



**Provision of Services to the European Commission  
in the field of n° MOVE/B2/2014-670:**

**“Services of technical support for the deployment  
of ERTMS along the core network corridors”**

**Synthesis report on NIP**

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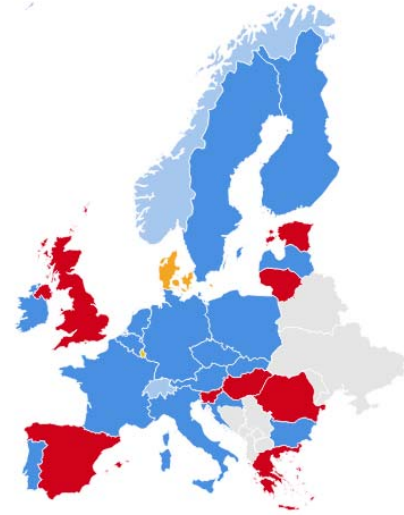
## DOCUMENT CHANGE LOG

Issue	Date	Affected sections	Comments
01	17/08/2017	All	Draft report index for contributions
02	3/11/2017	All	First draft for EC revision
03	18/01/2018	All	Update after receipt of additional NIP
04	30/01/2018	All	Revision
05	01/02/2018	All	Second draft for EC revision
06	06/02/2018	Section 0, 4 and annex	Update for overview per corridor
1.0	14/02/2018	All	Update for distribution
1.1	02/03/2018	Maps	correction

## 0 Executive summary

The following is the classification of the countries that were expected to submit the NIP by whether they have submitted it or not:

- Countries that have submitted the NIP (18):  
Austria, Belgium, Bulgaria, Switzerland, Czech Republic, Finland, France, Croatia, Italy, Ireland, Latvia, Germany, Netherlands, Norway, Portugal, Poland, Sweden and Slovakia.
- Countries that have not submitted the NIP (8):  
Estonia, Greece, Hungary, Lithuania, Romania, Slovenia, Spain and United Kingdom
- Countries that have submitted the NIP informally (2):  
Denmark, Luxembourg



Some of the highlights that can be derived from the synthesis of the NIPs are the following:

- Level of compliance within the NIPs to the EDP is high, including some networks where the expected dates are improved
- Detailed Cost Benefit Analysis cannot be found in many of the NIPs. However, most of the plans that do include some level of economic analysis, conclude that ERTMS has benefits
- There are 5 networks with specific plans to decommission the class B system and more of them clearly state that ERTMS only equipped onboards will be able to run in their ERTMS equipped routes foreseen in the near future

However, there are also negative aspects of ERTMS that have been included by the different countries in the NIPs. These are more specific to each network, but include as examples: infeasibility for industry of proposing technical solutions within the time frames set, still missing standard functionalities or clear understanding of the country that there is no obligation to install ETCS onboard in existing conventional railway vehicles which are the large majority of vehicles currently used.

NIPs contain the national view of ERTMS Deployment plans. This report completes this with an overview per CNCs by highlighting misalignments between NIPs and EDP and the focus on most immediate cross borders between the different countries.

## 1 Synthesis of the planning for ERTMS deployment included in the NIP

The main deployment aspects as required by the CCS TSI to be included in the NIPs are related to the planning which includes the dates of ETCS deployment on the different lines of the network, the dates of decommissioning of the class B systems (if applicable) and the dates when cross-border vehicles shall fully benefit from operation with 'ETCS only equipped on-board' on the high-speed network, corridors or other parts of the network.

In general, most of the NIPs received include information regarding these issues with different level of detail.

### 1.1 Overall compliance with the EDP and its objectives

In general, the NIPs give information regarding the deployment dates of the sections of each country. This information is detailed in a table format (with a list of all sections, with dates, levels, baseline...), maps with dates or at least date ranges, or a more global comment about the compliance with the EDP. For most of the NIPs there is more complete and accurate information on dates up to 2023.

**Austria, Belgium, Czech Republic, Norway and Sweden** are fully compliant with EDP, even some of the sections will be deployed before the deadline set. **Poland, Italy, Switzerland, Slovakia, Croatia** and **Netherlands** are compliant with the EDP with some exceptions. **France, Germany, Bulgaria and Latvia** are compliant with the sections they mention but no detailed planning is provided beyond 2023. **Finland** is not compliant with the EDP as dates go beyond 2030. Ireland is exempted from mandatory deployment of ERTMS. Finally, **Portugal** does not give enough details to evaluate the compliance.

Details for each MS are below:

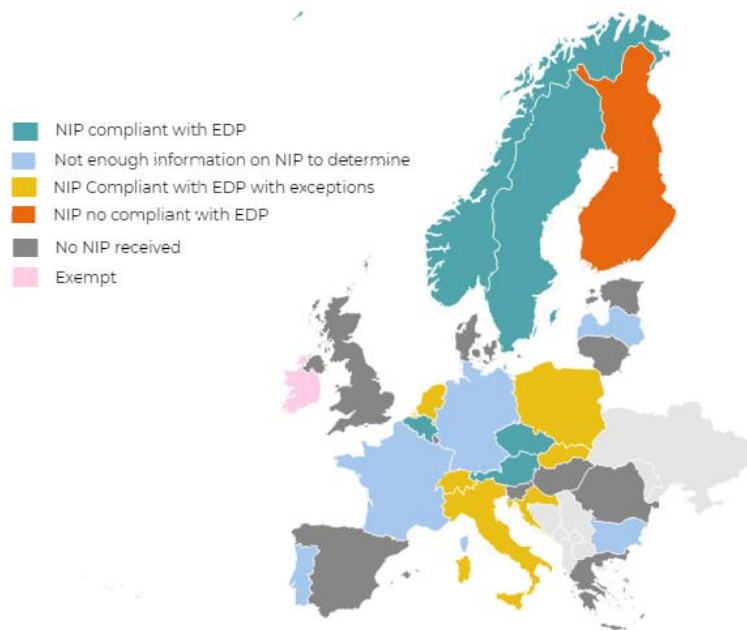
- **Austria** fully complies with the EDP as it is shown in the maps with information for deployment and levels for years 2017, 2018, 2021, 2022 and 2030.
- **Belgium** indicates that all the deployment of ERTMS will be done by 2022. All sections included in the NIP are in full compliance with the EDP, even sections Hal- Y. Antoing and Y.Antoing - Esplechin-Frontiere / Wannehein will be deployed by 2022 1 year in advance from the expected 2023.
- **Czech Republic** is fully compliant to the EDP and in fact its NIP planning is more demanding than the EDP in some sections
- **Norway** deployment is foreseen in the EDP beyond 2023. One section (out of two) included in the NIP is planned to be equipped before than expected, i.e. 2026
- **Sweden** NIP includes an estimation of deployment for the period 2023-2035. NIP includes a detailed list with all sections of the country and some dates are before EDP, such as Lockard-Malmo-border DK will be ready in 2023 instead of beyond 2023
- **Poland** is compliant with the EDP. All sections but the ones between Lowicz and Pilawa (100 km, i.e. only a 3% of their sections included in CNC) have an estimated date for ETCS in operation equal or better than the one set in the EDP.
- **Italy** includes a list with all sections differentiating between conventional and high speed. For each section gives information of level, date and baseline. The differences compared to EDP



are Milano area 2021 instead of 2020, Firenze area 2021 instead of 2030 and Arezzo Nord Junction <--> Valdarno Nord Junction 2019 instead of 2018. There is a detailed planning for sections beyond 2023.

- **Switzerland** NIP gives information with 2 maps about the status implementation of years 2017, 2018 and 2020. Planning is compliant with the EDP but a risk for achieving the cross-borders on time is identified in NIP.
- **Slovakia** includes all lines and dates as in EDP with some exceptions. Sections Devinska Nova Ves-Kuty and Lanzhot-Kuty are delayed till 2030. Also Zilina-Zilina (RRT) is delayed till 2023.
- **Netherlands** has a national roll-out strategy but some sections within the EDP fall out the scope due to the limited budget. These includes some CNC lines like Rotterdam-Utrecht that will be delayed to 2033 or the NSB part from Deventer towards the German border that will be deployed by 2037.
- **France** information only covers sections until 2023, these are in line with the EDP. The planning is not complete (around 5.800 km not included in the NIP).
- **Bulgaria** provides information regarding the existing lines in operation and under construction. All sections are included in the NIP but without detailed information, i.e. only gives information regarding dates with "by 2023" and "beyond 2023".
- **Finland** NIP is not compliant with the EDP. All EDP sections are included in the NIP but with a date for deployment beyond 2030
- **Portugal**, only 3 TENT sections dates are specified. The planning is not complete (e.g. 1200 Km without NIP planning)
- **Croatia** states that the ERTMS deployment will take place beyond 2023 and the upgrade to ERTMS of the existing lines is planned to be finished before 2030. The new construction line Horvati - Dugo Selo is missed in the "Detailed timetable of the ETCS installation".
- **Germany** is partially compliant with the EDP. No detailed planning is specified further than the current status in 2017, the ETCS status foreseen for 2023 and the status foreseen for 2030. Some dates are beyond EDP target dates. For example, the section Rastatt - Karlsruhe Hbf due to the NIP Karlsruhe main station, or the section Mulheim - CH/IT border due to the Katzenbergtunnel. On the other hand, there are lines that are not included in the NIP, such as Bamberg - Nuremberg or Berlin – Halle (in total around 6.450km not included in the NIP).
- **Ireland**, with its isolated network, is exempt from any mandatory requirements to upgrade the signalling system to ERTMS.
- **Latvia** it is planned to build a new 1435 mm railway line in the Baltic countries starting in 2022, but does not give information about the planned ERTMS deployment finish date.

The following map shows level of compliance between NIP and EDP:



## 1.2 Information on cross borders with ETCS

Only few Member States include specific information on Cross borders and mention existing agreements with their neighbouring countries in order to achieve a coordinated deployment.

In **France**, information on borders with Germany (2023), Switzerland (2021), Belgium (2017) and Luxembourg (2017) are included in NIP.

**Belgium** details some information regarding high speed and conventional cross borders. High Speed lines with Germany and the Netherlands are already operated in ETCS. From there to Brussels South will be in operation in 2022. Connection between Brussels South and France will be possible in 2025-2029 replacing TVM430 with ETCS L2. Rail Freight Corridor North Sea Mediterranean is in operation from Luxembourg and French border to Antwerp.

**Switzerland** gives a status of ETCS implementation at border sections in several areas. For the area of Basel, Germany has installed approximately 40% and in the NIP it is included the plan for it to be ready in December 2017. For the cross border Iselle – Domodossola, authorisation deadline included in the NIP is December 2017 whereas for Ranzo – Luino, it is expected in April 2018.

**Germany** funding priorities are in Corridor A(RALP) and cross-borders. Nevertheless, no details of existing cross-border agreements are shown in the NIP

**Norway** and **Finland** mention the cross-borders works ongoing but do not add specific data and **Latvia** mentions the coordination through the Rail Baltica project.

## 1.3 Synthesis regarding the decommissioning of class B system

All the Member States that submitted the NIP except Croatia describe the class B system currently in use with different level of detail. However, only few MS mention the availability of the STM and the decommissioning dates of their class B system.



COUNTRY	CLASS B SYSTEM	DECOMMISSIONING
AT	PZB and LZB. LZB does not work in parallel with ETCS	Yes, for national network
BE	TBL1 , TBL2 , TVM430 , TBL1+	Yes, for CNC
BG	ALS	No
CH	EuroSIGNUM/EuroZUB	Not specified but no class B required on-board from 2018
CZ	LS	Class B replaced by ETCS when deployed
DE	PZB 90 LZB	Not mentioned.
FI	ATP-VR/RHK	Yes
FR	KVB (and TVM	TVM not before 2030 KVB decommissioning not defined yet
HR	INDUSI I 60	Not mentioned
IT	SCMT as fall back system in conventional lines. High speed lines without class B	Yes, gradual from 2026
IE	CAWS IÉHS for the future	Not applicable
NL	STM - ATB	A target date at which the actual class B system can be decommissioned is not planned.
NO	Rebuilding trains so that these can run on stretches with both ERTMS and class B-systems (rolling stock strategy) in operation at the same time	No class B required OB once ETCS is deployed
LV	ALSN	In lines with 1520mm gauge no removal
PL	SHP. GSM-R class B system is Radio 150 Mhz	No removal for the next 20 years
PT	CONVEL (EBICAB700) on trackside	No
SE	ATC	2035
SK	LS general statements	Class B replaced by ETCS

In **France**, TVM system if decommissioned, will be after 2030. No dismantling of the KVB is scheduled at this stage on the conventional network, awaiting the information that will be provided by ongoing studies. KVB will be available as STM maintained by French railway sector.

**Poland** will not remove the class B system for the next 20 years, and GSM-R class B removal is expected after 2023. In fact, it is stated that, given the absence of plans to discontinue the use of Class B train control devices, all vehicles equipped with on-board ETCS equipment must be fitted with the STM.

**Portugal** states that ETCS + STM is required on-board, CONVEL will be gradually removed when it is outdated. A decommissioning of Class B radio system will begin in 2018.

**Latvia** does not plan to remove the class B system in existing lines of 1520mm gauge. Introduction of ETCS should also maintain the current class B system at the same time, to provide locomotive services from neighbouring countries. In the new lines of 1435mm gauge, class B system is not mentioned.

**Bulgaria** and **Netherlands** state the intention of decommissioning but with no detailed plan or dates. **Netherlands** states that during this transitional period, STM and class B systems will still be necessary.

**Sweden** will decommission their class B system on a line per line basis. In the most optimistic scenario class B system will be phased out 2035.





The information provided by **Switzerland** is that from beginning of 2018, new vehicles do not need anymore the class B system SIGNUM and ZUB as by December 2017, ETCS Level 1 Limited Supervision Swiss (LSCH) will include packet 44 (EuroSIGNUM/EuroZUB).

In the **Norwegian** NIP, there is no exact date of removal. However, class B system is only optional when ERTMS is deployed.

**Czech Republic** gives no detailed dates, but a process on how the class B will be decommissioned in 3 stages, from the moment when class A system is put into operation to when exclusive operation of class A system begins and at the same time class B system is put out of operation .

In **Germany** the Class-B decommissioning is not specified. Parallel equipment with the Class B systems and ETCS of lines with the systems is permitted. LZB and PZB 90 can then serve as fall-back systems.

**Croatia** only indicates that is going to use the “rolling stock” strategy. If a vehicle equipped with ETCS operates on lines equipped with INDUSI that is currently in operation, a STM will be required in the on-board system..

In **Austria**, sections with ETCS + PZB will remove their class B system after 3 years of being equipped with ERTMS. On the contrary, LZB will be decommissioned as soon as ERTMS deployed. Therefore, a full decommissioning of LZB is expected by 2030, and of PZB by late 2030s. In addition, lines equipped with ETCS may be accessed by vehicles with ETCS on-board equipment only.

**Belgium** has different class B decommissioning plans depending on the specific class B system: Memoir/Crocodile will be decommissioned in lines equipped with ETCS L1 and TBL1+ from the end of 2016, TBL1 will be taken out of service when commissioning ETCS in Halle-Brussels South, TBL2 will be limited to high speed line 2 by the end of 2017, TVM430 will be replaced with ETCS L2 by 2029 and TBL1+ will be maintained as class B system only on non-TEN-T lines.

**Italy** will begin a gradual removal of the SCMT system on the conventional network in 2026. For sections to be equipped after 2026, no decommissioning is programmed for the time being. Class B on Florence-Rome high-speed line is being decommissioned and by 2020 this line will be ERTMS-only.

**Slovakia** will replace LS with ETCS L2 except for Zilina-Cadca and ETCS L1 lines.

**Finland** indicates that the removal of the JKV class B system will take place by the introduction of the ERTMS / ETCS system. As soon as the ERTMS /ETCS equipment will be deployed, JKV will be removed. For the CNC lines equipped with ERTMS, rail vehicles will only need to be equipped with ERTMS system.

## 1.4 Other issues

Many countries clearly state in their NIP that the date when existing cross-border vehicles shall fully benefit from operation with ‘ETCS only equipped on-board’ will be the same as the ETCS target date, for example **Finland**, **Belgium**, or the **Czech Republic**. For the last two, it is clearly stated in addition, that their goal is to operate exclusively ETCS-fitted trains and no class B system will be required to the vehicles operating on interoperable lines. This is also the case for **Austria** explicitly for the CNC.

On the contrary, after the general analysis carried out in **Portugal**, the preferred migration strategy for ETCS will be to equip first their vehicles fleet with ETCS from 2021 onwards while there is no defined date for trackside.

It is important to highlight that 3 countries already set a date to allow ETCS-only equipped on-board in their networks:

- Luxembourg from June 2017
- Switzerland, from January 2018
- Belgium, with a date to be agreed with the RUs that could be between 2025 and 2032

## 2 Economic and Financial aspects included in NIP

Some of the NIPs submitted by the MS provided additional information which allowed further clarifications on some aspects of the economic and financial impact of ERTMS deployment. This facilitated an update of the business case analysis per CNC with new data and information. Some NIPs allowed also getting an up-to-date understanding of MS' plans regarding the decommissioning of the legacy system in their networks

In terms of economic content, among the NIPs submitted only 9 MS have quoted some figures regarding the cost of deployment on their rail sections. **Sweden** is the sole MS which has also submitted a CBA which however is calibrated on the country's national plan to equip the whole network with ERTMS by 2027 (few exceptions regarding some sections), due to the obsolescence of the legacy system. **French** and **German** NIPs both mentioned a CBA without entirely quoting the detailed results of this analysis.

### 2.1 Overall alignment of the CBA with the principles and conclusions of the CNC business case developed by DMT

As stated in the previous section, only Sweden provided a CBA with detailed figures in the NIP. The table below provides a quick comparison between the Swedish CBA and the business case analysis provided by the DMT in October 2016:

Item		Sweden	DMT
<b>Overall deployment strategy</b>		Dual on-board, full on-board deployment by 2027	Dual on-board, full on-board deployment by 2027
<b>Costs</b>	Track-side deployment cost	Overall cost, that take into account interlocking and are on the MS levels	Average unit costs, applied only on the sections of the CNC, and without taking into account interlocking. That being said the deduced averages are in the same range (L2: 300k€/km without interlocking for DMT; 500k€/km with interlocking in Sweden)
	On-board deployment costs	Overall cost It is considered that 57% of the fleet need to be retrofitted	Unit costs (and no information about the size of the Swedish fleet for comparison) On Scan-Med corridor, it is considered that 51% of the fleet need to be

			retrofitted
	Track-side maintenance costs	The CBA recognizes that ERTMS will be less expensive to maintain but does not provide figures or include this benefit in the conclusion	ERTMS L2 significantly less expensive to maintain than class B (up to 60%)
<b>Benefits</b>	Avoided costs of renewal of the class B system	The total renewal cost of class B is not mentioned, but adapting the class B in order to keep its use until 2035 (and not 2027) would cost 40% of its deployment cost	The total renewal of the class B system would cost the same cost as the deployment of ERTMS instead
	Reliability	The reliability benefit is assessed based on an estimation of the "value of time" and the decrease of the signaling-related delays thanks to ERTMS	The reliability benefits were not included up to now, but will included in the future releases
	Safety	ERTMS will not have any impact on safety	Safety benefits were included, but will be removed in the future releases.
	Speed	ERTMS will not have any impact on speed	ERTMS impact on speed is not assessed
	Capacity	ERTMS will not have any impact on capacity	Capacity was included in the CBA, but will be removed in future releases
	Interoperability	Since the CBA is Sweden-focused, interoperability was not considered	Interoperability is a core benefit of the CBA

## 2.2 Synthesis regarding the financing strategies

One of the major issues tackled in most of the NIPs is the question of funding the deployment. For trackside, the most frequent solution is the combination of state and CEF funds (and cohesion funds for cohesion countries). Onboard deployment is, on the other hand, rarely mentioned, and if so, it is to mention that the state cannot provide direct funding to RUs as it will not be compliant with the EU policy regarding state aid.

The table below presents for each MS its policy, according to the NIP, regarding this issue.

MS	Information about financing the deployment: trackside	Information about financing the deployment: onboard
AUSTRIA	The financing of ERTMS deployment is within the general framework of planning and financing infrastructure in Austria, the current framework will last 6 years (until 2023) for an overall allocated funding of 227 M€. In addition to funding provided at the national level, Austria will continue to apply for funding opportunities at European level, particularly CEF.	No direct public funding will be provided for the RUs, but counselling is provided in order to access EU-level financial support.
BELGIUM	The infrastructure costs are paid on the basis of an investment grant to the infrastructure manager, supplemented with EU subsidies where these can speed up the implementation process	The migration of the rolling stock that is only used for public passenger services is financed through an investment grant to the operator. This grant is supplemented with EU aid within the framework of the



		CEF
BULGARIA	<ul style="list-style-type: none"> <li>- 572 M€, provided by the Cohesion fund and the ERDF, are dedicated to improve (between 2014 and 2020) the railway infrastructure along the CNCs.</li> <li>- 406 M€, provided by the CEF (under the funding for cohesion countries)</li> <li>- The Bulgarian government is also considering applying for the "regular" CEF grants</li> </ul>	<ul style="list-style-type: none"> <li>- between 2011 and 2015, the Bulgarian government provided between 12 and 15 M€ annually to the public passenger RU for the modernization</li> <li>- The Bulgarian government is also considering applying for the "regular" CEF grants</li> </ul>
CROATIA	The NIP briefly mentions that the trackside deployment will rely on EU funding.	No clear information provided: it appears that no precise funds have been allocated yet
CZECH REPUBLIC	The development of trackside GSM-R + ETCS on TEN network lines in the planning period 2017–2023 will be primarily funded from CEF	<p>Fitting of vehicles with on-board ETCS will be supported by the state by combining two basic tools:</p> <ul style="list-style-type: none"> <li>-systematic funding of purchase and installation of on-board ETCS to RUs and primarily covered from EU funds – basic measure;</li> <li>- granting a discount on the charge for the use of railway infrastructure – complementary measure.</li> </ul>
GERMANY	<p>The Federal Ministry of Transportation joined DB Netz in a Financing partnership. This partnership allocated 393,1M€ of funding for the RALP Corridor project. These 393 M€ include 100M€ of CEF funding.</p> <p>Other funding opportunities quoted: EIB, Länder, specific federal legislations such as Municipal Transport Financing Act (GVFG) or Rail Freight Traffic Promotion Act (SGFFG)</p>	No clear information provided: it appears that no precise funds have been allocated yet
IRELAND	Only national funding is allocated (no EU-sources)	No clear information provided: it appears that no precise funds have been allocated yet
FINLAND	No clear information provided: it appears that no precise funds have been allocated yet	No clear information provided: it appears that no precise funds have been allocated yet
FRANCE	No clear information provided: it appears that no precise funds have been allocated yet	No clear information provided: it appears that no precise funds have been allocated yet
ITALY	No overall information, but for regional lines, the impacted regions/provinces	No clear information provided



	(Tsuchany; Bolzano) are directly contributing	
LATVIA	Not provided	Not provided
NETHERLANDS	The track-side deployment budget is mainly provided by the state	The ministry offers national funding for upgrades and is asking for CEF subsidy as well
NORWAY	Not provided	Not provided
POLAND	The costs of the deployment of ERTMS within Polish infrastructure is financed to a large extent by EU funds, with national contribution. Until 2023, the implementation of the system will be based on the Cohesion Fund.	Not provided
PORTUGAL	CEF and cohesion funds are mentioned, but no precise figures are given	CEF and cohesion funds are mentioned, but no precise figures are given
SLOVAKIA	- ZSRs own funds as the infrastructure manager - financing from the state budget (SB), - funding from EU sources + co-financing from SB sources - financing from ŽSR loans.	Not provided
SWEDEN	No information provided, but it appears that the state will be the main source of funding	Not provided
SWITZERLAND	Not provided	Not provided

### 3 Technical aspects included in NIP

For most of the NIP, the technical content is limited to the level and baseline of foreseen sections. Some NIPs also include generic technical requests (e.g. system stability)

#### 3.1 Analysis of the technical aspects as considered in the CBA

The different technical aspects that are considered by the countries within the CBA are included in the following list. The description of each of the technical aspects is in some cases taken from the specific NIPs, while for those where no detailed reasoning was included, the description is DMT understanding:

- Interoperability, it is highlighted that ERTMS avoids costs of dual equipment on a longer term of the deployment and open the market to different suppliers.  
Countries that have highlighted interoperability as technical benefit from ERTMS are:  
**Austria, Finland, Poland, and Sweden**
- Capacity, even if the gain in capacity can be achieved independently of the level installed and is more related to the previous existing systems, the countries highlighting capacity as the main gain for ERTMS deployments are those where level 2 is foreseen. It is also relevant that



for some countries it is not only the capacity that is improved by the deployment of ERTMS, but also the punctuality by decreasing the necessary journey time.

Countries that have highlighted capacity as technical benefit from ERTMS are: **Netherlands, Poland, and Sweden**

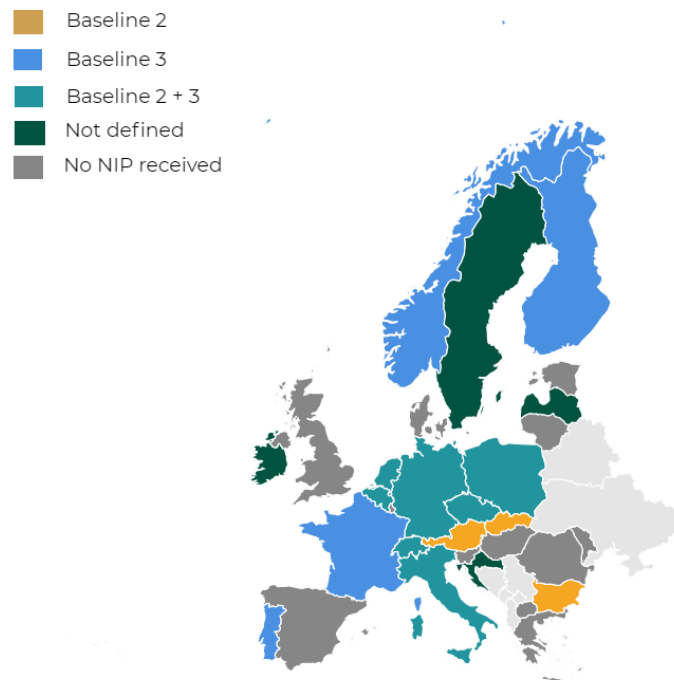
- Safety, because of the continuous technical monitoring of the driver actions. Countries that have highlighted safety as technical benefit from ERTMS are: **Belgium, Germany, Latvia, Poland, Sweden, and Finland**
- General modernisation of the railway network, mainly **France**, links the ERTMS deployment to the best solution when modernising the existing network and modifying the existing other control command and signalling systems
- **Latvia** states that the deployment of ERTMS would not improve the interoperability. The main reason is that since the gauge of the railway network is 1520mm, as in the neighbour countries, interoperability is already achieved.

### 3.2 Analysis of the technical aspects/justifications raised in the deployment plans

The most relevant technical aspects linked to the deployment plans are the definition of ERTMS levels and baselines.

For railway undertakings' planning it is also essential to have an overview on the baselines to be deployed in the different sections. Although from 2019 new vehicles authorised will be Baseline 3 that can run both over Baseline 2 and Baseline 3 lines, all the existing vehicles are Baseline 2 and there are currently some Baseline 2 onboard being retrofitted, which cannot run in Baseline 3 lines. NIPs reveal that some countries will have a network with only one Baseline, e.g. Baseline 2 (**Austria and Slovakia**), or Baseline 3 (**Finland and Norway**) while others are planning different baselines within the network. For example, **Germany, Poland, Switzerland, France and Belgium** will have a mixed network with Baseline 2 and Baseline 3 lines. The **Netherlands** new deployments will be in baseline 3. The **Czech Republic** will switch to Baseline 3 on the new lines from 2017 and **Italy** will deploy Baseline 2 in the high speed lines and baseline 3 in the conventional lines. **Bulgaria, Portugal and Sweden** did not provide in their NIPs information regarding the baselines.

The following map shows the Baseline deployed in each country:



Regarding the level of ERTMS to be applied, countries have taken different approaches:

- ERTMS Level 2 for the complete network,

**Austria, Czech Republic, Netherlands, Norway, Portugal and Slovakia**

- Other countries link the selected ERTMS level to the existing type of signalling

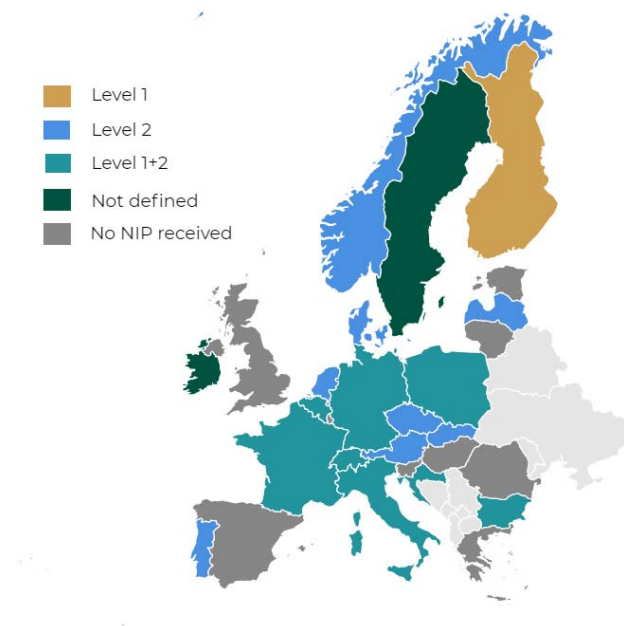
**Belgium, Bulgaria, Switzerland, France, Germany, Italy and Poland.** For example, **Italy** intends Level 2 as the relevant for high speed lines and level 1 or 2 depending on existing signalling systems for main lines.

- ERTMS level 1 for the complete network

Even if the information is not conclusive, it appears that **Finland** is the only country that foresees to equip only ERTMS level 1 in the network.

**Croatia** and **Sweden** are the only Member States which do not include level of ERTMS in the deployment strategies included in the NIP.

The following map shows the levels for each country:



An additional technical aspect to be highlighted is that it is explicit in some NIPs that ERTMS can be interfaced with different types of interlocking and not only electronic interlocking. Information on the interface between ERTMS and the interlocking can be found in NIPs from **Austria, Bulgaria, Switzerland, Czech Republic, Netherlands, Poland** and **Sweden**.

It should be highlighted that there is clearly less information on GSM-R in the NIPs than the information on ETCS. Some Member States already have a GSM-R network deployed or have started the deployment and, therefore, have experience on it: **Bulgaria** 298 km, **Czech Republic** 1.660 km, **Germany** 235.8km, **Italy** 11.200 km and **Poland** 1.600km. The most remarkable network is in **Italy**, where the largest GSM-R network is deployed. Regarding the GSM-R network, **Bulgaria** and **Norway** have expressed the importance of ensuring the complete coverage of the line with the GSM-R signal in lines equipped with ERTMS Level 2. **Belgium** and **France** have stated that the GSM-R will be supplemented with a GPRS module on high-speed lines, in order to meet the high-speed data transmission requirements.

#### 4 Overview per corridor

This section includes a short overview per CNC of the ERTMS deployment dates as included in the NIPs, i.e. the dates that were agreed in the ERTMS EDP per corridor are compared to the dates available in the NIPs.

The results can be found in the schemes that are included in Annex A of this report. The sections target dates that are marked in dark red correspond to the cases when the NIP has indicated a target date later than the one in the EDP. These schemes identify also the sections of the CNC that belong to Rail Freight Corridors (RFC).





DMT has not received NIPs from the following MS: Estonia, Greece, Hungary, Lithuania, Romania, Slovenia, Spain, United Kingdom, Denmark and Luxembourg. Therefore, no delay in these MS is shown in the corridor schemes attached, but sections corresponding to these countries have been highlighted in light red.

For those countries that have submitted the NIPs but no detail information on specific sections or specific periods is included, DMT has assumed that the EDP will be fulfilled. Therefore, they are not highlighted in the maps. For further identification of this sections or periods where no detail comparison has been possible, please refer to section 1.1 of this report.

As part of this overview of the national ERTMS implementation plans vs ERTMS deployment plans per corridor (i.e. information as included in NIPs and EDP) specific focus is set to the deployment of the system in the cross border sections.

The following table includes the misalignment of the cross borders planning between the EDP and the NIPs taking into account that when no detail information is available in the NIP, it is understood that the data remaining applicable is the one in the EDP.

Description	CNC	Country	ETCS Status	Target date	NIP finish date
Montzen <--> Botzelaer Frontiere DE	NSB - RALP	Belgium	No ETCS	31/12/2020	31/12/2022
Basel-Süd <--> Basel-Kleinhüningen (border CH-DE)	RALP	Switzerland	ETCS under construction	31/12/2017	31/12/2018
Mulheim <--> Border (DE/CH)	RALP	Germany	No ETCS	31/12/2022	31/12/2030
Border F/CH I <--> Mulhouse (part 1)	NSM	France	ETCS under construction	31/12/2020	31/12/2021
Hengelo <--> German border II / Border D/NL (part 1)	NSB	Netherlands	No ETCS	31/12/2030	31/12/2037
Lanzhot <--> Kutý	OEM	Slovakia	No ETCS	31/12/2023	31/12/2030

Focus is also set to the cross border sections in order to identify if there are specific locations which require more complex cross border agreements in the coming years. The following map highlights the level of difficulty as evaluated by DMT of the expected cross border sections before 2023 with the following criteria:

- Difficulty of the cross border increases if there is a delay in timing between the 2 countries of the border sections of 5 years or higher
- Difficulty of the cross border increases if it involves an ERTMS level 2 deployment
- Difficulty of the cross border increases if ERTMS baselines at both sides of the border differ
- Difficulty of the cross border increases if there is a mismatch on the expected dates between the EDP and the NIPs





## 5 Abbreviations

Terms	Definition
AT	Austria
ATC	Automatic Train Control
B2	Baseline 2
B3	Baseline 3
BE	Belgium
BG	Bulgaria
CBA	Cost-benefit analysis
CCS TSI	Control Command and Signalling Technical Specification for Interoperability
CEF	Connecting Europe Facility
CH	Switzerland
CN	Core Network
CNC	Core Network Corridor
CZ	Czech Republic
CZK	Czech koruna
DB Netz	Deutsche Bahn Net
DE	Germany
DK	Denmark
DMT	ERTMS Deployment Management Team
EDP	European Deployment Plan
EE	Estonia
EIB	European Investment Bank
EL	Greece
ERDF	European Regional Development Fund
ERTMS	European Rail Traffic Management System
ES	Spain
ETCS	European Train Control System
EU	European Union
FI	Finland
FR	France
GPRS	General Packet Radio Service
GSM-R	Global System for Mobile Communications – Railway
Hbf	Central Station, ( <i>Hauptbahnhof</i> )
HR	Croatia
HU	Hungary
IE	Ireland
IM	Infrastructure Manager
IT	Italy
L1	Level 1 of ERTMS

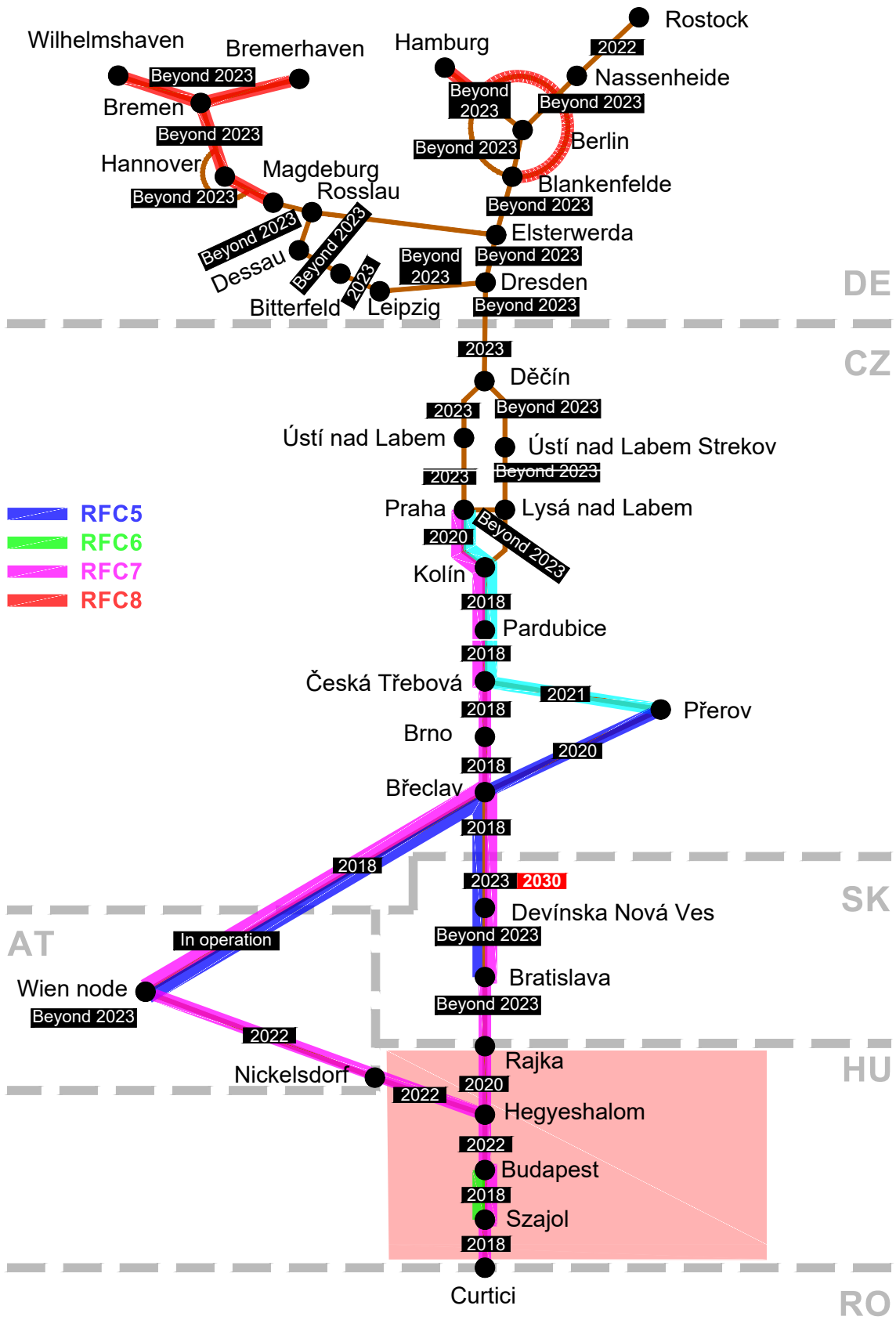


L2	Level 2 of ERTMS
LS	Limited Supervision mode of ERTMS or Czech class B system
LSCH	ETCS Level 1 Limited Supervision Swiss
LT	Lithuania
LU	Luxembourg
LV	Latvia
MS	Member State
NIP	National Implementation Plan
NL	Netherlands
NO	Norway
NSB	North Sea-Baltic Corridor
OB	Onboard
OBU	OnBoard Unit
PL	Poland
PT	Portugal
RALP	Rhine-Alpine Corridor
RFC	Rail Freight Corridor
RO	Romania
RU	Railway Undertaking
SE	Sweden
SEK	Swedish krona
SI	Slovenia
SK	Slovakia
STM	Specific Transmission Module
TEN-T	Trans-European Transport Network
TENtec	European Commission's Information System to coordinate and support TEN-T Policy
UK	United Kingdom
ŽSR	Railways of the Slovak Republic, ( <i>Železnice Slovenskej republiky</i> )



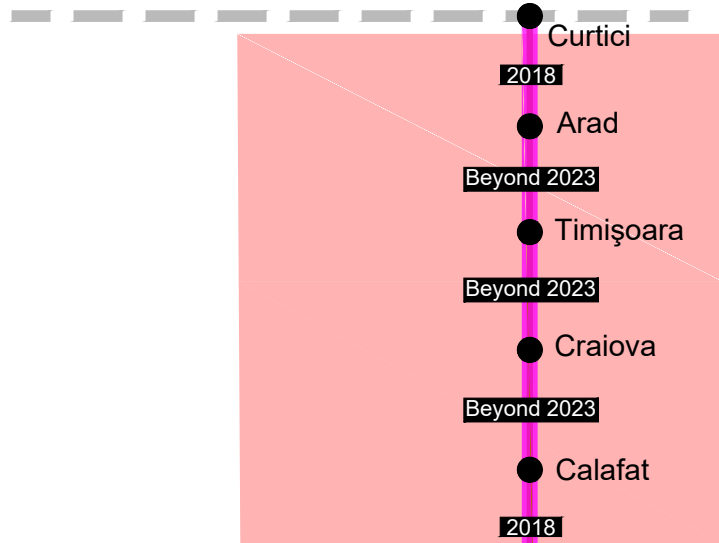
## **Annex A. CNC in EDP vs NIP schemes**

# ORIENT/EAST-MED CORRIDOR Passenger & Freight 1/2

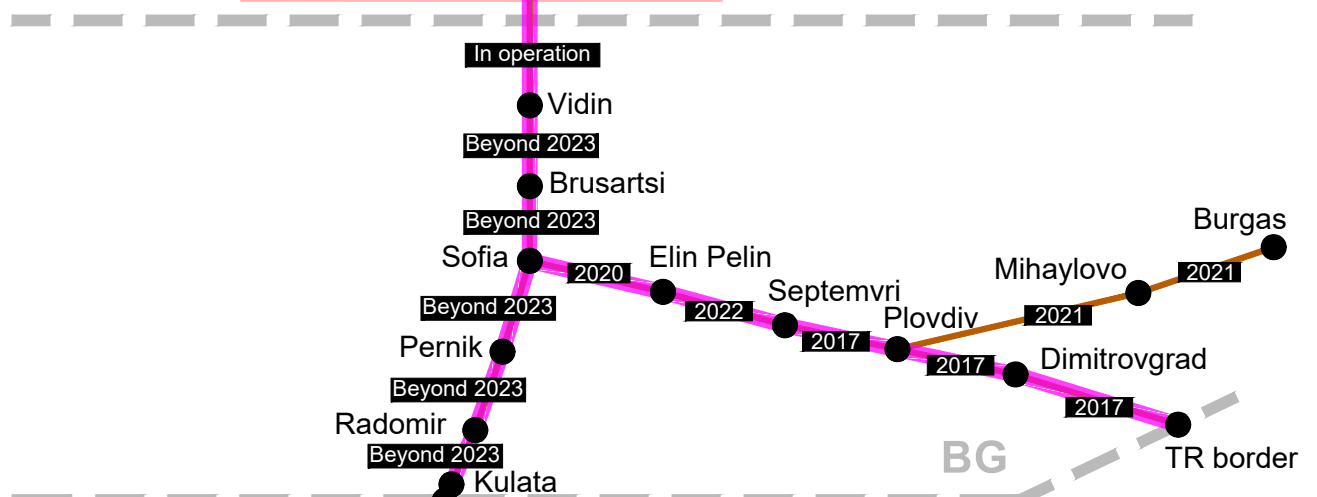


# ORIENT/EAST-MED CORRIDOR Passenger & Freight 2/2

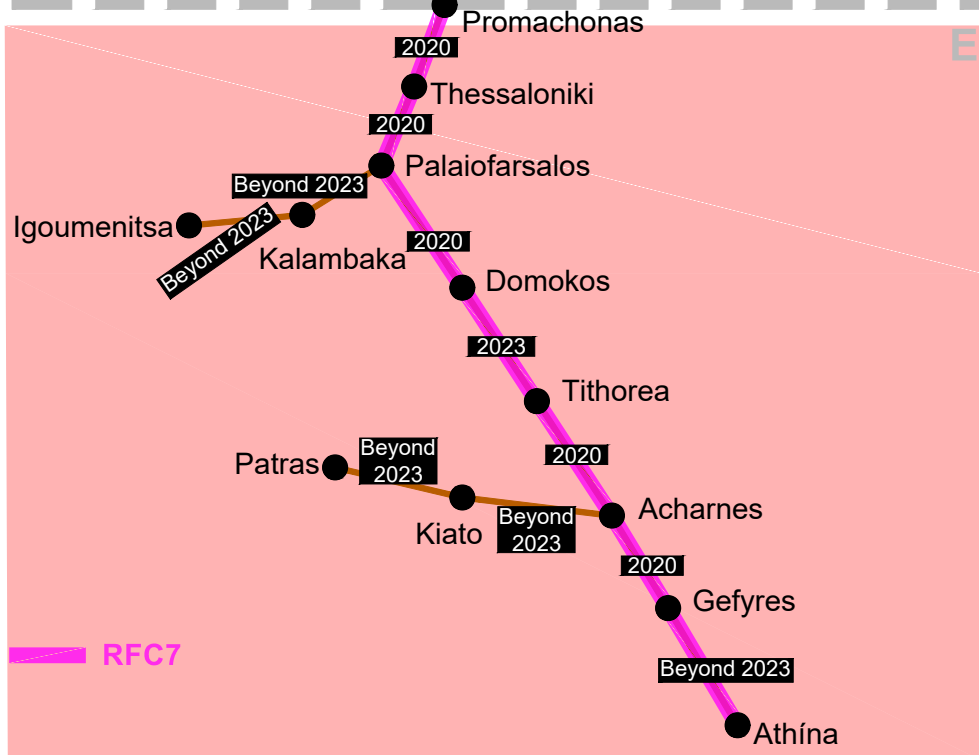
HU



RO



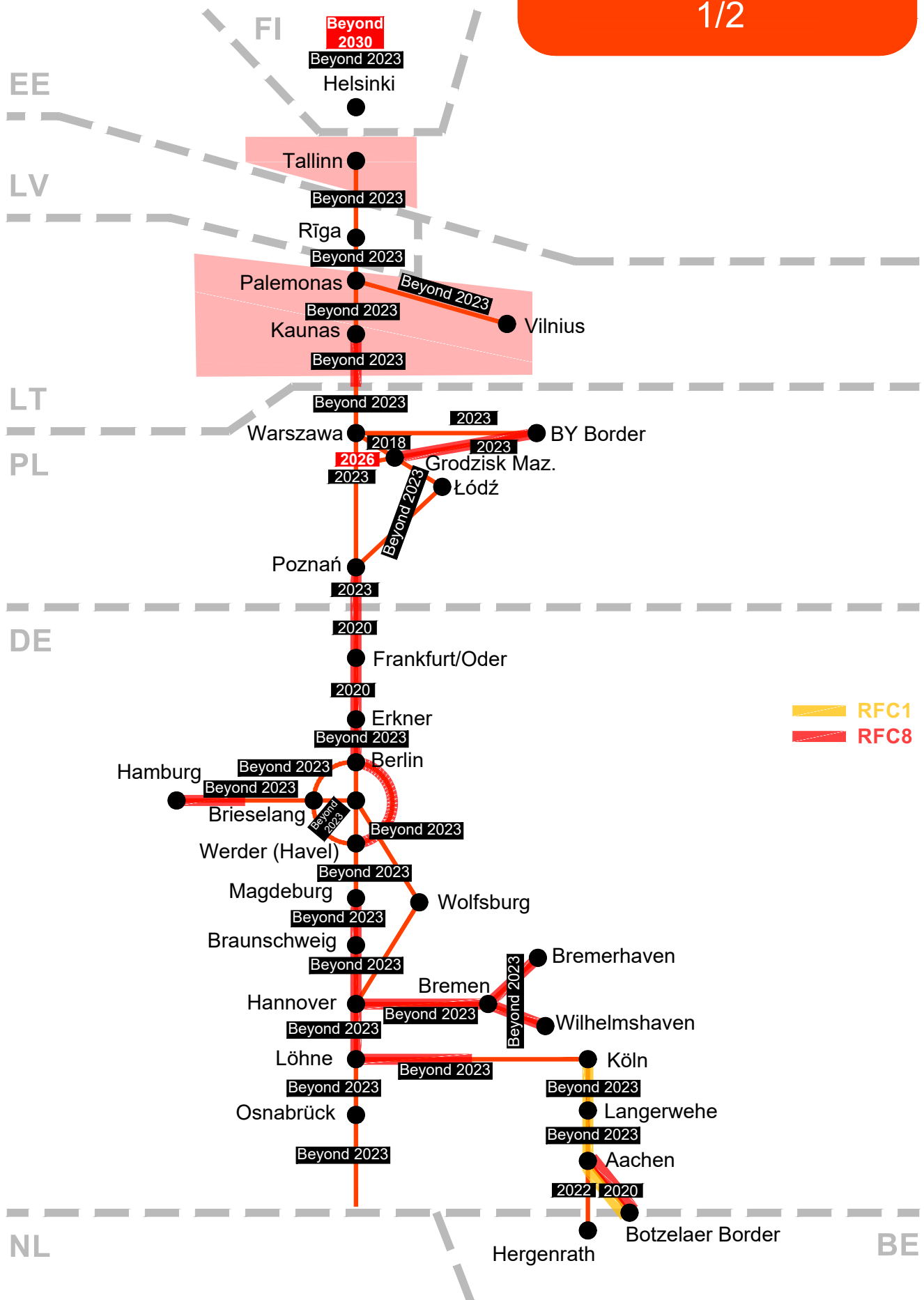
BG



EL

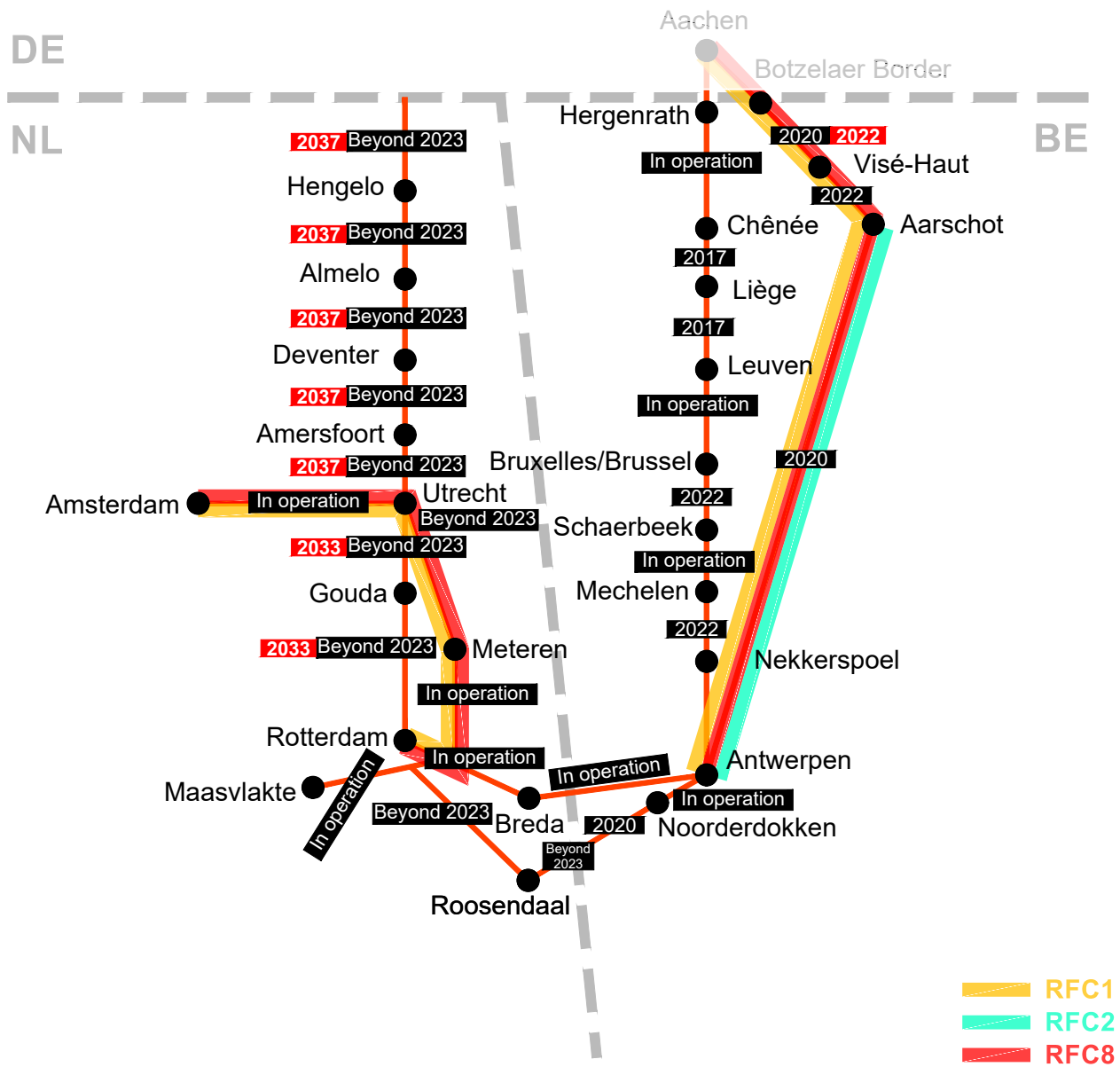
RFC7

# NORTH-SEA BALTIC CORRIDOR Passenger & Freight 1/2

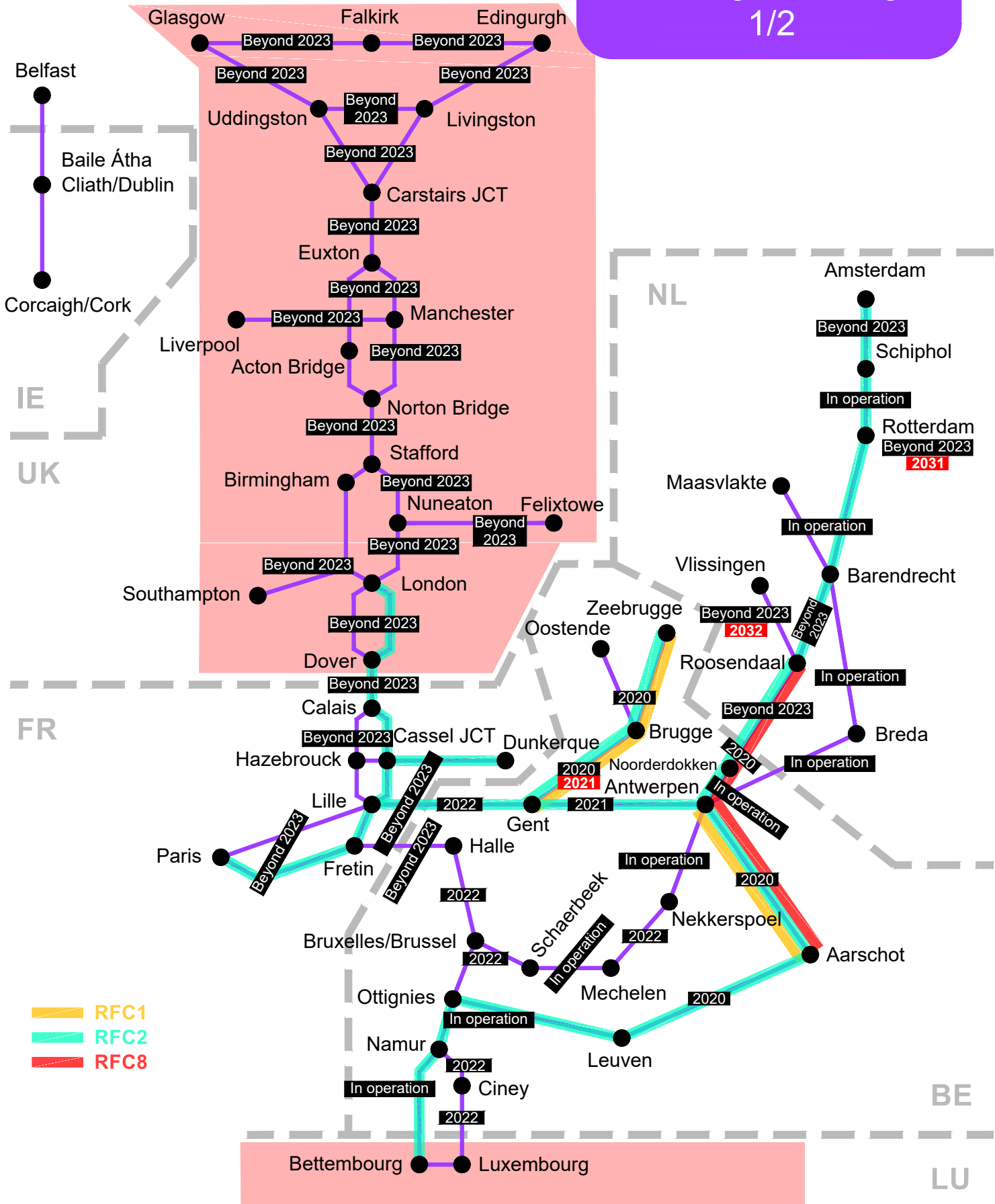




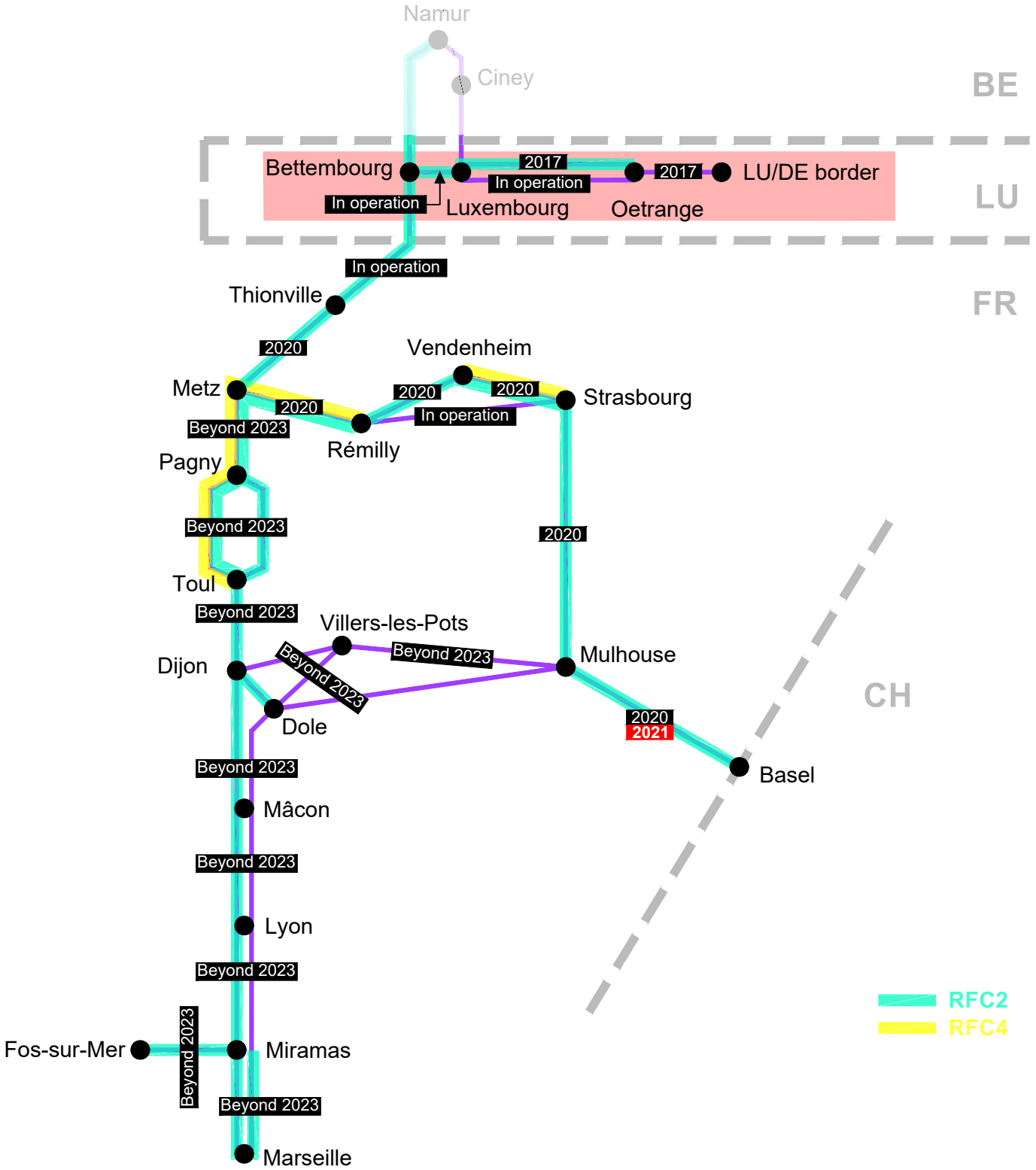
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# NORTH-SEA MED CORRIDOR Passenger & Freight 1/2

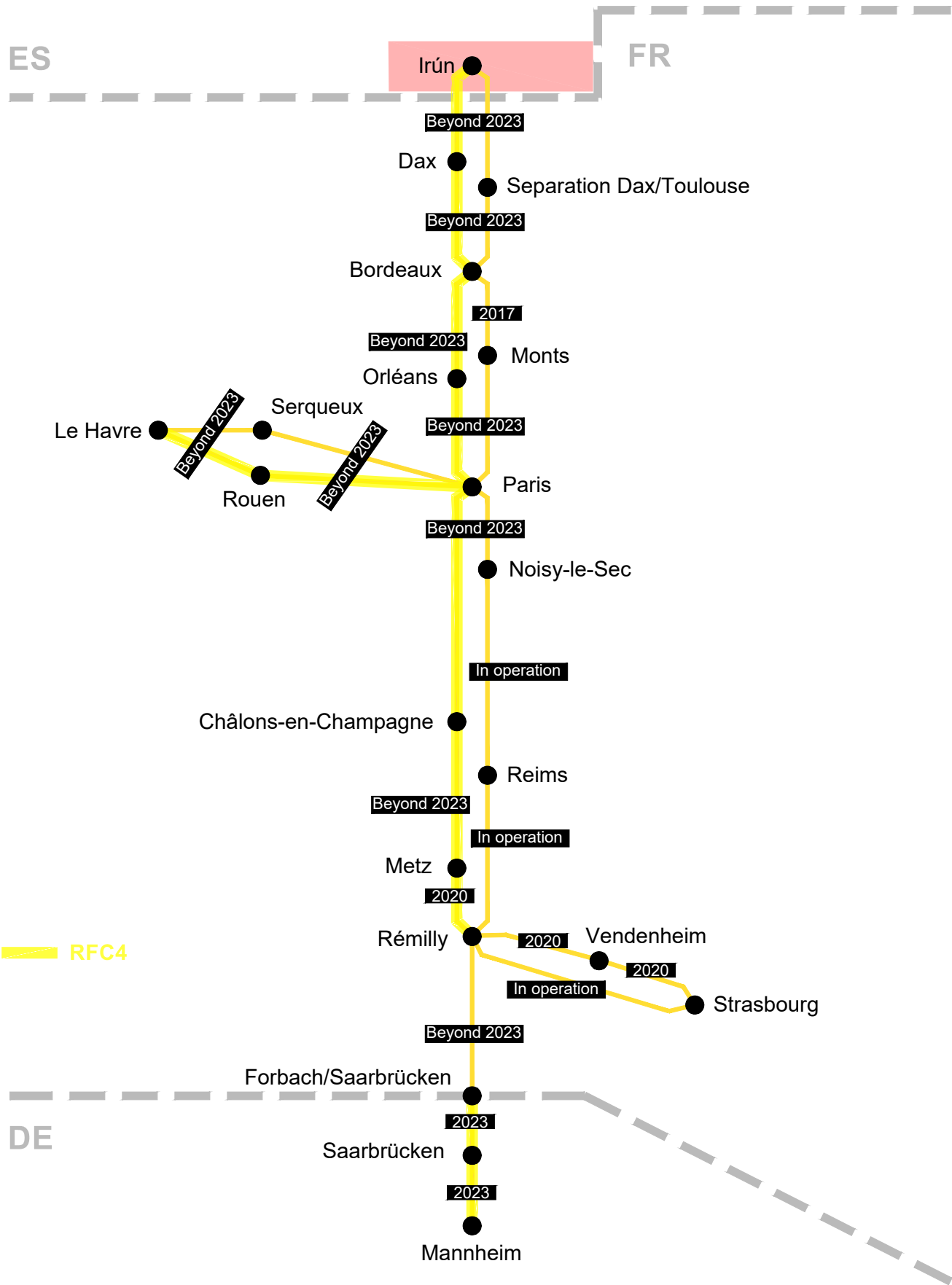


# NORTH-SEA MED CORRIDOR Passenger & Freight 2/2





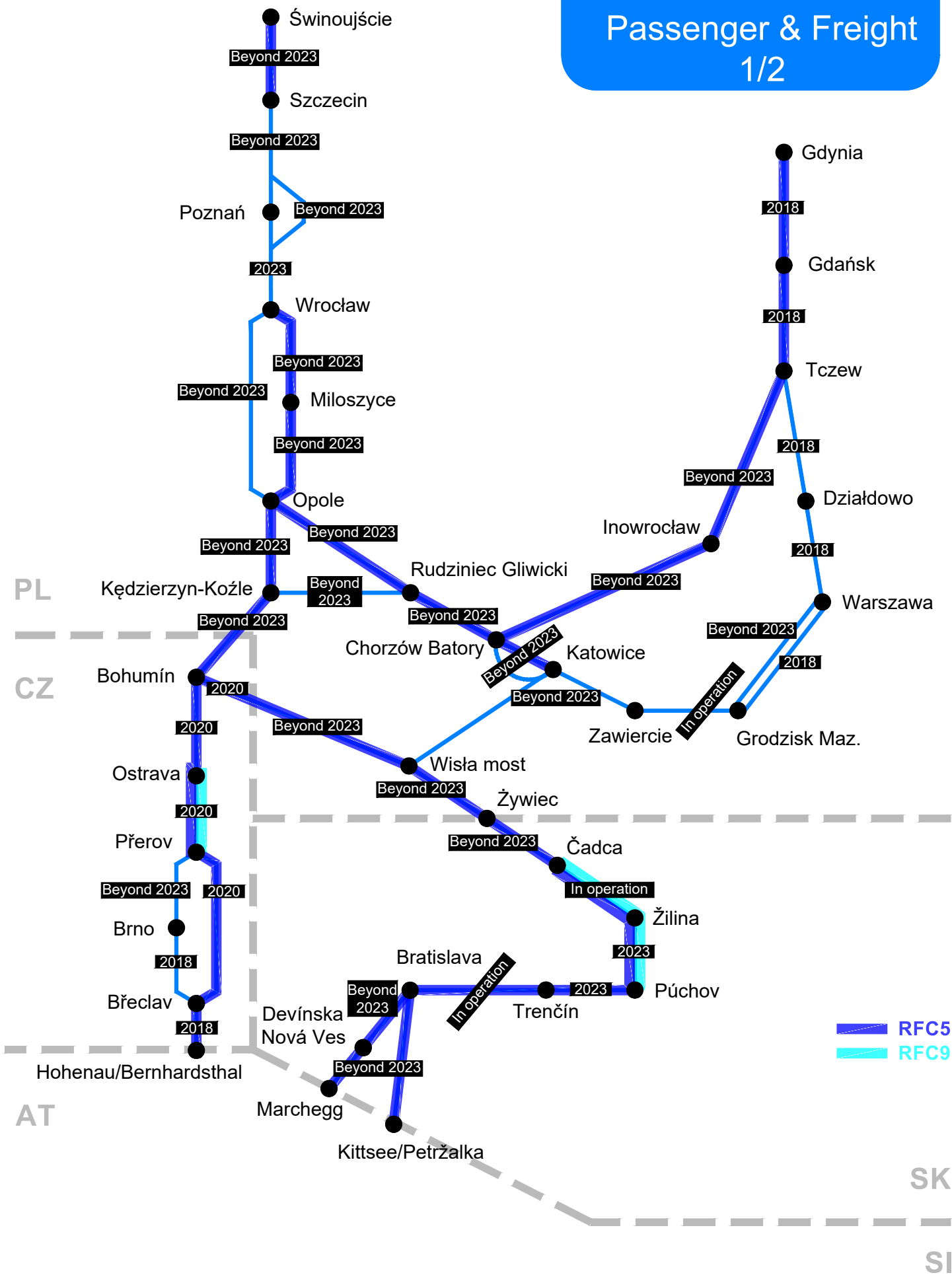
# ATLANTIC CORRIDOR Passenger & Freight 2/2



# BALTIC-ADRIATIC CORRIDOR

## Passenger & Freight

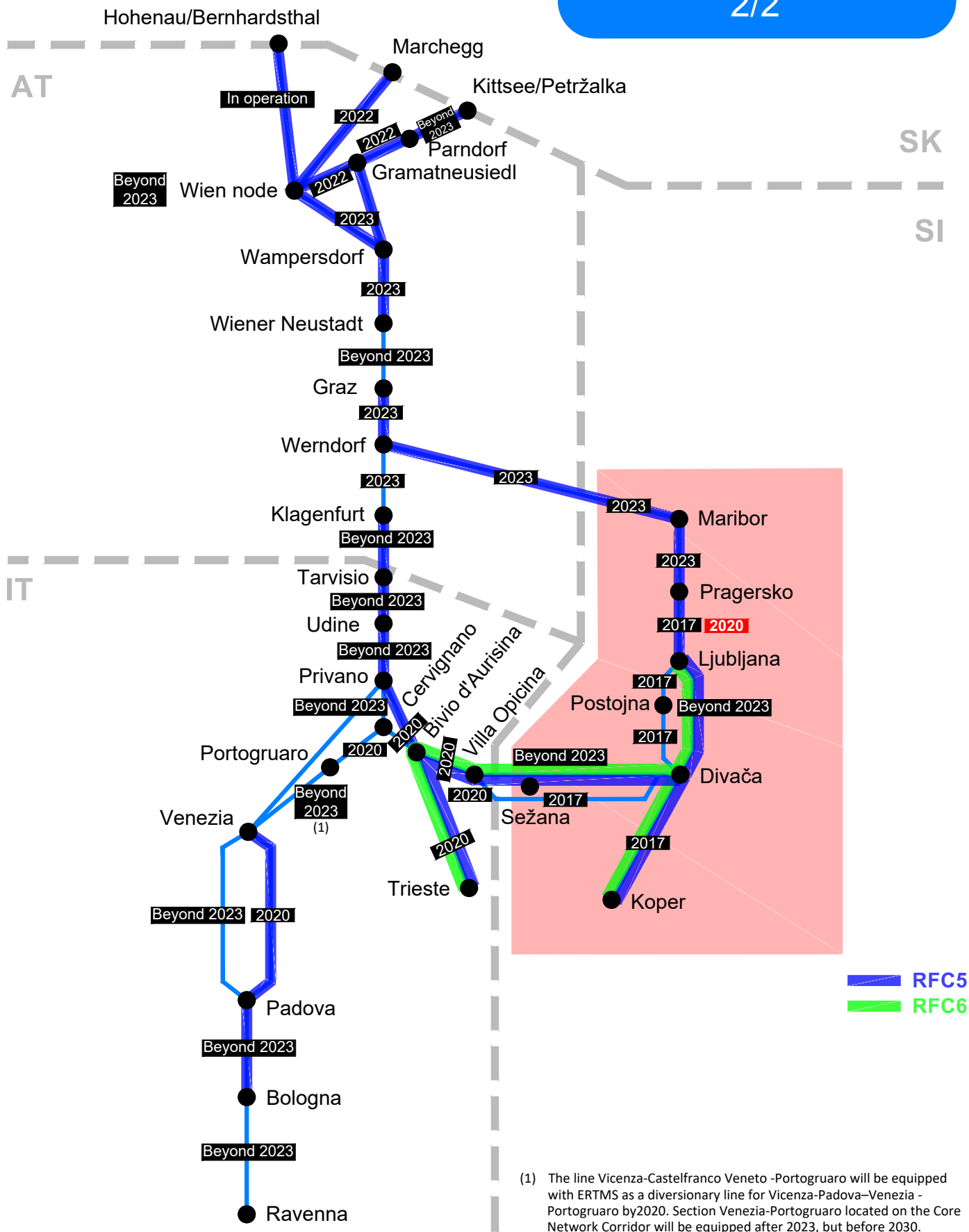
### 1/2



# BALTIC-ADRIATIC CORRIDOR

## Passenger & Freight

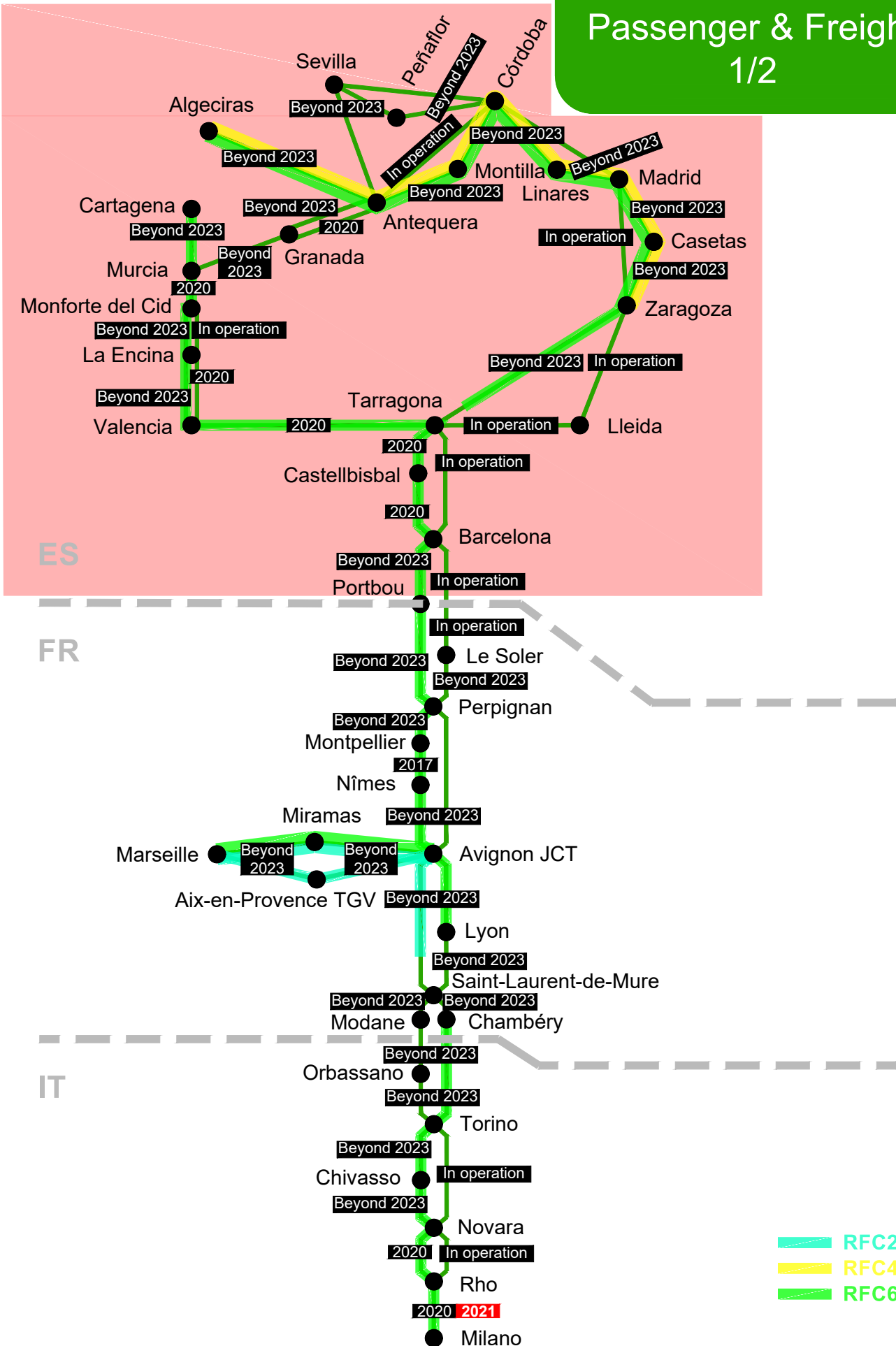
### 2/2



# MEDITERRANEAN CORRIDOR

## Passenger & Freight

1/2

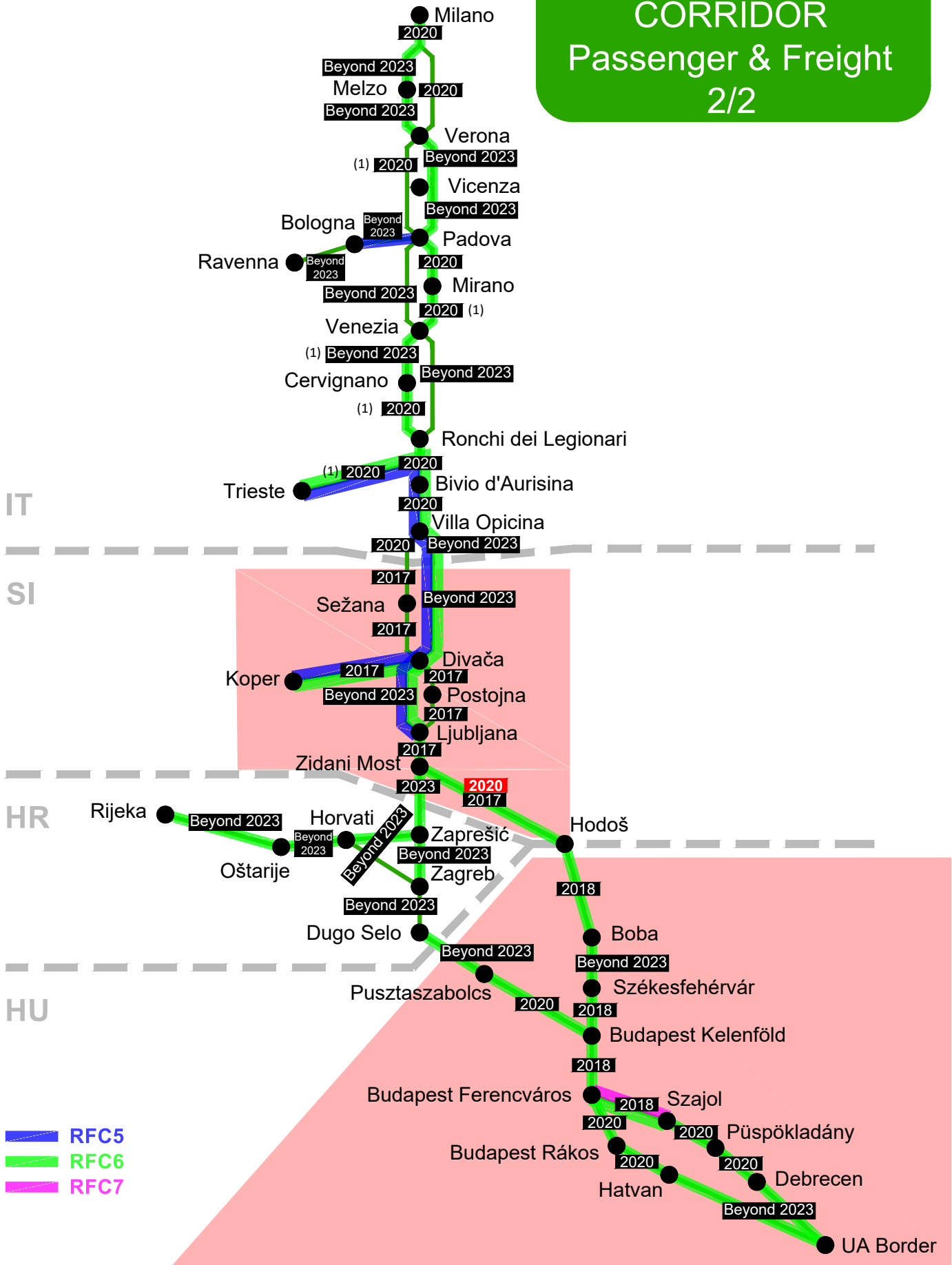




# MEDITERRANEAN CORRIDOR

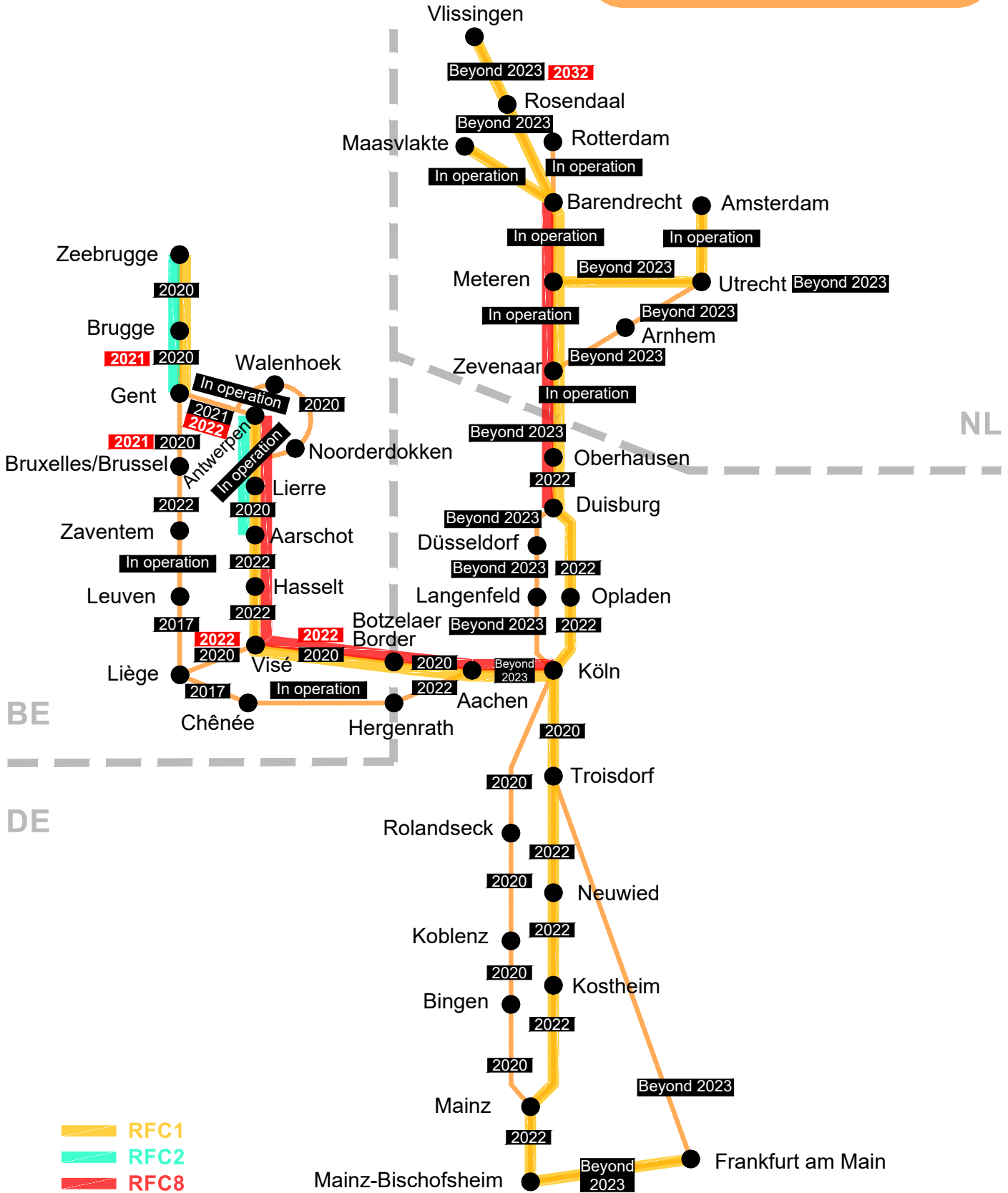
## Passenger & Freight

### 2/2

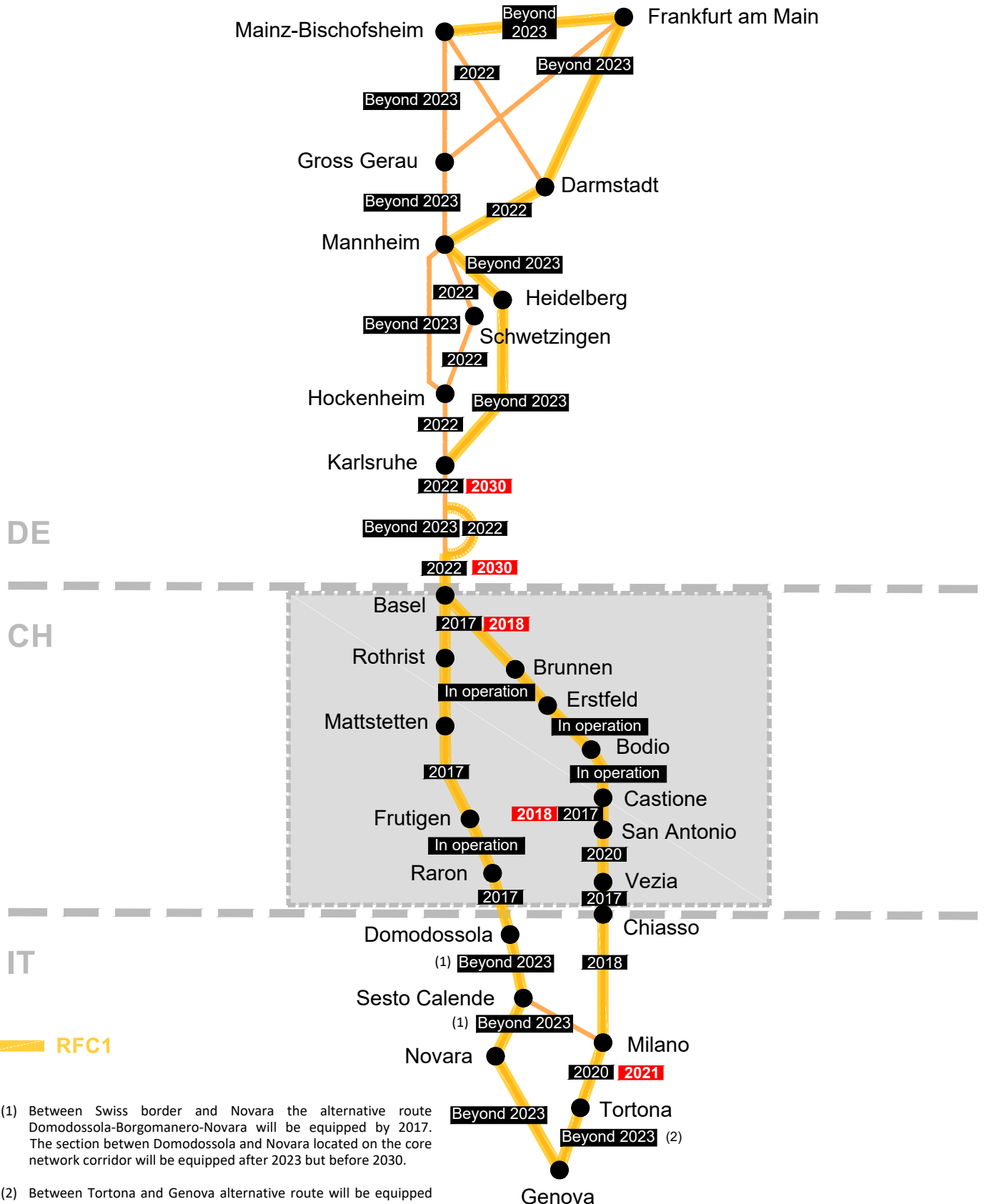


(1) The line Vicenza-Castelfranco Veneto -Portogruaro will be equipped with ERTMS as a diversionary line for Vicenza-Padova-Venezia -Portogruaro by 2020. Section Venezia-Portogruaro located on the Core Network Corridor will be equipped after 2023, but before 2030.

# RHINE-ALPINE CORRIDOR Passenger & Freight 2/2



# RHINE-ALPINE CORRIDOR Passenger & Freight 2/2



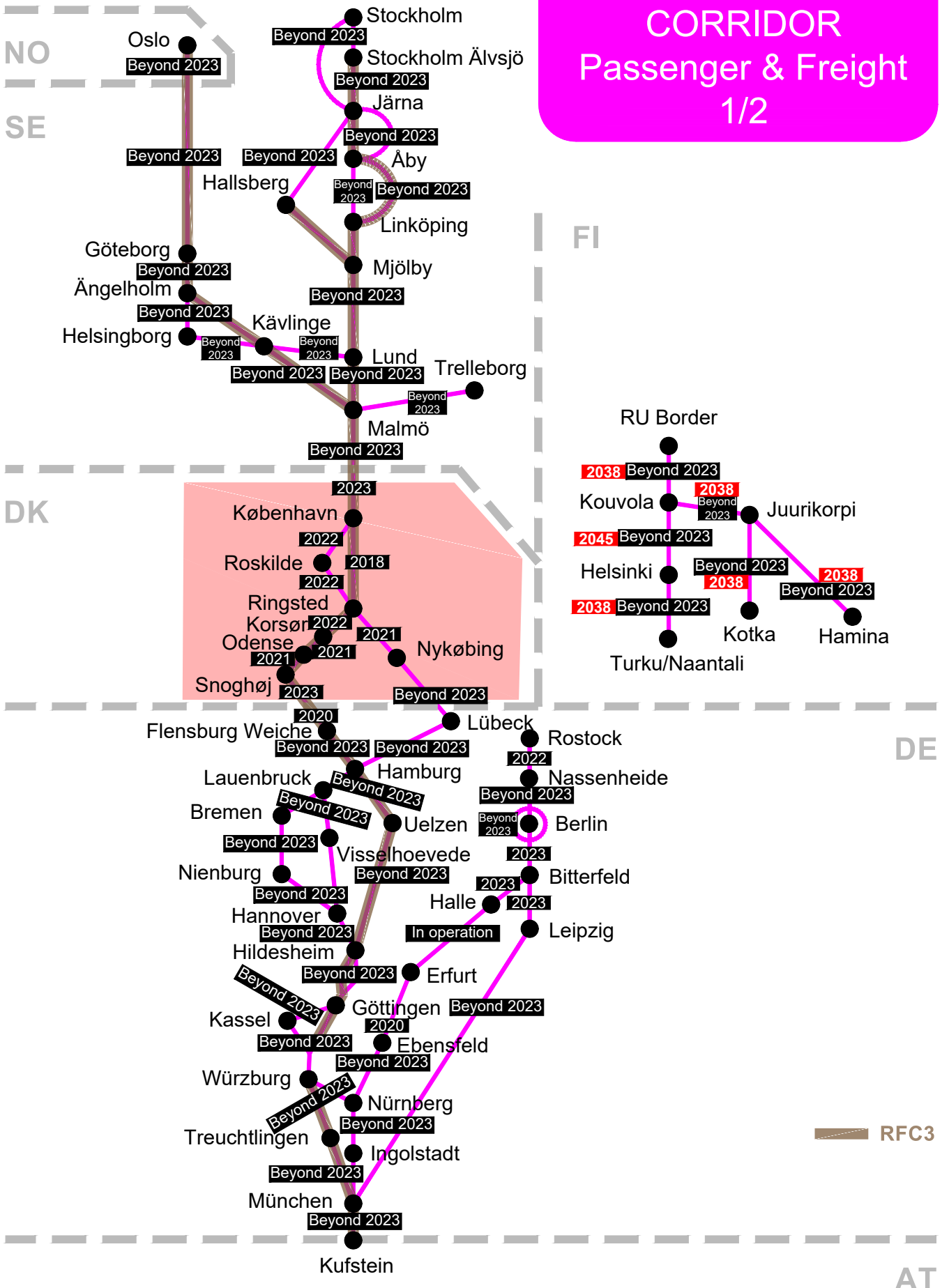
**2018** (1) Between Swiss border and Novara the alternative route Domodossola-Borgomanero-Novara will be equipped by 2017. The section between Domodossola and Novara located on the core network corridor will be equipped after 2023 but before 2030.

**2021** (2) Between Tortona and Genova alternative route will be equipped by 2020. The section between Tortona and Genova located on the core network corridor will be equipped after 2023 but before 2030.

# SCANDINAVIAN-MEDITERRANEAN CORRIDOR

## Passenger & Freight

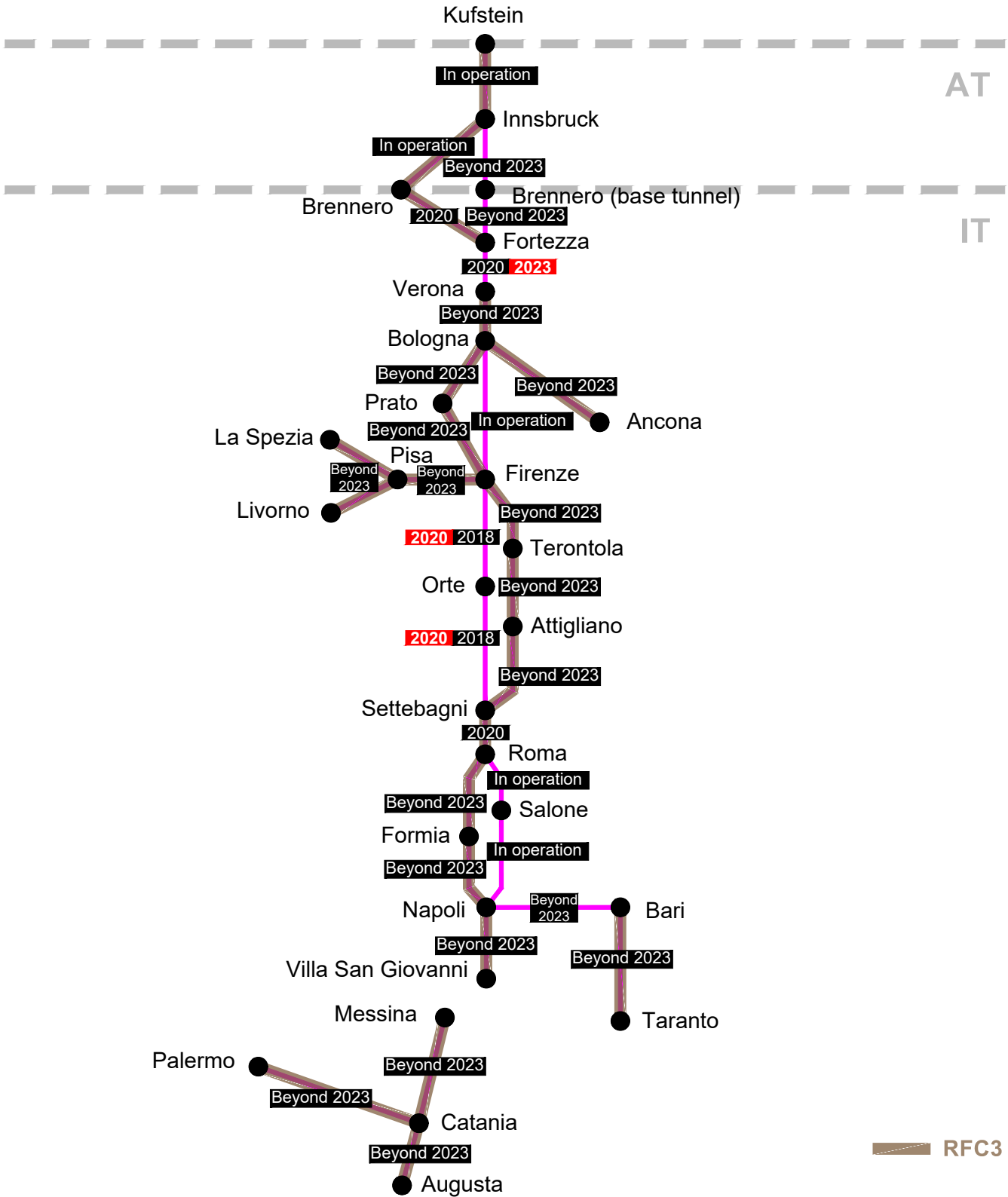
1/2



# SCANDINAVIAN-MEDITERRANEAN CORRIDOR

## Passenger & Freight

2/2

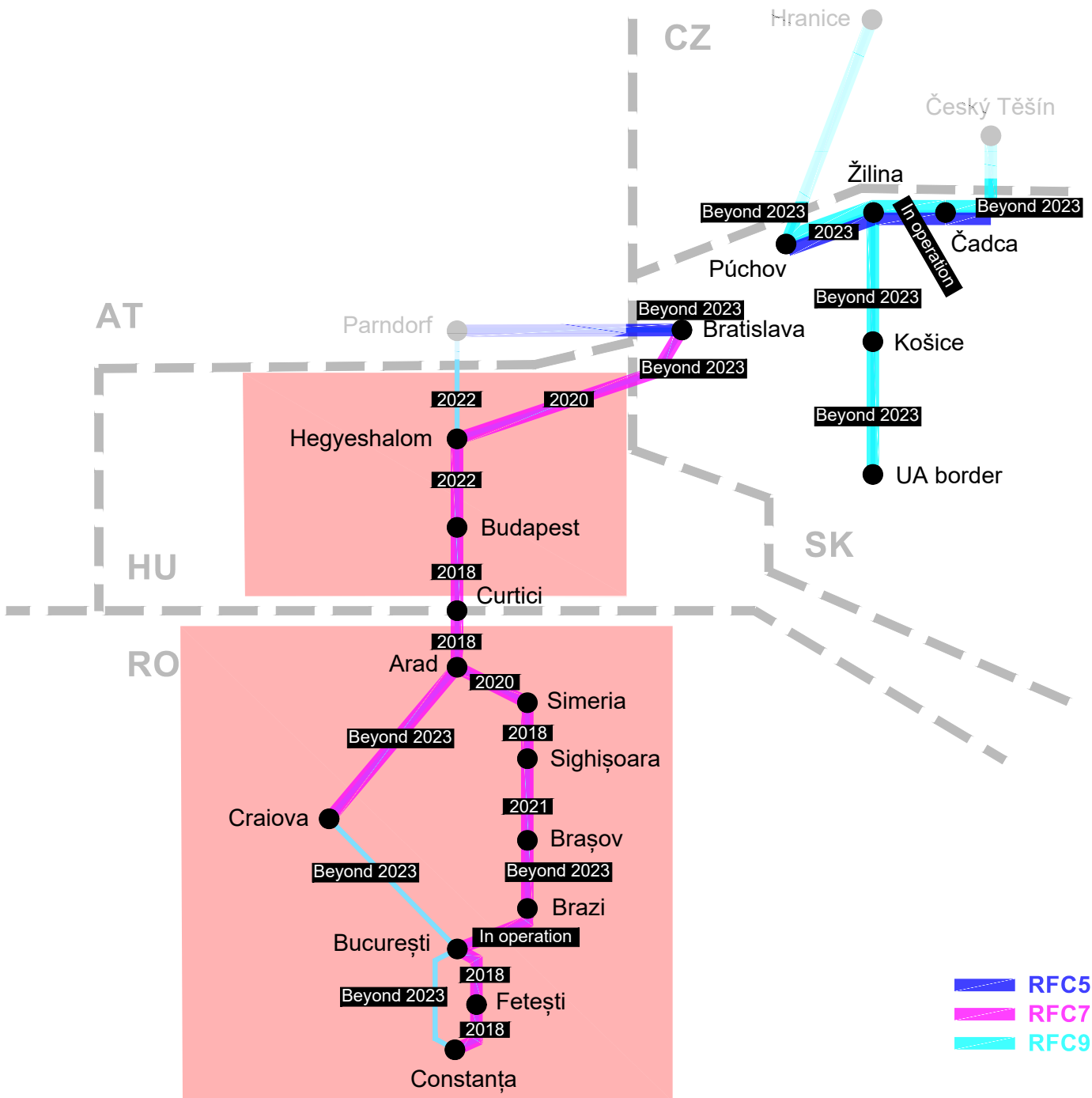




# RHINE-DANUBE CORRIDOR

## Passenger & Freight

2/2



- ▬ RFC5
- ▬ RFC7
- ▬ RFC9