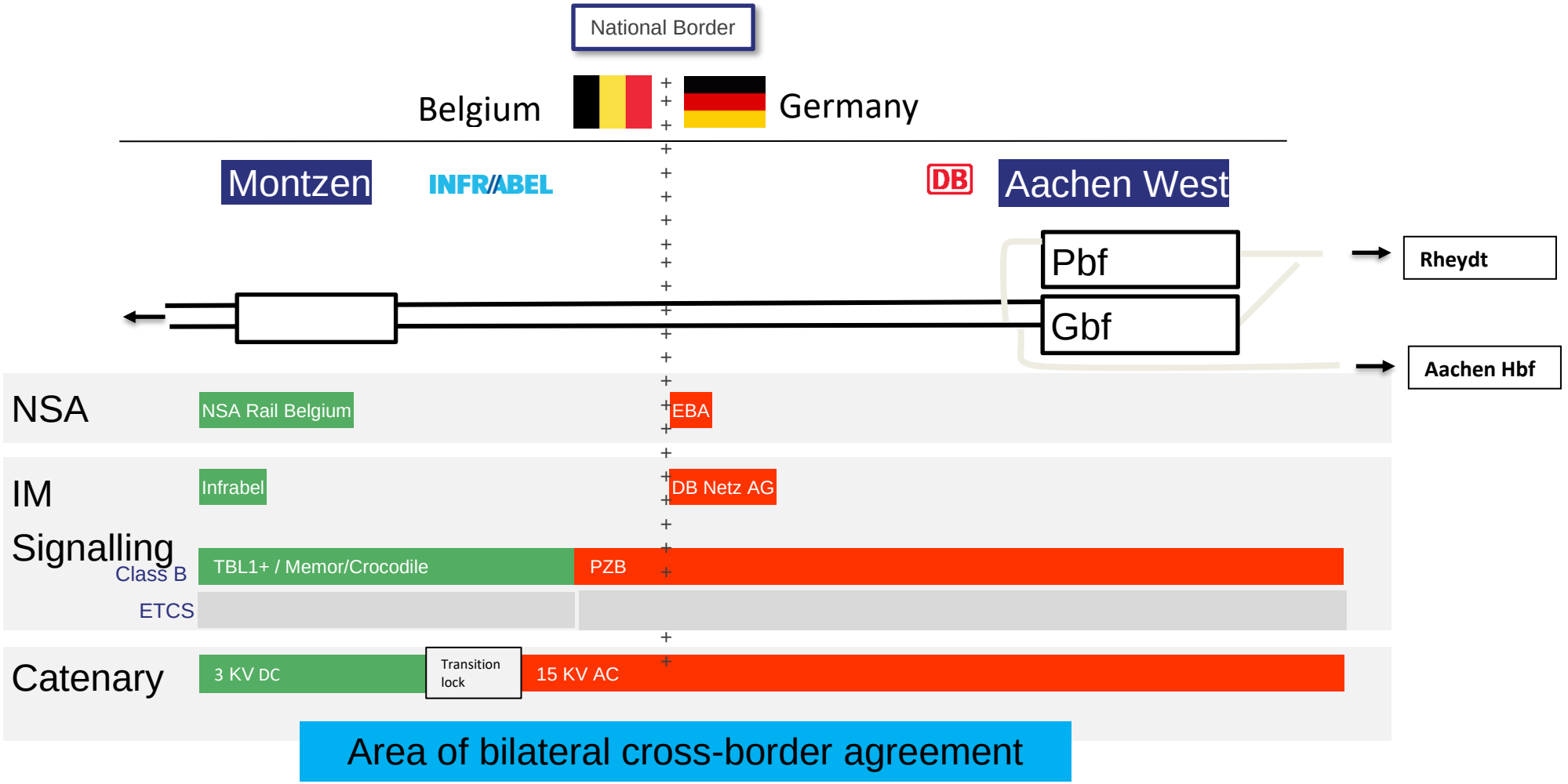
Cross-border schematic overview Oldenzaal – Bad Bentheim (2023)



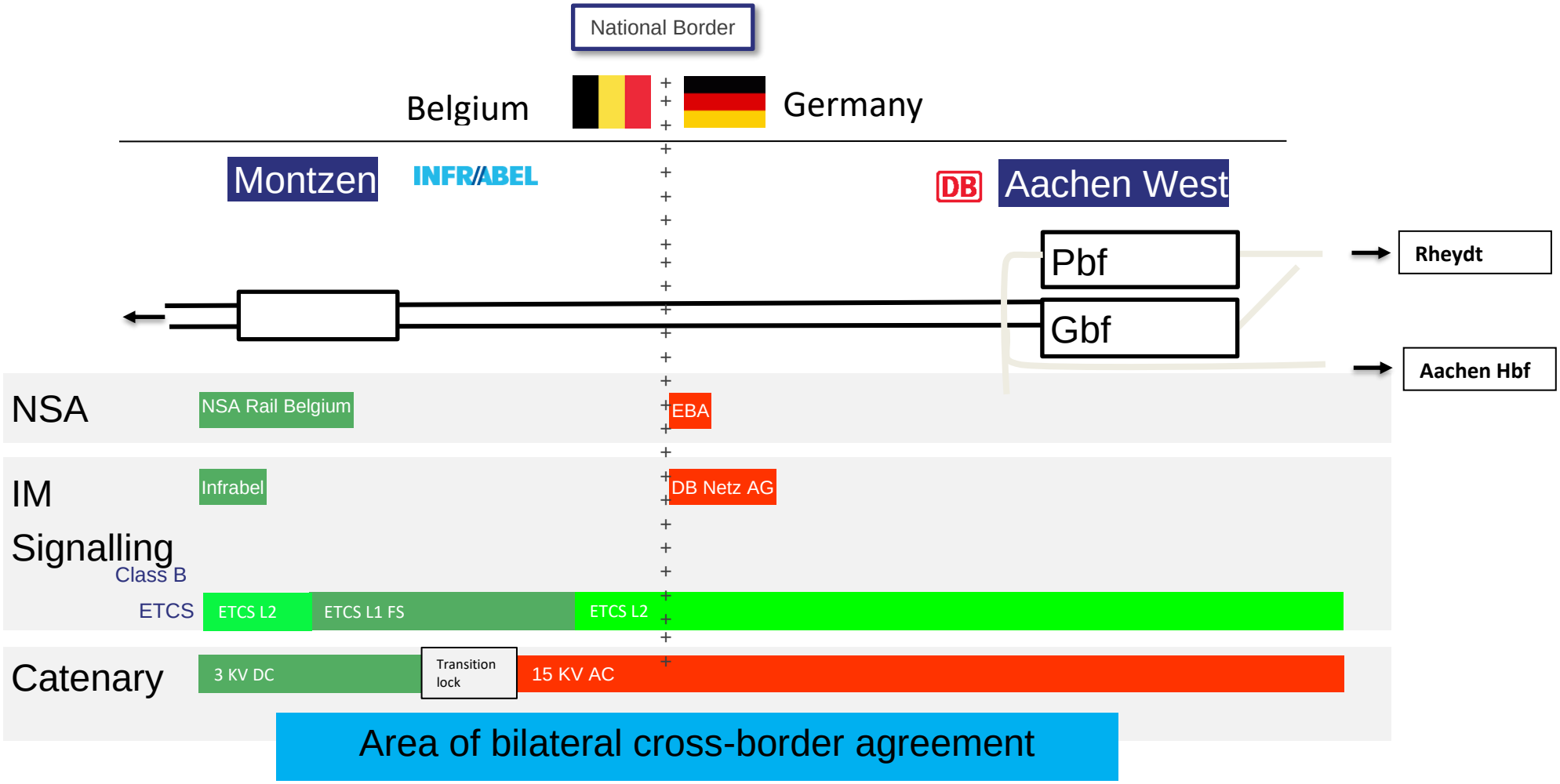
Cross-border schematic overview Oldenzaal – Bad Bentheim (2030)



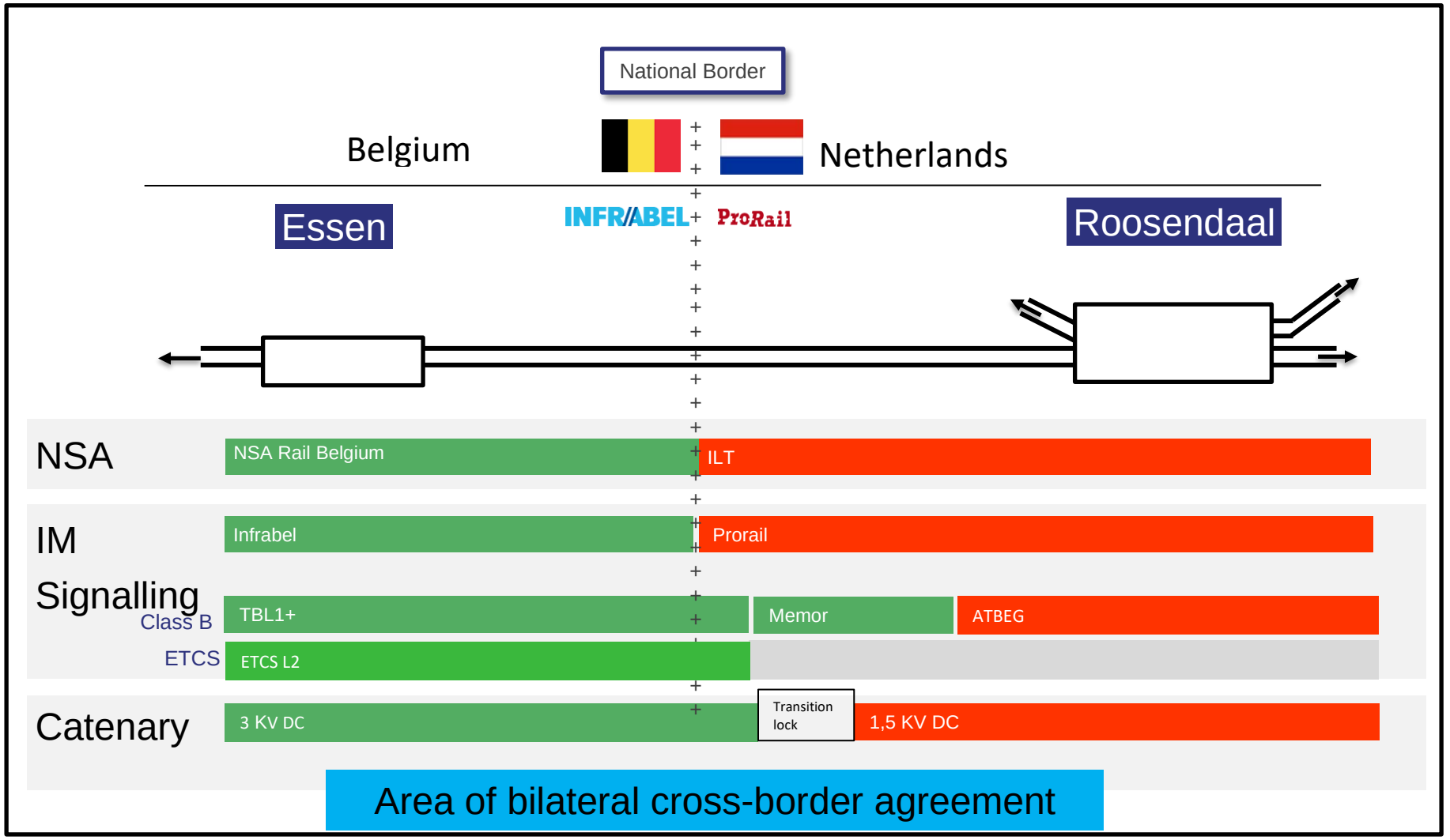
Cross-border schematic overview Montzen – Aachen West (2023)



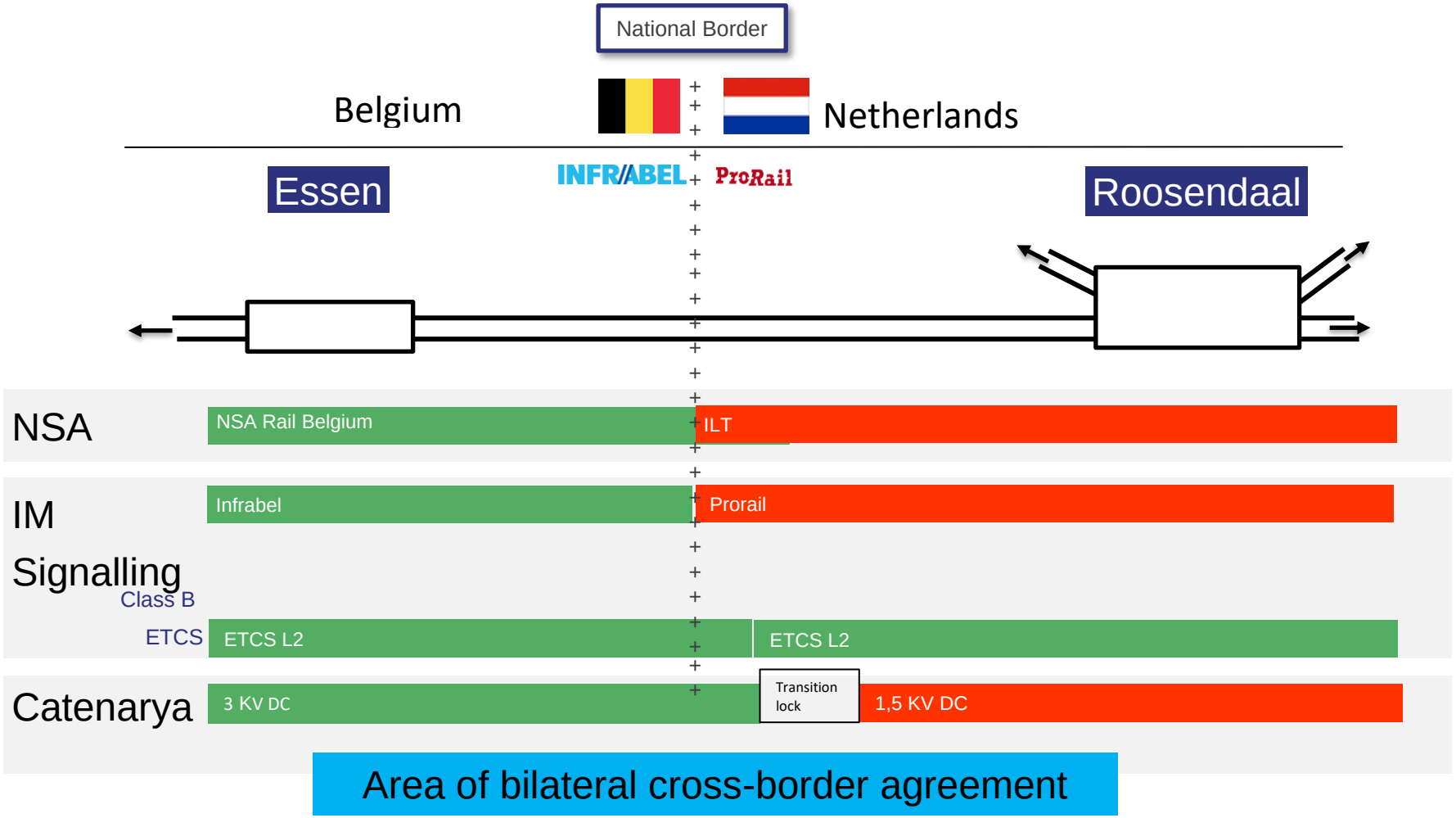
Cross-border schematic overview Montzen – Aachen West (2029)



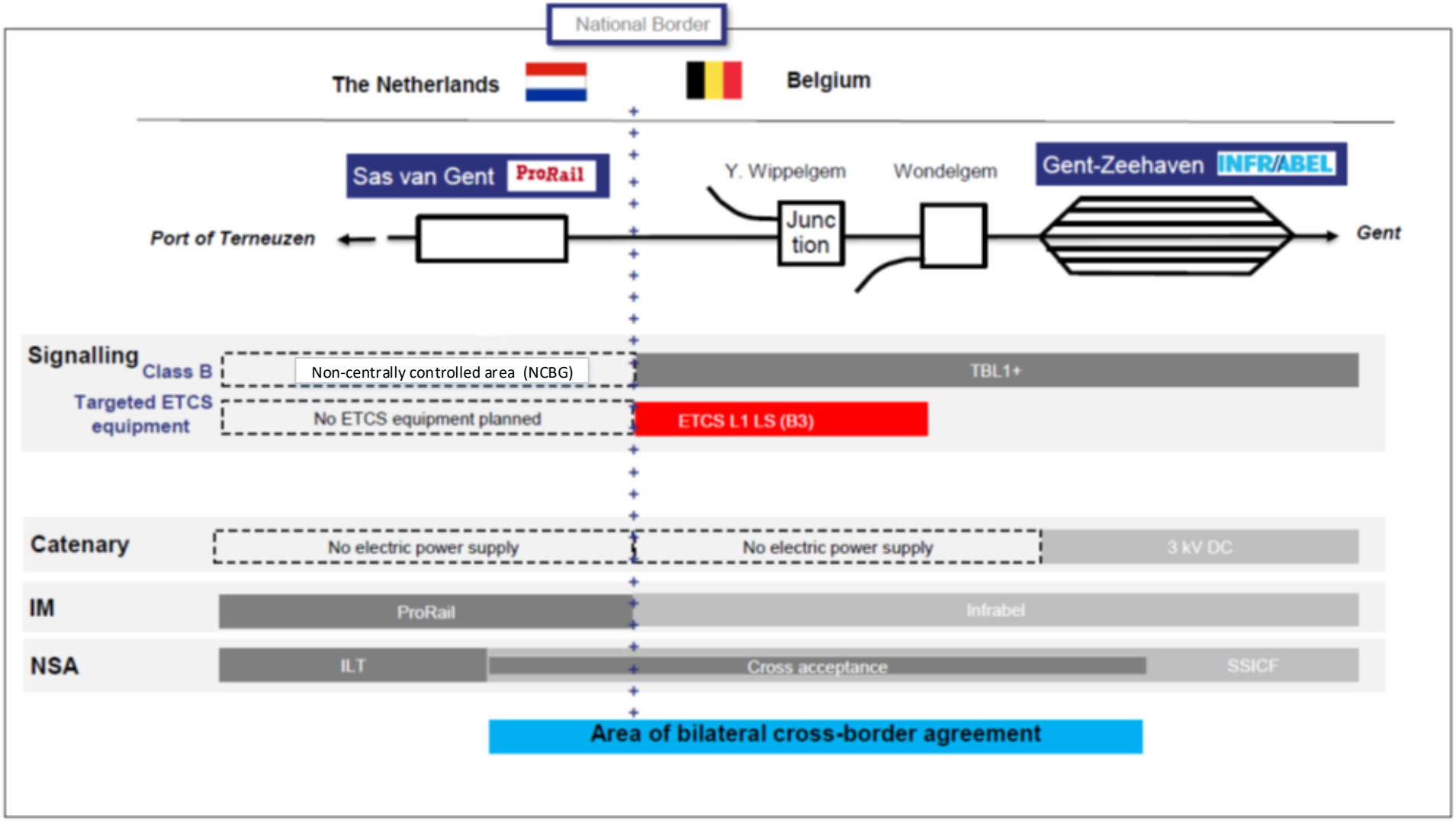
Cross-border schematic overview Essen – Roosendaal (2023)



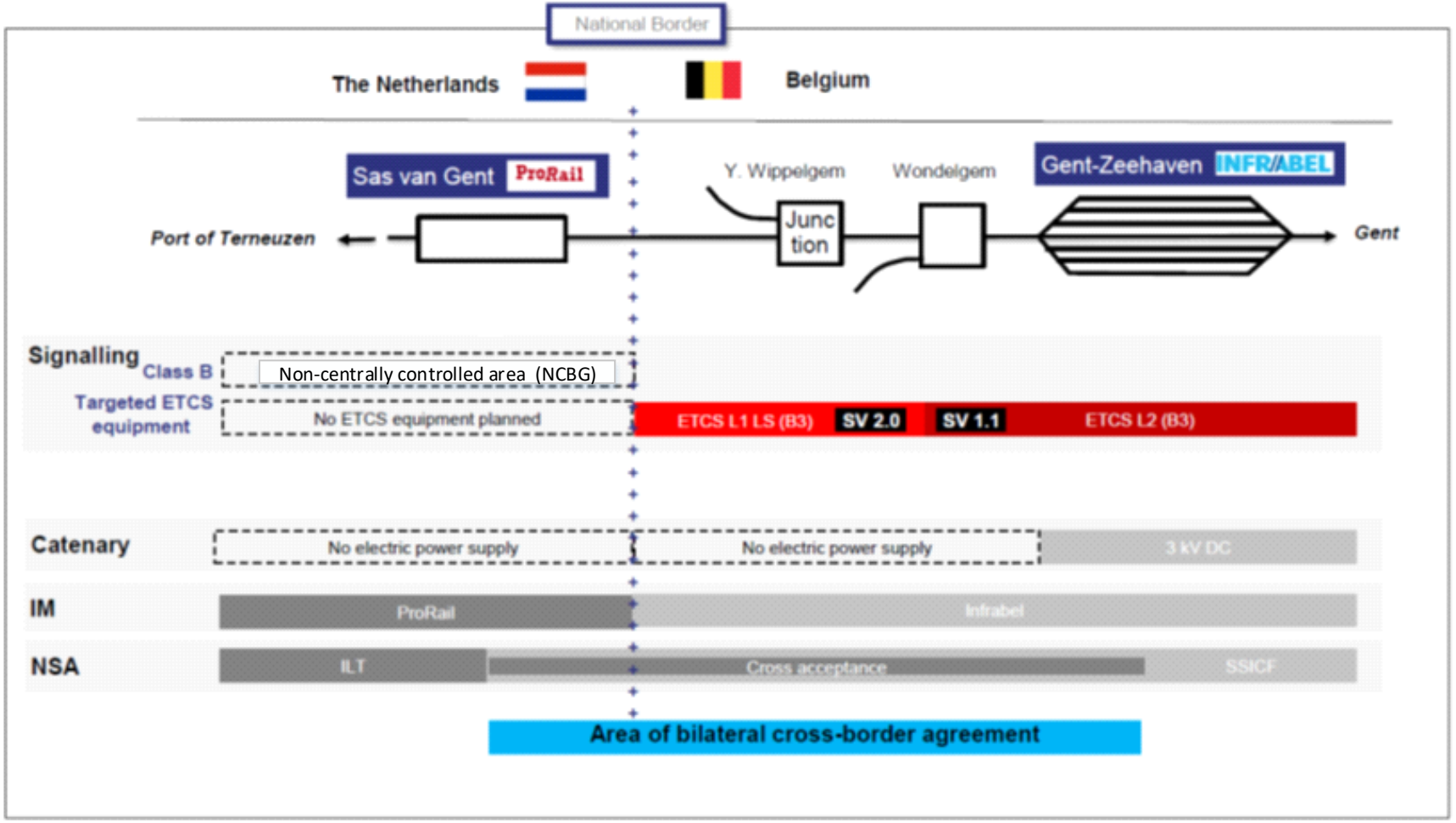
Cross-border schematic overview Essen – Roosendaal (2028-2030)



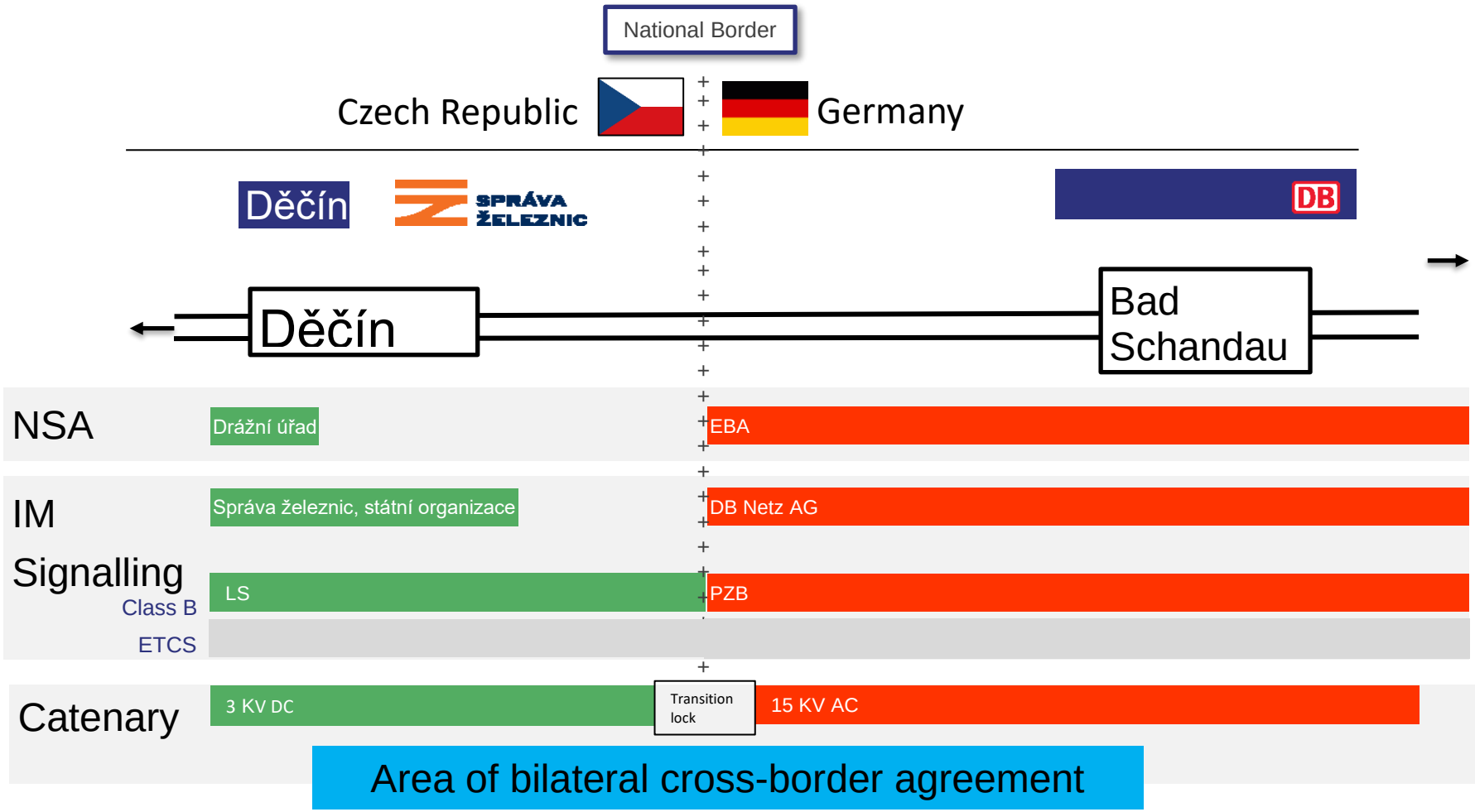
Cross-border schematic overview Zelzate – Sas van Gent (2023)



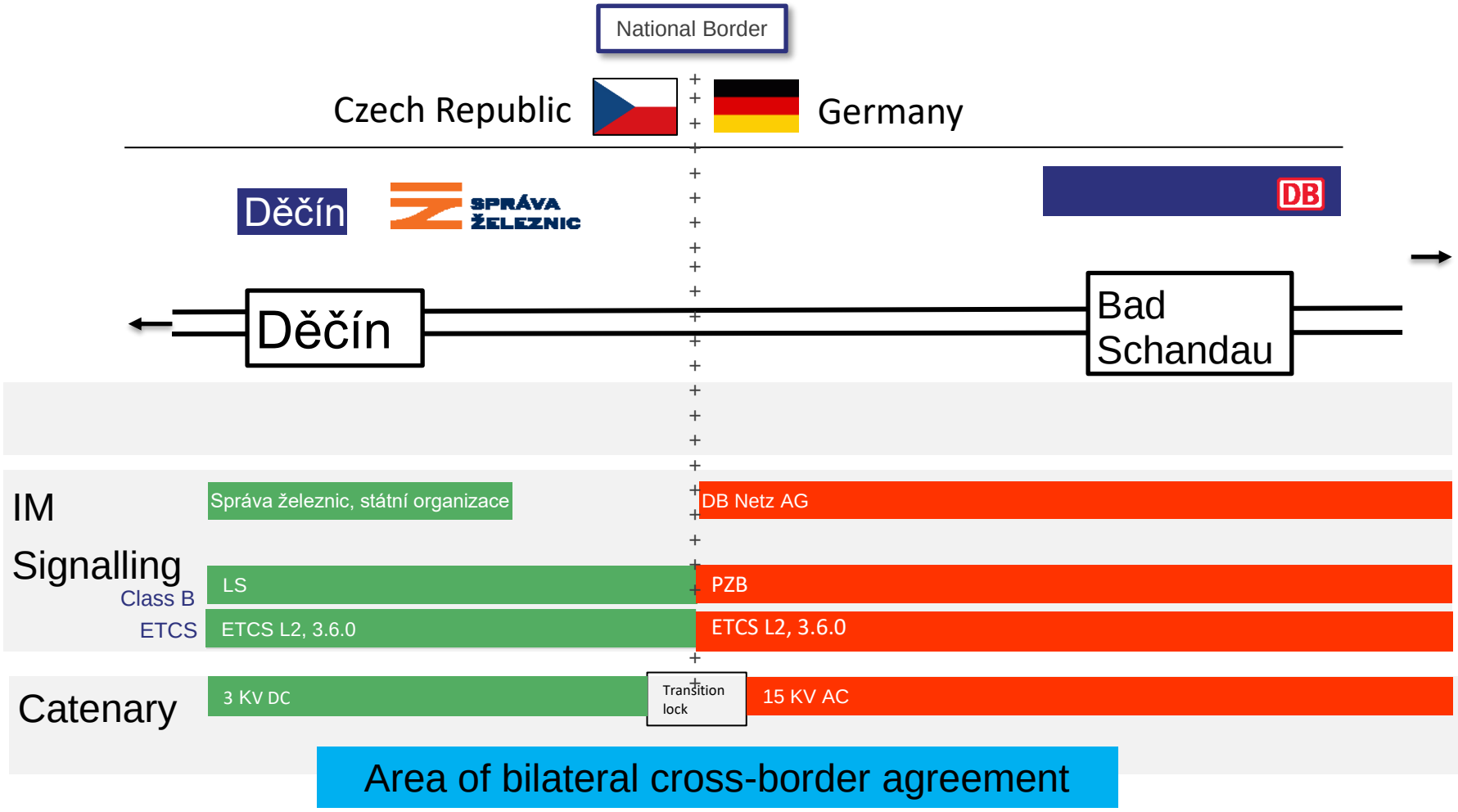
Cross-border schematic overview Zelzate – Sas van Gent (situation 2026)



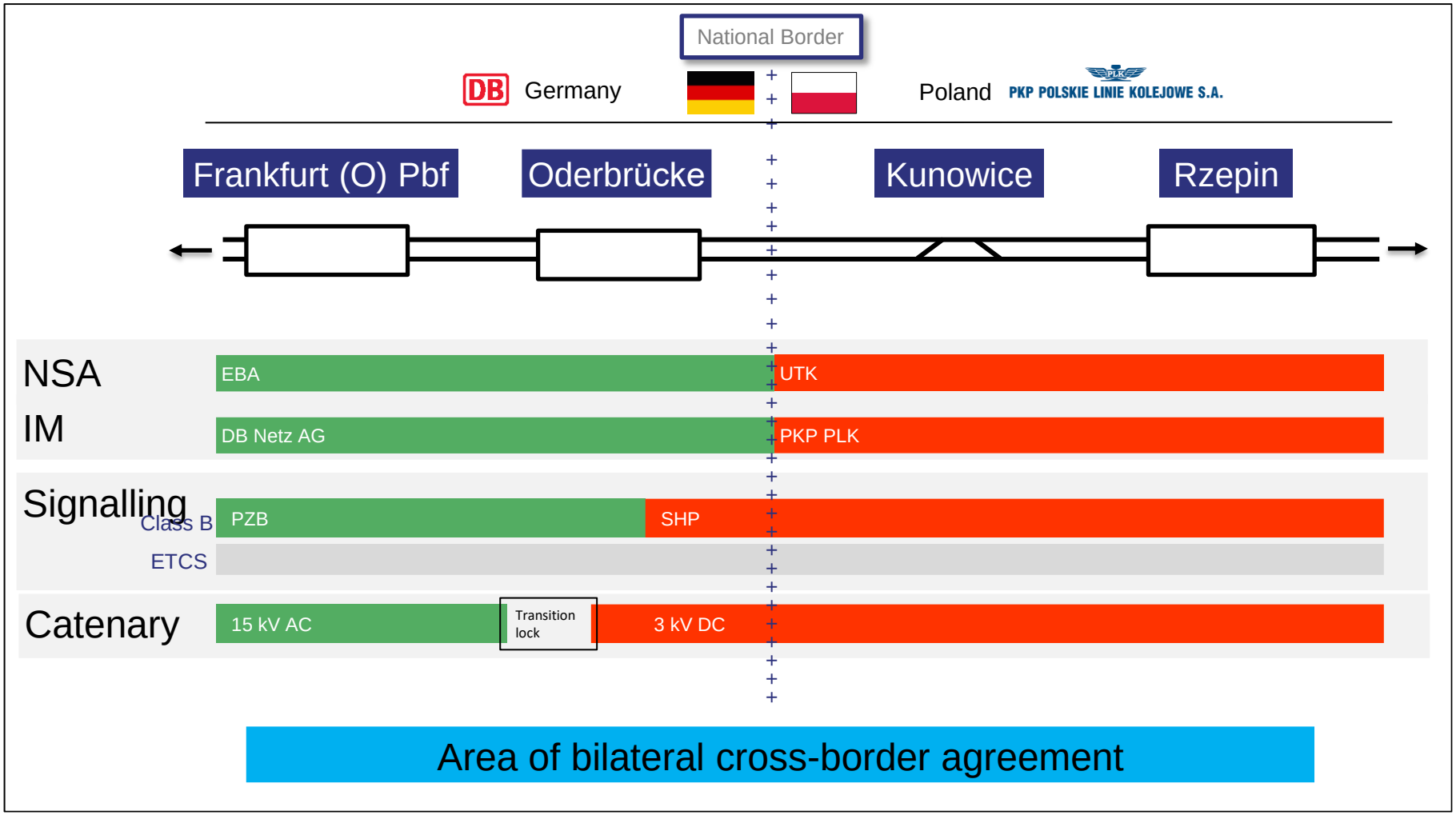
Cross-border schematic overview Děčín – Bad Schandau (situation 2023)



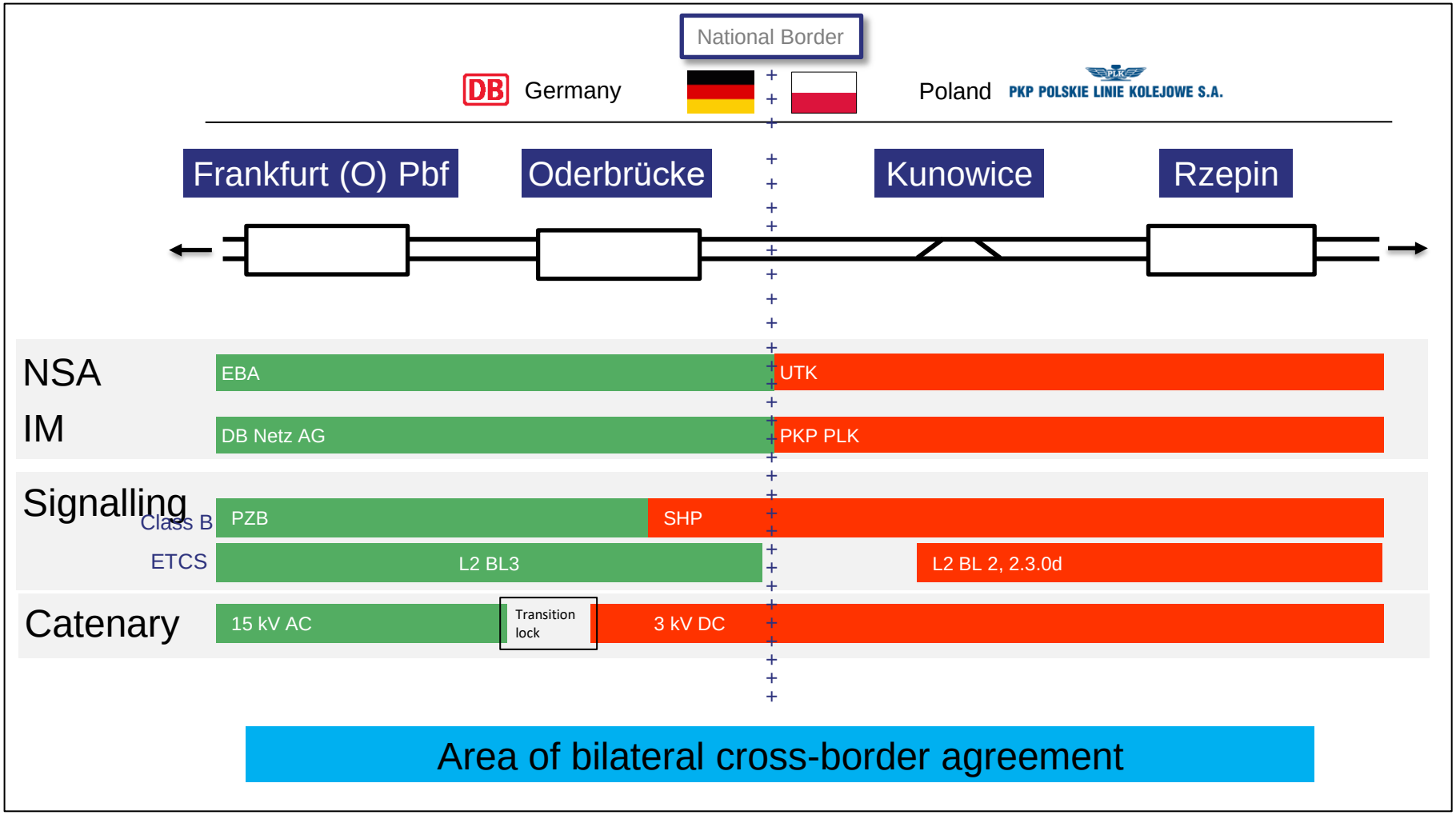
Cross-border schematic overview Děčín – Bad Schandau (2026)



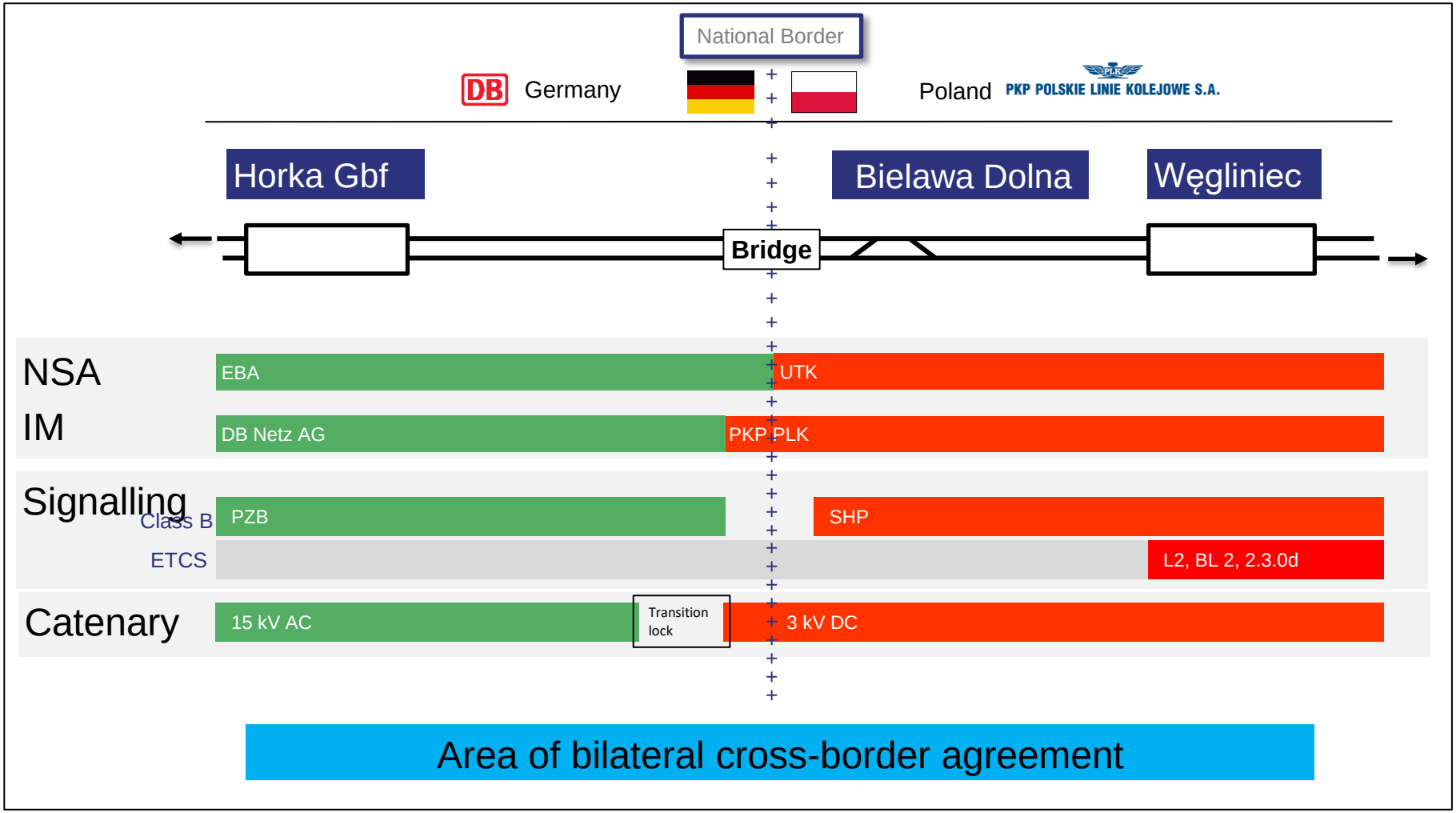
Cross-border schematic overview Frankfurt (Oder) – Rzepin (situation 2023)



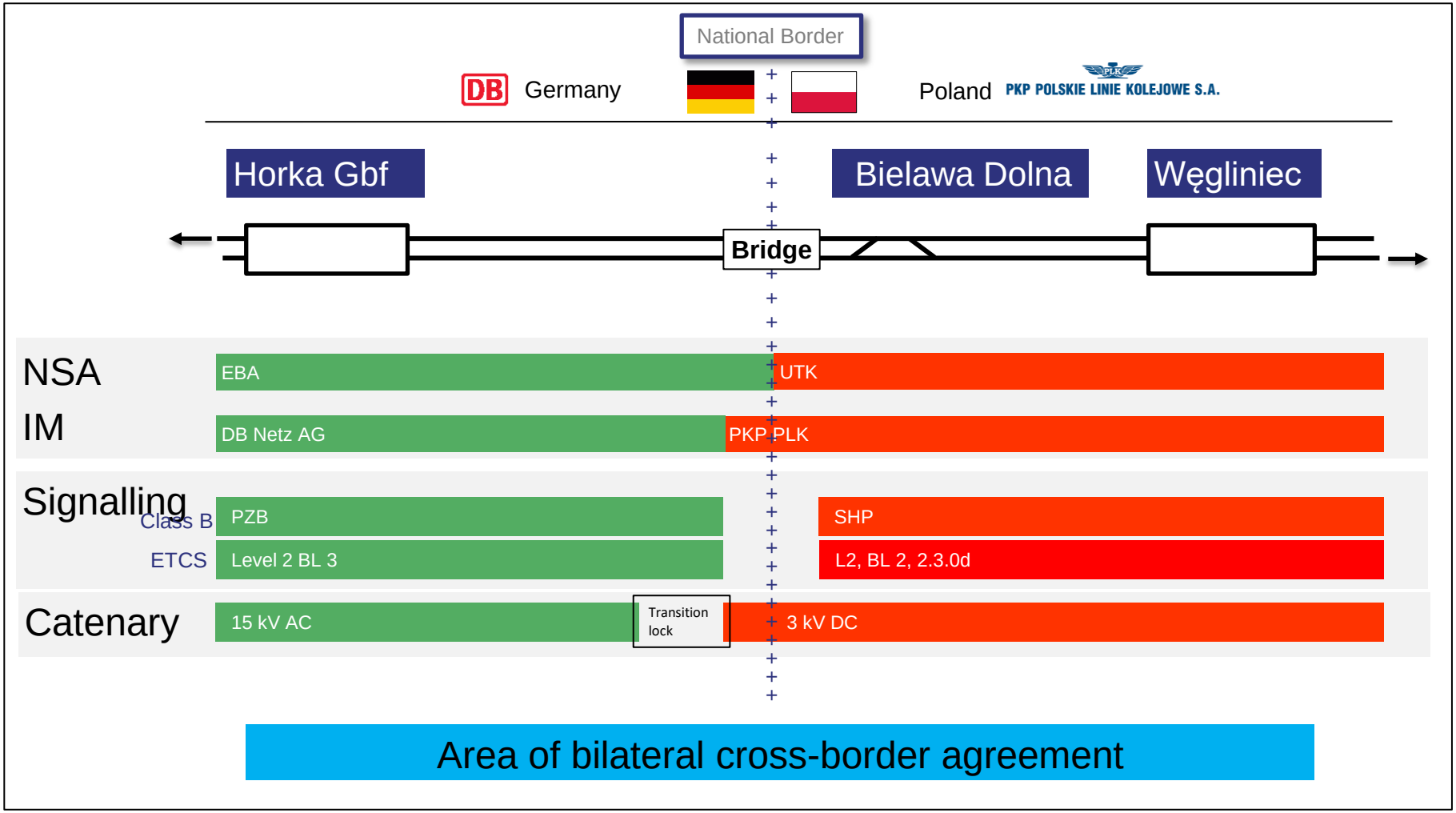
Cross-border schematic overview Frankfurt (Oder) (timeline open) – Rzepin (2026)



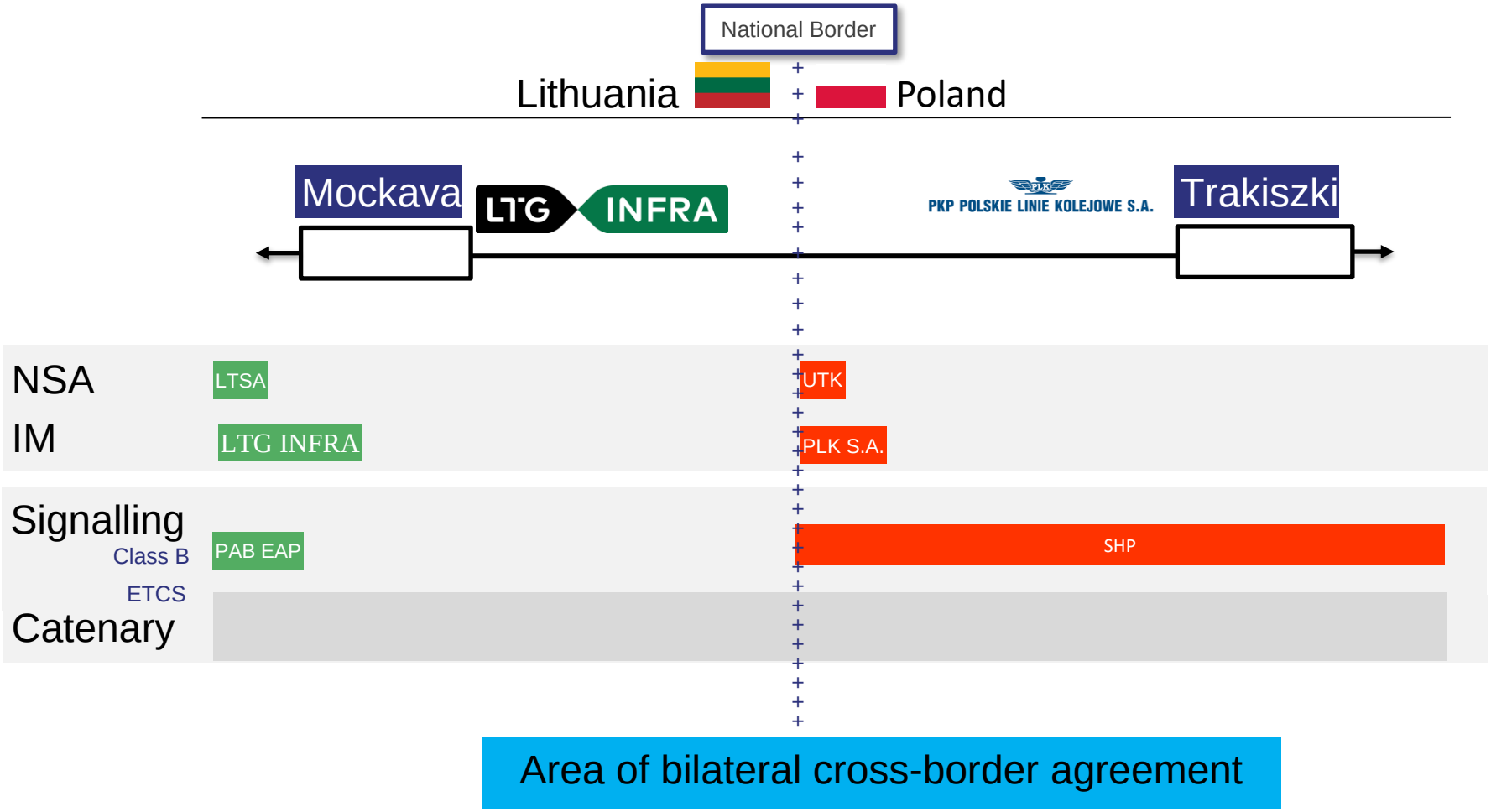
Cross-border schematic overview Horka Gbf – Węgliniec (situation 2023)



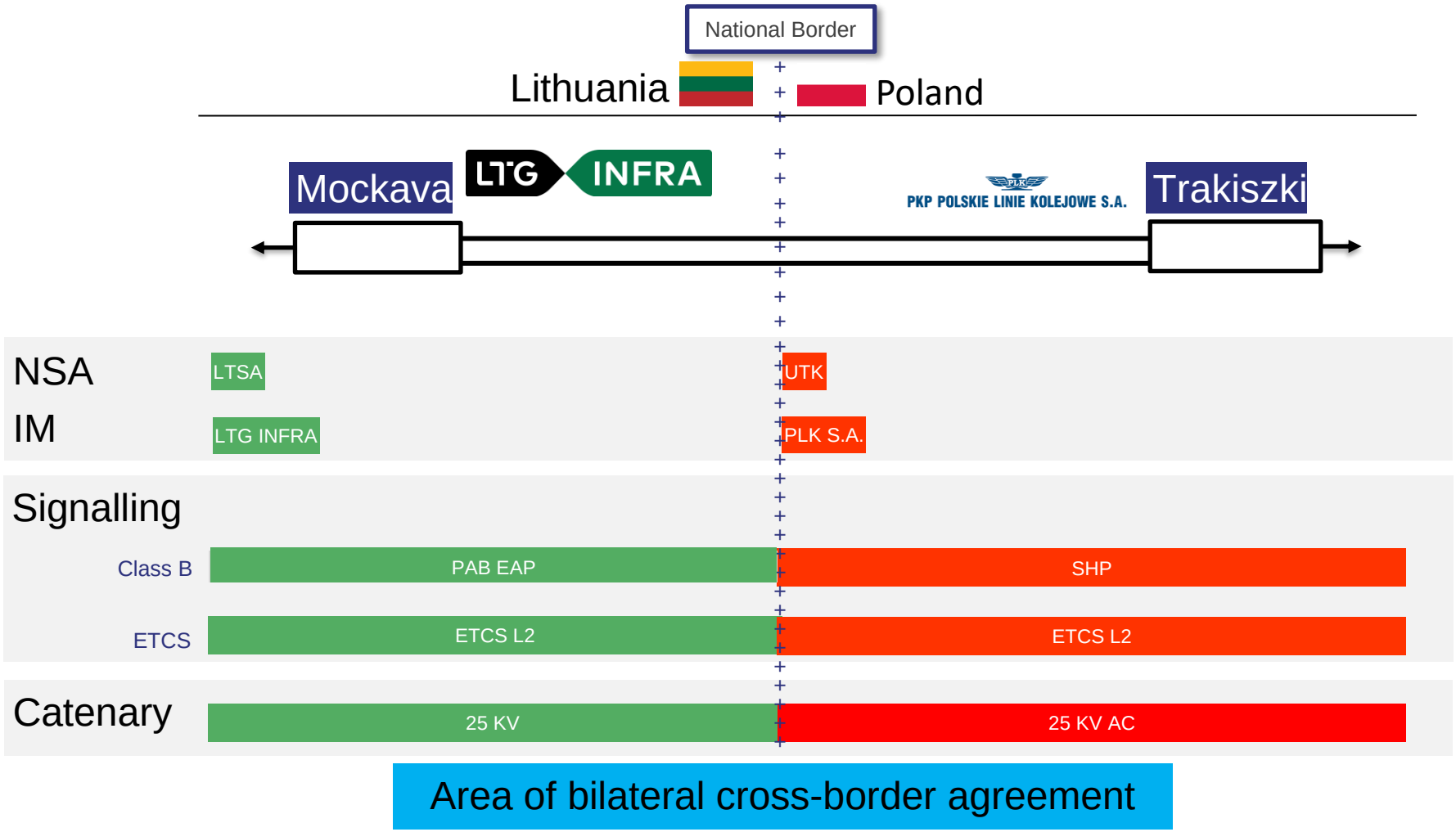
Cross-border schematic overview Horka Gbf – Węgliniec (after 2023)



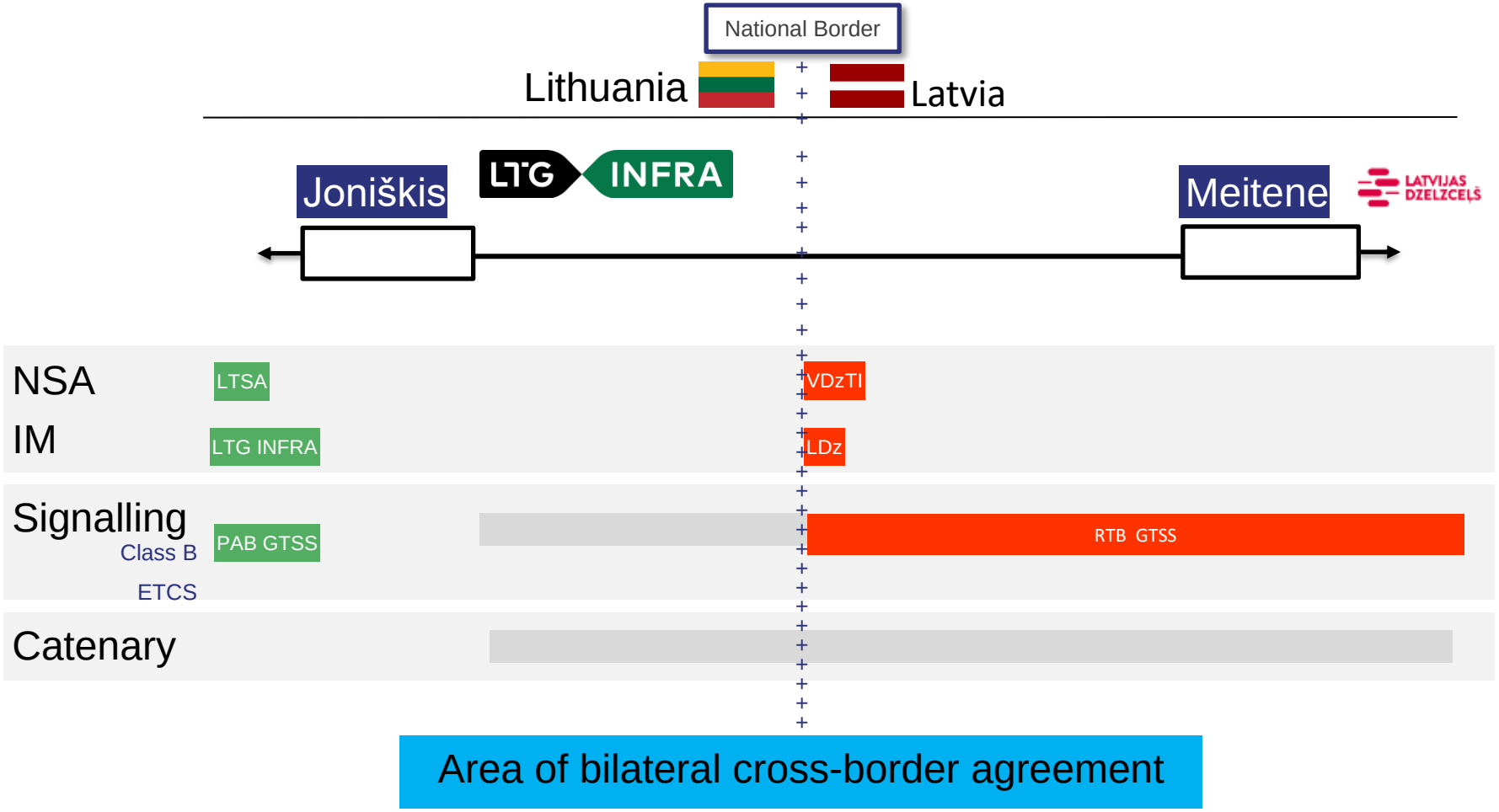
Cross-border schematic overview Mockava - Trakiszki 1435mm (current situation)



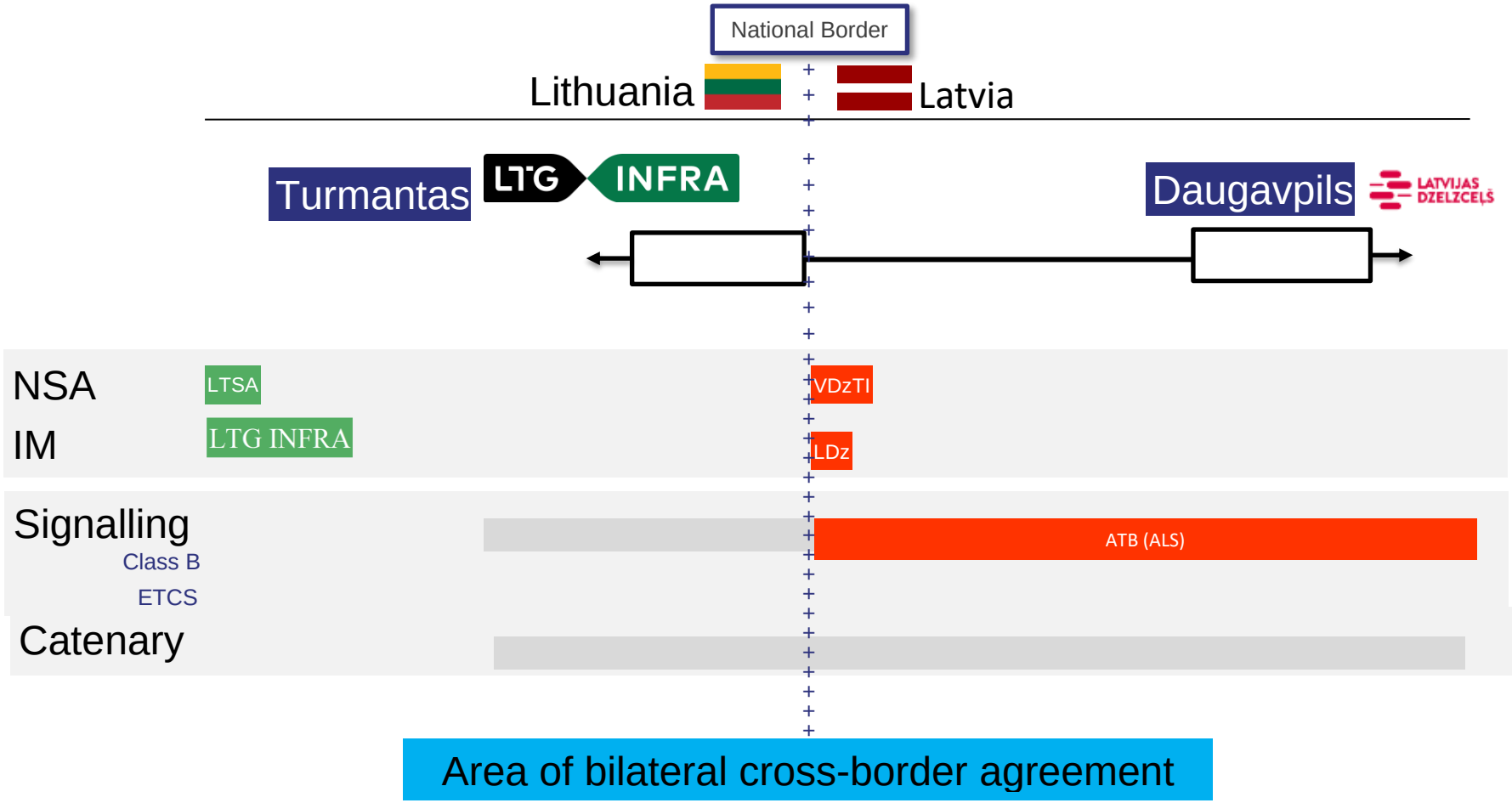
Cross-border schematic overview Mockava – Trakiszki 1435mm (2027)



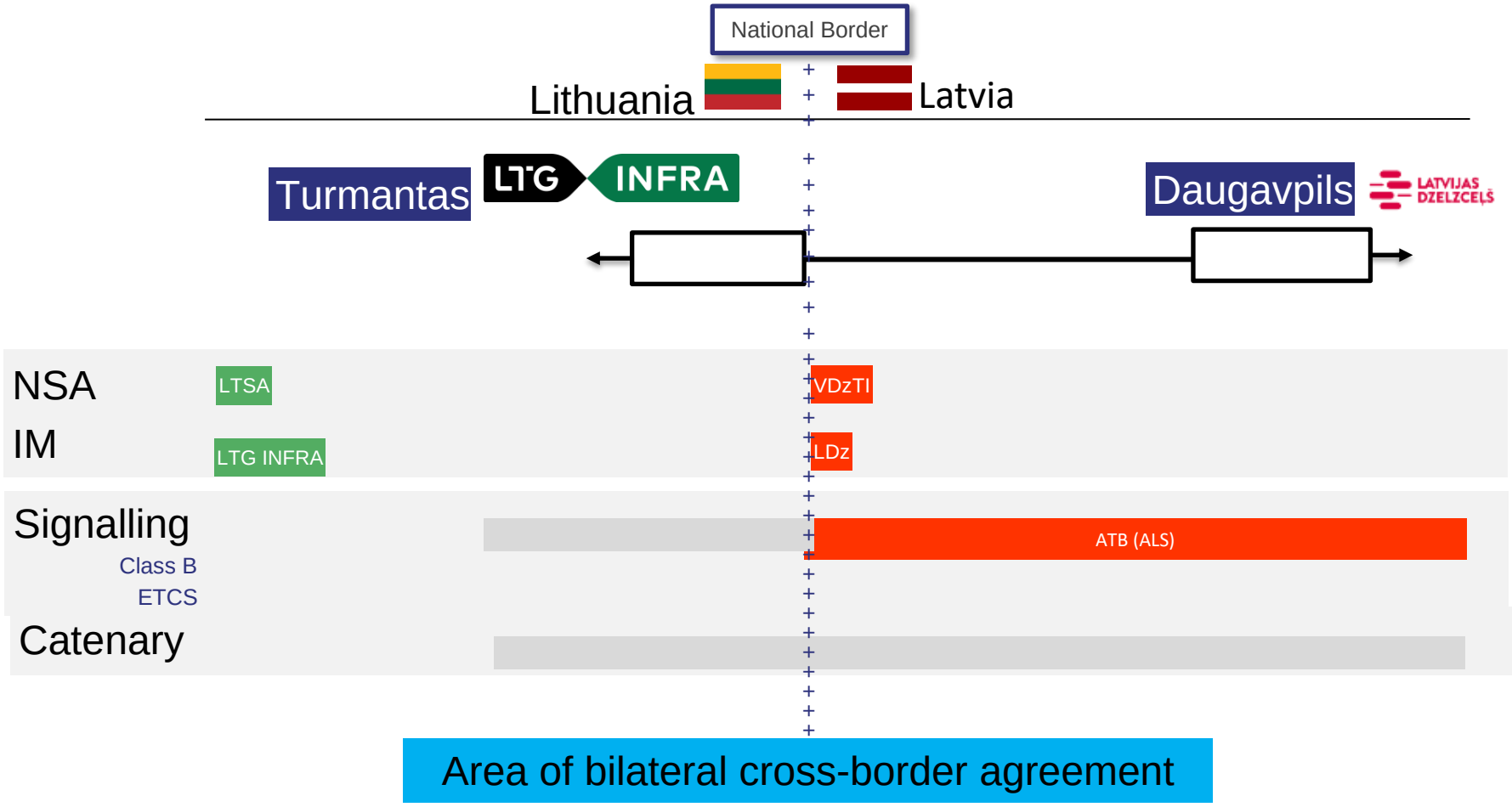
Cross-border schematic overview Joniškis – Meitene 1520mm (current situation)



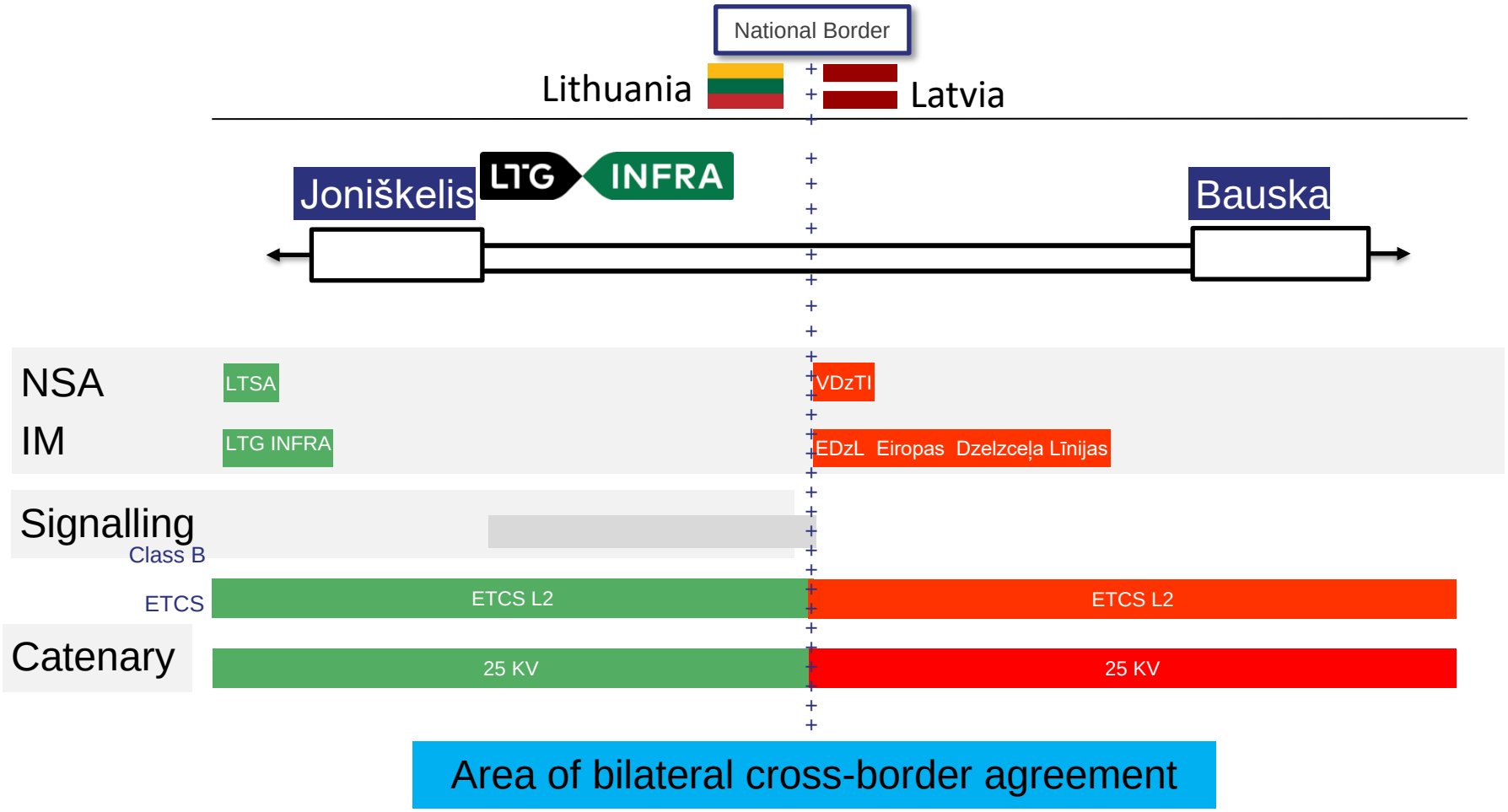
Cross-border schematic overview Turmantas – Daugavpils 1520mm (current situation)



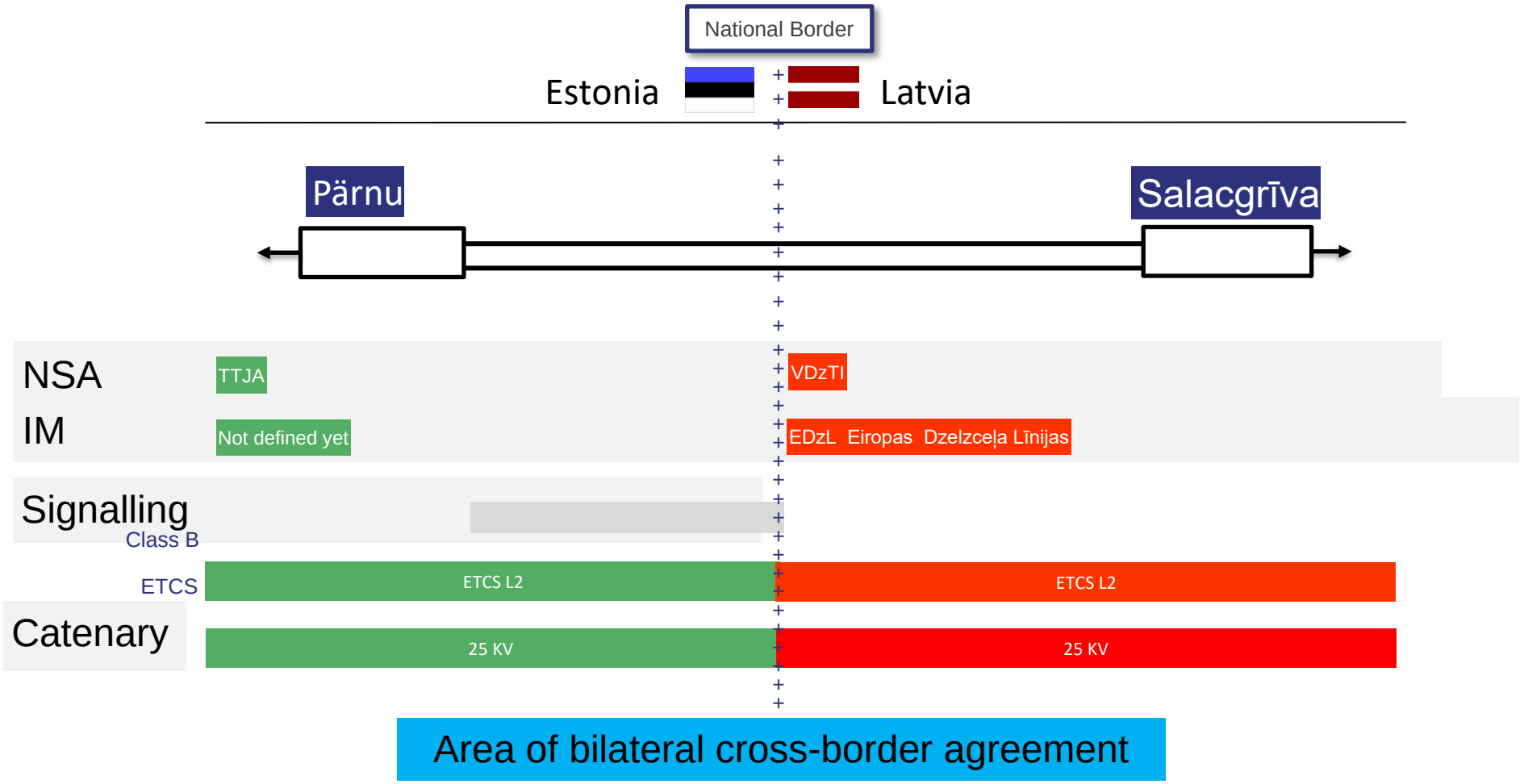
Cross-border schematic overview Turmantas – Daugavpils 1520mm (2026)



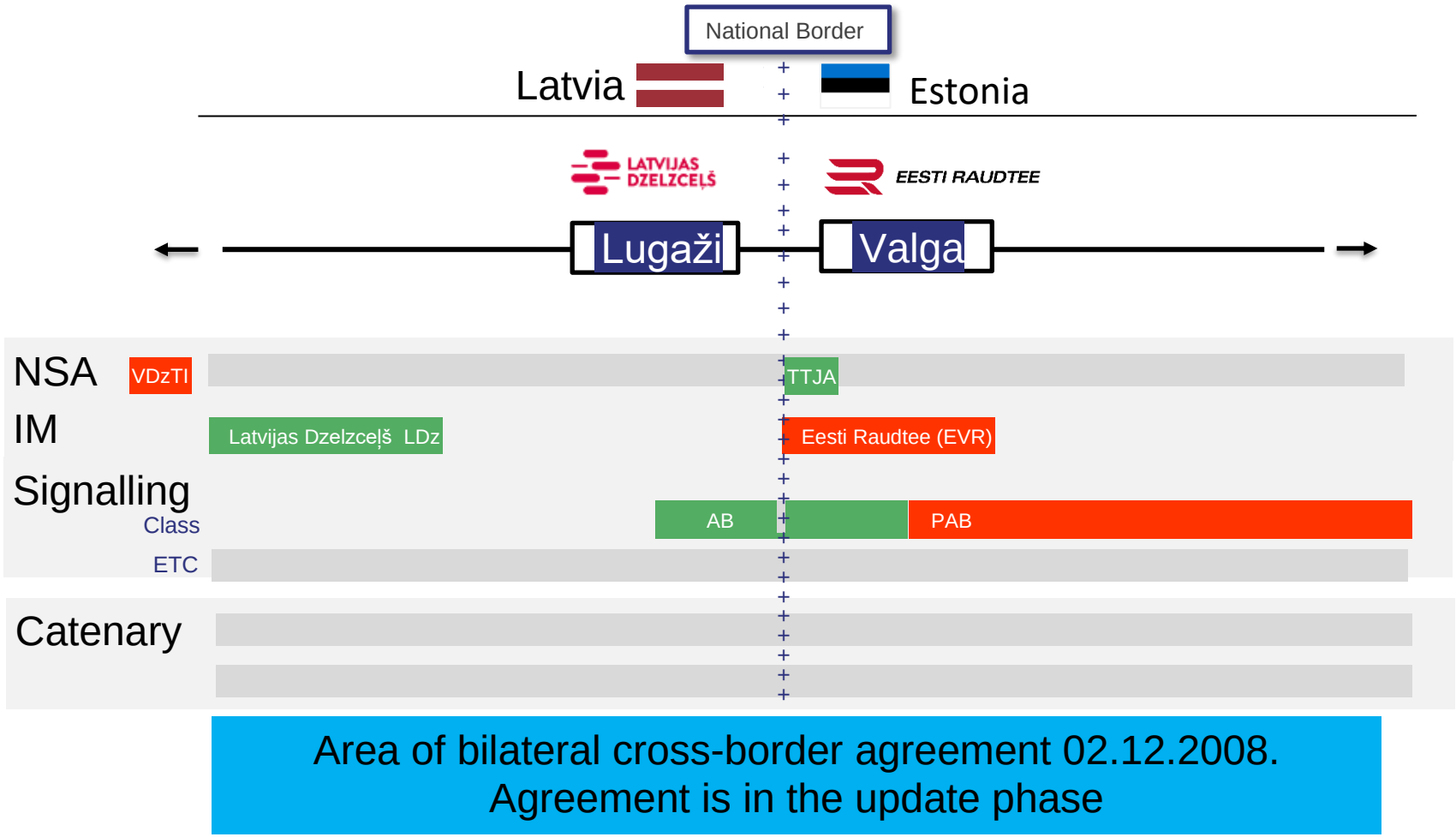
Cross-border schematic overview Joniškelis – Bauska 1435mm (2030)



Cross-border schematic overview Pärnu – Salacgrīva 1435mm (2026)



Cross-border schematic overview Lugaži - Valga (2008) Update of agreement is in progress



Area of bilateral cross-border agreement 02.12.2008.
Agreement is in the update phase