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Situation and Perspectives of the Rail Market

TREN/R1/350-2008 Lot 2

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Contents

List of Tables

List of Figures

List of Boxes

List of Selected Case Studies

1. Case Study on Under Used Links Between Old and New EU Members: The Example of Italy–Slovenia
2. Case Study: High-speed Charter Trains Between the Netherlands and the Costa Brava (Spain)
3. Case Study: Passenger Long-Distance Train Sofia–Belgrade
4. Case Study Germany-Basel: Regional Border Crossing Transport with a Non-EU Country
5. Case Study Rail Baltica: Rail Transport with Baltic Countries
6. Case Study: Development of Intercity Services Between EU15 - EU12
7. Case Study on Cross-Channel Traffic: The Competition Between an International High-speed Link and Shuttle Service with Air, Bus and Ferry
8. Case Study: International Car Sleepers with Destination France
9. Case Study on Night Trains: CityNightLine
10. Case Study on Mixed Regional/Long-Distance Operators: Link Copenhagen-Malmö
11. Case Study Arriva: A Private Operator under PSO Contract
12. Case Study Joint Operators: Cisalpino - Italy-Switzerland Rail Passengers Transport
13. Case Study Joint Operators: Railteam - Alliance of Operators
14. Case Study Joint Operators: Eurostar
15. Case Study on Technical Barriers: Ukraine–Poland

A description of the case studies is included in Annex 6.

List of Abbreviations

AC	Alternating current
AGC	Agreement on Main International Railway Lines
AGTC	Agreement on Combined Transport Lines and Related Installations
APTU	Uniform Rules concerning the Validation of Technical Standards and the Adoption of Uniform Technical Prescriptions applicable to Railway Material intended to be used in International Traffic
AT	Austria
ATMF	Uniform Rules concerning the Technical Admission of Railway Material used in International Traffic
BCh	Belarus Railways
BDZ	Balgarski darzhavni zheleznitsi (Bulgarian State Railways)
BE	Belgium
BEEX	Bosporus-Europe Express
BG	Bulgaria
BiH	Bosnia and Herzegovina
BY	Belarus
CFM	Calea Ferată din Moldova (Moldovan State Railways)
CH	Switzerland
CIM	Contract for International Carriage of Goods by Rail
CIS	Commonwealth of Independent States
CIV	Contract of International Carriage of Passengers by Rail
CNG	Compressed Natural Gas
CO_2	Carbon dioxide
COTIF	Convention concerning International Carriage by Rail
CRCT	China Railway Container Transport Co. Ltd.
CRE	China Railway Express Co. Ltd.
CRSCSC	China Railway Special Cargo Services Co. Ltd.
CTS	ContainerTrans Scandinavia Ltd
CUI	Contract of Use of Infrastructure
CZ	Czech Republic
DB ERS	Deutsche Bahn European Railservice
DB	Deutsche Bahn
DBF	Deutsche Bahn Fernverkehr, German long-distance rail operator
DC	Direct current
DE	Germany
DK	Denmark
DSB	Danske Statsbaner, Danish State railways
EC	European Commission
EE	Estonia
EF	Entry into force
EI	Ireland
ERTMS	European Rail Traffic Management System
ES	Spain
EU12	"New" Member States (joined the EU in 2004 or 2007, namely Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, Bulgaria and Romania)
EU15	"Old" Member States (joined the EU before 2004, namely Belgium, France, Germany, Italy, Luxembourg, Netherlands, Denmark, Ireland, United Kingdom, Greece, Portugal, Spain, Austria, Finland, Sweden)

EU27	EU Member States
FF	Frequencies (initial approximation cross-border)
FI	Finland
FNM	Ferrovie Nord Milano
FR	France
FS	Ferrovie dello Stato
FTO	Swiss Federal Office of Transport
HE	Greece
HR	Croatia
HSH	Hekurudha Shqiptare (Albanian Railways)
HST	Highspeed train, i.e. hispeed train, Eurostar, X2000, Thalys, ICE, Cisalpino
HU	Hungary
HZ	Hrvatske željeznice (Croatian Railways)
IC	Intercity
IC/EC	Intercity/ Eurocity
ICE	Intercity Express
IE	Ireland
IT	Italy
JSC	Joint Stock Company
LD	Long-distance train
LHS	Linia Hutnicza Szerokotorowa
LKAB	Luossavaara-Kiirunavaara Aktiebolag (Swedish mining company)
LoI	Letter of Intent
LPG	Liquefied petroleum gas
LT	Lithuania
LU	Luxembourg
LV	Latvia
MÁV	Magyar Államvasutak (Hungarian State Railways)
MD	Moldova
MK	Macedonia
MLA	Multilateral Agreement
MoR	Ministry of Railways
MoU	Memorandum of Understanding
MZ	Makedoncki Zekeznici (Macedonian Railways)
NL	Netherlands
NMBS	Nationale Maatschappij van Belgische Spoorwegen
NO	Norway
NS	Nederlandse Spoorwegen (Dutch Railways)
NSB	Norges Statsbaner, Norwegian State railways
ÖBB	Österreichische Bundesbahnen
O-D matrix	Origin/Destination matrix
OSJD	Organisation for Railway Cooperation
OTIF	Intergovernmental Organisation for International Carriage by Rail
PKP	Polskie Koleje Państwowe (Polish State Railways)
PL	Poland
PSO	Public Service Obligation
PT	Portugal
RENFE	Red Nacional de Ferrocarriles Españoles
RID	Regulation concerning the International Carriage of Dangerous Goods by Rail hazardous goods

RMMS	Rail Market Monitoring Scheme
RO	Romania
RoLa	Rollende Landstrasse
RS	Republic of Serbia
RU	Russia
RUs	Railway Undertakings
RZD	Russian State Railways
SBB	Schweizerischen Bundesbahnen
SE	Sweden
SEETO	South East Europe Transport Observatory
SJ	Statens Järnvägar, Swedish passenger rail operator
SK	Slovakia
SL	Slovenia
SNCB	Société Nationale des Chemins de fer Belges
SNCF	Société Nationale des Chemins de fer Français, French National Railways
SZ	Slovenske Zeleznice (Slovenian Railways)
TCDD	Türkiye Cumhuriyeti Devlet Demiryolları (State Railways of the Republic of Turkey)
TEN-T	Trans-European Transport Networks
TGL	Trenitalia Global Logistics
TGV	Train à Grande Vitesse
TOC	Train operating company
TRACECA	Transport Corridor Europe Caucasus Asia
TT	TRANS-TOOLS European Transport EU27 model for passenger and freight
TU	Turkey
UA	Ukraine
UIC	International Union of Railways
UK	United Kingdom
UZ	UkrZaliznyza (Ukrainian Railways)
ZFBiH	Zeljeznice Federacije Bosne i Hercegovine (Railways of Federation of Bosnia and Herzegovina)
ZRS	Zeljeznice Republika Srpske (Railways of Republika Srpska. Serbia)

Executive Summary

General Background

Restructuring of the European Rail Transport Market

Over the past 20 years the European Community has been engaged in restructuring the European rail transport market and promoting the growth of rail transport. The Community's efforts in opening the rail market, improving interoperability and developing infrastructure have resulted in a growth of the rail market during the period examined in this study (2001-2009) and continued growth is expected. The third rail package anticipates the opening of the rail market for international passenger transport services in 2010. In addition, a pivotal element of the EU transport policy is the development of interoperability within the European Union and in relation to third countries.

Objective

In order to maximise the potential of current and future developments, it is essential that the European Commission develops a sound and comprehensive understanding of the current situation in the rail market. To this end the European Commission has initiated this study, which analyses the development of international rail passenger transport in the EU27 and between EU27 and neighbouring countries, as well as the development of international freight transport between EU27 and neighbouring countries.

Methodology

Methodology has been developed for estimating rail passenger transport performance. Basically three sources of information are used: (i) TRANS-TOOLS, the EU transport model that analyses passenger flows in the EU27 in 2005; (ii) Eurostat transport statistics that provide estimates of cross-border passenger rail transport for the period 2000-2008 and (iii) train frequencies based on timetable information from different years. This method has been developed to compensate for the absence of a single comprehensive data source. For rail freight transport no such dedicated approach is required, as transport data of sufficient quality and detail are available.

Approaches for Passenger and Freight Transport Services

The freight transport and passenger transport services represent totally different markets. International passenger transport by rail is largely restricted to movement between neighbouring countries, with a few exceptions. Longer distance passenger transport is dominated by car and plane. Rail freight transport is predominantly over much longer distances. Furthermore, rail freight is especially strong in transporting large volumes between sea ports and their hinterlands. Because of these differences, the analysis has been split into separate sections for passenger and for freight transport.

International Rail Passenger Transport

International Rail Passenger Demand

Nearly 100 million international border crossings were made in 2007 by rail passengers across internal EU27 borders, which represents an increase of 27 percent compared to 2001. The internal borders between the EU15, i.e. the "old members", account for 85 percent of this traffic. Growth here is dominated by the developments in high-speed services between France and various countries and by the traffic between Denmark and Sweden. On other international crossings across EU15 - EU15 borders, the average growth rate has been below 10 percent over this six year period.

International passenger services are modest in comparison to domestic services. On longer distance trips, i.e. trips of over 400 kilometres, rail has a relatively small market share. For such trips, the car and plane have largely captured the market. In short-distance regional rail markets, most demand is related to suburban rail services within agglomerations inside one country and hence the volume of international rail travel is modest. There are however a few examples of suburban rail services where international transport takes place, one of these being the S-Bahn around Basel.

Approximately 90 percent of international rail passengers travel between neighbouring countries for distances of less than 300 kilometres. High-speed rail services, however, can be competitive on journeys with a duration of up to four hours, examples being the Paris-Amsterdam and London-Brussels routes.

The average growth in markets between old and new Member States is 51 percent, which is almost twice the total EU27 average. Here supply has also grown significantly, especially on cross-border regional services.

Traffic between the EU27 and neighbouring countries accounts for another 26 million passengers - 20 million across borders with Switzerland and Norway and 6 million to or from the Balkan countries and Eastern Europe. Table S.1 presents a summarised overview of the developments in international rail passenger demand.

Table S.1 International rail passenger demand for 2001 and 2007

Submarkets	Rail passenger demand in 1,000 passengers for 2001 (cross-border)	Rail passenger demand in 1,000 passengers for 2007 (cross-border)	Growth of rail passenger demand between 2001-2009 (in %)
EU15 - EU15	67,582	84,036	24%
EU15 - EU12	6,415	9,679	51%
EU12 - EU12	4,120	5,344	30%
Total EU27	78,293	99,059	27%
EU27 - CH/NO	15,745	20,386	29%
EU27 - Eastern Europe	4,341	6,092	40%
Total EU27 - non-EU	19,988	26,478	32%
Total rail passengers within EU27 and EU27 – non-EU (in 1,000 pass)	98,248	125,536	28%

Source: NEA analysis

Market Segments

In this study the following market segments have been distinguished: high-speed, IC/EC trains, other long-distance trains and regional trains.

The market for high-speed trains has grown strongly in recent years. Through the use of new cross-border infrastructure, effectively linking improved domestic networks in France and Germany, more attractive international services have been developed. The increased market share of such high-speed services has reduced the market share of other, slower, long-distance train services.

IC/EC branded trains cover a core network between major cities and provide services offering high quality. Other long-distance trains are slower in comparison and (in most cases) less frequent. Many of such services are not profitable and supply is under pressure. The niche markets of night trains and car sleeper trains face strong competition from low-cost airlines and low-priced buses. Car sleeper services are also suffering from the availability of affordable car rentals at holiday destinations.

The international market for regional train services that cross borders is relatively small, as in many cases border areas are not densely populated. In such cases, international Public Service Obligation (PSO) contracts are commonly applied to cover operational deficits.

Occupancy

Despite the growth in traffic, the occupancy (measured in number of passengers per train) at the borders between EU15 and EU12 Member States is (still) only 43, suggesting that on average these services remain financially insecure. This compares with an average occupancy of 135 at borders between EU15 Member States. The international high-speed train services contribute strongly to the average occupancy at EU15 - EU15 borders. The development of the supply of regional trains financed by PSO contracts has been most notable on routes across EU15-EU12 borders, and on these types of services occupancy at borders is generally far below average.

Future Orientation

Using the TRANS-TOOLS model it is foreseen that up to 2020 passenger border crossings between the EU27 Member States will increase by 17 percent (compared with the base year of 2007) and passenger border crossings between EU and non-EU countries will increase by 21 percent.

Looking at different submarkets, different developments can be observed. High-speed services are operated on a commercial basis and new entrants are expected to take a share of this market in the future. At the same time, there are signs that the incumbent state-owned operators, which have hitherto cooperated in the running of international services, are beginning to compete with each other as well. Where they run services jointly, there is a trend towards doing this through a separate jointly owned subsidiary company (rather than through jointly operated services). This concept is believed to lead to better marketing and a more flexible approach to market developments. Increased competition and the completion of new infrastructure will facilitate

further strong growth; any implementation of transport policy measures aiming to internalise the external costs of the airline industry could enhance this growth even further.

Night trains represent a niche commercial market where developments are less positive. Competition exists from low-cost airlines, low-priced buses and accelerated day trains. Moreover, aging rolling stock, relatively low levels of service and security incidents contribute negatively to the attractiveness of night trains. Incumbent operators that have cross-financed these services as part of their total concessions are no longer obliged to do so, nor are they prepared to offer loss-making services. Several services have ceased operation in recent years. Private operators are taking a larger share of this market.

A growing market is the regional market for trains financed under PSO contracts. In this market several routes have enjoyed a revival, after being neglected by their incumbent operators for many years. In many Member States private operators compete with incumbent operators for the PSO contracts and in other Member States this is expected to happen in the near future. Cross-border PSO contracts require a high degree of cooperation between franchising authorities in neighbouring countries, and whilst there are some excellent examples of this working well, there are also examples of missed opportunities. A condition for the development of these types of services is the availability of subsidies; especially in the new Member States this is a bottleneck and it must be stated that the future of several international regional lines in Eastern Europe is insecure. In addition to financing regional trains, PSO contracts can also be used to safeguard international long-distance services. Many long-distance trains that are not branded EC or IC are not profitable and can survive only through co-financing by authorities.

Barriers

In the subsidised (PSO contract) market, the involvement of various authorities complicates the organisation of international services. Nevertheless there are several good examples of international regional lines that are run under a PSO regime.

Many technical barriers to the operation of international services still exist, requiring solutions which come at additional costs. As international passenger transport covers only a very small part of the total rail service that is offered, technical standardisation is only feasible to a limited extent.

The incomplete implementation of existing EU legislation continues to be a barrier to the development of cross-border passenger services. In some countries fears remain of discrimination in the allocation of paths. Problems and delays in accessing facilities such as cleaning and maintenance depots can act as additional barriers. The lack of strong independent regulators, to whom appeal can be made in case of dispute, is also considered to be a barrier. High track access charges can also be a barrier, particularly on new high-speed lines. An additional barrier is the failure to charge air transport for its externalities or even to harmonise tax arrangements such as value added tax between the two modes.

Border delays still make cross-border rail travel unattractive between some countries. Poor organisation and fears of unreliability on the part of the railway companies are factors contributing to this barrier.

EU and Third Countries Rail Freight Transport

Rail Freight Demand between EU andThird Countries

With respect to freight transport, this study focuses on the market between the EU and third countries. Geographically four submarkets are defined, as presented in Table S.2. In Eastern Europe rail freight transport is more important than rail passenger transport; this is especially the case in the Baltic Rim. The incumbent operators in this region tend to regard freight traffic as their main business and passenger services as a more marginal activity.

Table S.2 Development of rail freight demand 2001–2007, per submarket

Submarkets in EU27 – non-EU	Rail volume in 1,000 tonnes			Change in freight tonnes lifted from 2001-2007, in %
	Rail 2001	Rail 2005	Rail 2007	
EU27 – Switzerland/Norway	21,976	25,506	25,855	18%
EU27 - Eastern Europe (1,520mm gauge, Baltic Rim)	82,803	85,647	77,280	-7%
EU27 - Eastern Europe (1,520mm gauge, Ukraine, Belarus, Moldova)	31,550	28,390	33,874	7%
EU27 - Eastern Europe (1,435mm gauge, Balkan and Turkey)	1,495	10,001	11,193	649%
Total EU27 - non-EU	137,824	149,544	148,202	8%

Source: NEA analysis

Future Orientation

Forecasts made by the TRANS-TOOLS model show large growth (20-40 percent) across borders with Eastern Europe up to 2020. The economic crisis has led to a considerable drop in volumes in 2008/2009. However, it can be expected that once the economic crisis is over, the volumes will recover towards previous levels and that long-term forecasts will not have to be revised.

The current rail transport volume with China is modest and is almost completely directed to Baltic and Finnish ports. The development of rail traffic between China and Western Europe suffers from the gauge differences between China (1,435mm gauge); Kazakhstan/Russia/Baltic Rim/Finland (1,520mm gauge) and Western Europe (1,435mm gauge). The volumes from Kazakhstan are higher; the volumes can be routed without gauge changes to Baltic and Finnish ports.

Freight transport is a commercial activity and private operators, as well as joint ventures of private and public operators, will be the main actors in the future. Although the speed of opening of the market and railway reform varies from country to country in Eastern Europe, the trend is heading towards stronger private involvement. This will benefit the position of railways in the long run.

Barriers

Barriers for interoperability can be diminished once international arrangements such as COTIF are applied by more countries. However, the gauge difference between Eastern Europe and Central and Western Europe will remain a bottleneck for the growth of the rail market share. The creation of a 1,520mm gauge connection into Central Europe could be helpful for specific links and for market segments such as container transport.

Border crossings are another problematic issue with respect to interoperability between the EU railways and the railways of neighbouring countries. The establishment of jointly operated border crossing facilities, where operations are carried out simultaneously, can help to reduce the total time required at borders to complete all procedures and formalities.

Section 1
General Background

1 Introduction

1.1 Background

Over the past 20 years the European Community has been engaged in restructuring the European rail transport market, and in promoting the growth of rail transport. European Community efforts have concentrated on three major areas:

1. Opening the rail transport market to competition.
2. Improving the interoperability between national networks and the safety of national networks.
3. Developing rail infrastructure.

Since 2001, three packages have been adopted in European Community rail transport legislation with the aim of providing a legal framework for the opening of the European rail market.

The first package (2001) was intended to stimulate competition in order to create more and better international freight rail services and to improve the efficient use of infrastructure capacity.

The second package (2004) aimed to accelerate the integration of the market by removing significant obstacles to cross-border services through the harmonisation of technical standards. The package focused on opening the rail freight market to competition.

The third package (2007) signalled an even closer integration by concentrating on international passenger services. Directive 2007/58/EG of the European Parliament and the Council[1], which came into force on 1 January 2010, will open the EU international rail passenger market. This permits any licensed, certified rail company established in the EU to operate in this market. At this stage, the market for national rail passenger services will not be open to cross-border competition, although this could change in the future.

Besides opening the market for new entrants, the European Community encourages interoperability both within the European Union and between the European Union and neighbouring countries. Consequently, the European Community is negotiating an Agreement on the Accession of the European Community to the Convention concerning International Carriage by Rail (COTIF). COTIF aims to establish standardised rules and a legal foundation for international rail passenger and freight transport for its 43 Member States.

The Commission requires an updated and comprehensive overview of the current state of the European railway market and its potential development. This would help to establish a benchmark for the opening of the market from January 2010, so that the situation after market opening can be monitored and, closely related to that benchmark, to provide a base scenario for the next steps

[1] Published October 2007

of the liberalisation of the rail market. At the same time an updated and comprehensive overview of the railway market will inform the COTIF debate.

In order to obtain a better overview of the railway market, the European Commission (EC) has invited a consortium led by NEA to carry out this "Situation and Perspectives of the Rail Market" project, with the objective as outlined below.

1.2 Objective of the Study

The objective of the study is to describe and assess the current rail market situation in the European Union, as far as international passenger rail services are concerned, and between the European Union and neighbouring third countries both for international freight and for passenger transport by rail.

More specifically, this study aims to:

1. Provide the EC with an updated and comprehensive overview of the current and future (up to 2020) situation of the rail market to support the opening of the market for international rail passenger transport services.
2. Create a basis for the EC to assess the issues at stake concerning the possible adhesion to COTIF.
3. Provide additional information for the Rail Market Monitoring Scheme (RMMS).

1.3 Outputs of the Study

According to the tender specifications, there are two outputs of this project:

1. A quantitative and qualitative analysis based on statistical data and market information regarding international passenger traffic between the 27 countries of the European Union.
2. A quantitative and qualitative analysis regarding passenger and freight traffic between the European Union and third countries.

International Passenger Traffic within the European Union

Regarding international passenger traffic within the European Union, the study focuses on the following aspects:

- Traffic and traffic performance per market segment, e.g. high-speed, conventional intercity, regional, night trains, car trains, etc.
- Evolution of rail traffic since 2000 and expected market development potential up to 2020.
- Expected impact of the market opening in 2010, e.g. new entrants, fares, intermodal and intramodal competition, etc.
- Operators, including joint companies such as Eurostar, Thalys, Artesia, etc.
- Identification of barriers to competitiveness and development and interoperability/safety barriers for international services.

Other relevant indicators are taken into account in the analysis of the market situation, such as revenues; profits; marketing; customer interface; intramodal and intermodal competitiveness of services; cost/fares; frequencies; journey times; punctuality/reliability; information to customers with regard to timetables and fares; and passenger rights that are granted, including compensation in respect of delays and/or damage.

Passenger and Freight Traffic between the European Union and Third Countries

With regard the passenger and freight traffic between the European Union and third countries, the study covers the following aspects:

- Traffic performance by market segment.
- Evolution of traffic since 2000 and expected evolution.
- Market development potential until 2020 (quantitative and qualitative analysis).
- Identification of barriers to competitiveness and development.

1.4 Structure of this Report

The report is structured as follows:

Section 1 - General Background

- Chapter 2 contains the description of the methodological approach, including dimensions and definitions, data sources and limitations, methodology for passenger and freight transport and the approach that has been used for case studies.

Section 2 - EU International Passenger Transport

- Chapter 3 provides data on international rail passenger demand and supply. This section concentrates on the analysis of the current situation as well as a historic perspective and also provides a future outlook.
- Chapter 4 provides information on international passenger rail operators. This section provides a classification of operators, as well as an analysis of the performance of the operators in terms of international passenger transport.
- Chapter 5 analyses the barriers that exist for future development, notably organisational and technical barriers.

Section 3 - EU-Third Countries Rail Freight Transport

- Chapter 6 provides the analysis of rail freight traffic between the EU and third (non-EU and neighbouring to the EU) countries.
- Chapter 7 presents the description of four regional rail freight corridor cases.

Section 4 - Conclusions

- Chapter 8 presents the overall conclusions, based on the specific conclusions that are drawn at the end of each chapter.

Annexes

A set of supporting Annexes is included, as outlined in the Table of Contents.

2 Methodological Approach

2.1 Background

In order to meet the objective and deliver the outputs as defined in the first chapter, the following steps have been taken:

- A broad desk research was carried out, covering recent key documents dealing with rail, including an analysis of annual reports from national railway undertakings.
- Information was collected within the different EU countries and third countries. It proved difficult in some countries (including both EU and third countries) to get information, as market opening also means that information becomes commercially sensitive information[2].
- Different sources of information were combined and compared, as the information on international passenger movements is rather scattered and multiple types of operators are involved.
- Case studies were identified which are representative of the present situation in the railway market for rail passenger and freight transport.
- The competitive position of passenger rail was analysed in all international rail segments according to journey time, frequencies and in comparison to competing modes such as plane and road transport (car and bus) in Europe.

The outline and structure of the study was discussed and agreed upon on 13 August 2009, during a meeting with representatives of the EC and a team of experts consisting of Prof. Chris Nash from ITS Leeds, Eric Kroes from Significance and Pieter Hilferink from NEA. These three experts formed the Quality Board of the study. This report is based on the approach that was agreed upon at this meeting.

2.2 Dimensions and Definitions

Geographical Scope

The geographical focus for the first output of this study (see previous chapter) which concentrates on EU international rail passenger transport is EU27, with the exceptions of Malta and Cyprus. The geographical scope is broadened for the second output, concentrating on international rail transport between the EU and third countries. The third countries here are defined as non-EU countries that have a railway connection with the EU. In this sense these are the countries bordering the EU, such as Norway and Switzerland, Russia, Ukraine, Belarus, Moldova, the non-EU Balkan countries and Turkey. For freight the transport connections often go further. Notably in the Baltic countries there is

[2] This difficulty occurred despite the fact that the team obtained a letter of recommendation from the EC. This is one of the consequences that is also observed in freight transport. The liberalisation is one of the reasons why private railway undertakings are not well represented in the railway freight statistics.

considerable rail freight transport originating from Kazakhstan, Uzbekistan, China and other countries[3].

Cross-border Rail Operations

The international train services that are analysed ralate to passenger train services connecting at least two stations in different countries, and where at least one of them is situated in a Member State of the European Union. Place of departure and place of destination of the train are situated in two different states, irrespective of the domicile, the place of business or the nationality of the parties to the contract of carriage. By definition, international trains cross at least one border between EU Member States or between an EU Member State and a neighbouring country.

Cross-border rail operation in passenger transport takes place at border crossings between 35 country pairs within the EU27. Between the EU and third countries this takes place between 25 country pairs. Annex 2 provides a full overview of those border crossings. There can be a multitude of railway connections between neighbouring countries. For example, between the Netherlands and Germany there are 6 connections for passenger rail transport (Leer-Groningen, Oldenzaal-Bad Bentheim, Enschede-Gronau, Arnhem-Emmerich, Venlo-Kaldenkirchen and Geleen-Aachen[4]) offering different types of services.

These border crossing sections form an important element in the analysis to bring all information to the same level for rail passenger and freight transport. First of all, the frequencies of trains on these border sections for different years were used to provide information on the development of the supply of trains, and these frequencies were compared over time, i.e. from 2001 till 2009. It can be assumed that in the long run supply will follow demand; i.e. for a short period of time operators can run trains "empty" but in the long run this is not a viable situation. Then again, if there is an increased demand, operators are likely to increase frequencies. Of course, exceptions to this rule exist, for example in case of cross-subsidisation or if authorities order services through PSO contracts. Also, there are other ways to cope with reduced/increased demand, e.g. to increase/decrease capacity through longer/shorter trains.

Market Segments

The market segments that have been considered within the study are as follows:

1. High-speed trains (HST)
2. Intercity/Eurocity (IC/EC) trains
3. Long-distance trains (LD)
4. Regional trains

The market categories are "production-oriented" rather than "user-oriented". When a passenger considers international travel, the use of international trains can cover the need for access to a foreign destination, or be only one of the

[3] More information on Baltic freight originating from China and Kazakhstan is presented in Section 6.2, notably Table 6.4.
[4] Coevoerden-Bad Bentheim is used for freight transport, now and then plans for opening up for a regional passenger line are considered.

modes used to fulfil the demand for access to another country. For an international traveller, the train can also be an extension of a trip made by plane, ferry, car or coach (and vice versa). An international trip may also necessitate boarding different connecting trains, and using a mix of international, national and regional trains for the same trip. In fact some international trips connect with other modes, such as ferries (Berlin-Malmö night trains) airlines (for EU or long-distance trips[5]) or coaches (e.g. access to ski stations). This highlights the difficulty of identifying international trips undertaken purely by train.

International trains cover different distance segments, from regional cross-border, short-distance trains to international long-distance trains. International trains are usually also available to domestic passengers.

High-speed services
High-speed services are defined within this study as services advertised as high-speed (Train à Grande Vitesse (TGV), ICE, etc). This includes services that use high-speed infrastructure within one country but continue on conventional tracks on the cross-border section, for instance Paris-Geneva, where from the start of the high-speed operations in France in 1981, international services were offered (Paris-Geneva) in addition to domestic services. Later on, high-speed infrastructure that purely serves international services was added. The international share of high-speed services is now considerable.

IC/EC Trains
IC (Intercity) trains may provide domestic or international services; EC (Eurocity) trains are by definition international. IC/EC services are operated on the main international lines (but not on the dedicated high-speed lines). Together with the domestic IC networks, the IC/EC lines offer a more or less complete network of long-distance services between major cities. The market position is strong on distances up to 300 km.

Long-Distance Trains (LD)
This category consists of all long-distance trains (mostly over 100 km) not branded as high-speed or IC/EC. They differ from regional trains by distance and by their relatively limited stopping pattern. Branch-line services are mostly regarded as regional services, however, the dividing line between regional trains and long-distance trains is somewhat arbitrary.

International long-distance trains can include regular, seasonal or chartered trains. Specific niche markets are night trains and car sleepers, which have, in most cases, been developed for the tourist segment. In one known case in the Netherlands a bus operator currently active on the Netherlands-Spain route has tried to develop a charter train, but it has proven too difficult to organise a profitable operation. Niche markets are, in most cases, organised by either private entities or separate entities organised by larger railway undertakings. In some cases these entities have their own rolling stock. The night trains and car sleepers are described as cases in Annex 6.

[5] Shown by the fact that Air France-KLM has shares in the Thalys service which operates on the Amsterdam-Paris corridor.

The frequencies and speeds of the regular international long-distance day trains are often low; the fastest international trains on main lines are, in most cases, branded as IC or EC. As a result, the international share of day time long-distance trains is modest. The night trains and car sleepers cover very long distances in most cases; the international element of these niche markets is considerable.

Regional Trains

Regional trains cover shorter distances (mostly below 100 km), mostly stopping at all stations and using either main-lines (together with other categories of trains) or branch-lines. Cross-border regional train services can be part of a suburban or regional transport system, organised by regional authorities who also coordinate buses, tramways and/or metro services.

Compared with the domestic regional trains, the market for international regional trains is modest. As most of the borders concerned are not within densely populated areas, the demand for regional international services is relatively low.

Occupancy

The occupancy of a train is defined as the average number of passengers per train at the border crossing. So if the occupancy of the train is estimated[6], the volume transported per day can be derived from the number of trains operated, and when multiplied with the number of days per year this will approximate the volume of rail passengers per year.

Occupancy is an important benchmark in passenger train traffic and can be expressed in different ways, either as the ratio of passenger-kilometres to train-kilometres (as has been done in this study) or as the number of passengers in a train relative to capacity (in number of seats). It should be noted that analysis of frequencies does not provide information on how the number of seats/length of train has developed over time.

[6] Also referred to as the load factor. Wherever possible we have used direct sources, e.g. from Treni Internazionali, RENFE, Deutsche Bahn instead of the demand derived from train frequencies. However, where data from the direct data were not available, we decided to derive rail demand from the rail frequencies for various markets. The Thomas Cook European Rail Timetable (2000, 2007 and 2009 versions) provided information on the daily numbers of cross-border services in the following categories: high-speed and Intercity Express (HST/ICE) Intercity/Eurocity/Interregio (IC/EC) other long-distance trains (other LD) and regional trains. We assumed the following train load factors for EU15 – EU15 rail services for a first approximation:
1. HST/ICE: 300 passengers on average (and also for CH and NO)
2. IC/EC: 200 passengers
3. other LD: 100 passengers
4. Regional trains: 20 passengers

For cross-border rail services that were not EU15 - EU15, we assumed for a first approximation:
1. HST/ICE: 100 passengers on average
2. IC/EC: 100 passengers
3. other LD: 50 passengers
4. Regional trains: 10 passengers

The daily numbers of services each way were first doubled in order to account for the return trips and then multiplied by 365, and by the average load factor, to obtain the annual number of passengers for each border crossing.

Gauge size
In the report the following gauge sizes are used:

- 1,435mm, which corresponds to the standard European gauge.
- 1,520mm, which corresponds with gauge used in Russia and most of the former Soviet Union, including the Baltic States, Ukraine, Belarus, the Caucasian and Central Asian republics and Mongolia. This size is also referred to as broad-gauge.

2.3 Information Sources and Limitations

2.3.1 Information Sources

In this study a number of information sources have been used. The three main sources are outlined below.

TRANS-TOOLS
Results from the TRANS-TOOLS model[7] present passenger flows within the EU27 at the detailed level needed for the present study. Box 2.1 presents more information on TRANS-TOOLS and the rationale for using this model.

Box 2.1 TRANS-TOOLS description and rationale

TRANS-TOOLS is an integrated transport model that covers both passenger and freight transport within the EU27 and in relation with the third countries. It includes all modes of transport, i.e. road, rail, inland waterways and maritime for freight transport and it covers road (bus and car), rail and air for passenger transport. TRANS-TOOLS is based on the year 2005 and forecasts up to 2020. The dataset for 2005 and the forecasts represent the current state of data used in rail passenger modelling for the EU. The model is based on flows for the year 2005. For this study an update to 2007 has been made.
The advantage of using TRANS-TOOLS is that besides rail transport, road (both bus and car) and air transport have been included. Furthermore, the model is based on the latest available Europe-wide statistics and is calibrated against observable figures available within the EU27. Besides domestic and international transport within the EU27, it also provides information on international transport with the third countries. Furthermore, it shows the flows at a detailed level on an origin-destination basis. To make comparisons with the border crossing data, assignments have been made. For example, railway transport from Austria to the Netherlands crosses the German-Austrian border and the Dutch-German border.

Source: NEA

By assigning traffic, the volume of rail transport can be calculated. It must be noted that across most borders more than 85 percent of the cross-border traffic is between the two adjacent countries (for example "NL-DE" accounts for about 90 percent of the traffic that crosses the Dutch–German border). Both directions are summed to provide one figure. This method is also applied to road and air transport, allowing a comparison between modes and thereby

[7] More information on http://energy.jrc.ec.europa.eu/TRANS-TOOLS/FTP.html.

providing an insight into the competitive situation of rail transport versus other modes.

Eurostat and Direct Sources
Eurostat provides information on passenger rail transport. A limitation is the fact that only data on intercity train services is available. This information is available up to 2007.

Where possible direct sources were used, e.g. from Treni Internazionali, Red Nacional de Ferrocarriles Españoles (RENFE) and Deutsche Bahn. Selected sources were approached through use of a questionnaire. The questionnaire and the responses are included in Annex 4.

Train Frequencies
Thomas Cook European Rail Timetables[8] provide information on the daily numbers of cross-border services in the following categories: high-speed and Intercity Express (HST/ICE), Intercity/Eurocity/Interregio (IC/EC), other long-distance trains (LD) and regional trains. Based on the occupancies and number of trains per day an estimate of the volume of passengers per year for each border crossing is obtained.

2.3.2 Data Limitations

Limitations and Explanations
It is very difficult to retrieve information from railway companies with respect to the operational aspects of international rail passenger services. This mainly relates to the availability of data dealing with international rail services. Often data exists only for national services, resulting in a serious lack of information relating to international services. In most cases a differentiation between national and international services cannot be made.

National railway companies were asked to provide figures on turnover generated by different services in such a manner as to enable the identification of the market segment for international rail services. Some companies had difficulties in providing figures in this way, for various reasons, e.g. (i) the small role that these services play in certain countries; (ii) data exists only for national services and (iii) no distinction is made between income from national and international services. From other companies it is difficult to obtain figures more detailed than those presented in their annual reports.

One explanation given by operating companies for the lack of data availability is the complexity of the arrangements for international trains. These trains carry national travellers over shorter distances and usually there are no reserved seats. This means that the companies are not able to distinguish between those passengers who have used an international train for a trip between two countries and those who have used it for a trip within any one country. Furthermore, several tickets may be issued for one international trip and so it is

[8] The timetables are published every year, the editions 2000, 2001, 2005, 2007 and 2009 have been used in this study.

difficult to define the portion of the trip and fare corresponding to an international trip. This creates a lack of transparency and a lack of information about the economic performance of international trains, with the exception of those international trains for which passengers have to make a reservation in advance and where purely domestic travel is not allowed. In some cases data exists but is regarded as confidential and hence is not provided.

The lack of data concerning the travellers' perceptions of international rail services is equally of great concern. Although the EC maintains the "Euro-barometer", a statistical survey of customer satisfaction which reflects the perception of European citizens throughout the EU of many public services (including national public transport), international rail passenger services have never been specifally examined in this survey.

Dealing with Limitations

To measure transport performance, two approaches can be followed:

- The demand approach: this relies on ticket sales.
- The supply approach: this relies on the frequencies of trains multiplied by an occupancy rate (see Section 2.2).

Both methods have their disadvantages. Notably, not all tickets sold are reported for a number of reasons (international train tickets may be sold in different countries, by different organisations, and sometimes not reported at all). At the same time it is also a drawback to work with supply only, as occupancy rates are often estimated or based on a small samples (and can vary according to circumstances). In this study a method has been developed that combines the demand and the supply sides; on demand side TRANS-TOOLS, Eurostat and direct sources gathered in this study have been used; from the supply side the frequencies and occupancy rates have been estimated. This approach has certain advantages in monitoring the international railway markets, as is explained in the next section.

In the medium and long-term supply and demand are related, as the frequency has a relationship with the number of passengers actually using the services. It can be expected that when the market has opened this relationship will become more evident. Train services will follow the market more closely, and a low demand will be followed by a lower frequency. At present it can be the case that there is cross-subsidisation between domestic services and international services. Notably, international trains are being kept in operation and are financed through the "domestic services departments".

Besides this, at present a number of cross-border services operate under a public service obligation (PSO) structure, which means that there is an obligation to carry out a service (number of trains per day) with a specified quality level. Here again there is no direct relationship between frequency and the volume of passengers.

It is expected that the introduction of liberalised markets will strengthen the relation between frequencies and passenger flows. However, at the same time, the data on passenger flows will become commercially sensitive and it will be a challenge to obtain good information. From the perspective of the European

Commission this is a problem, as good information on passenger transport flows is essential for an assessment of investment in railways. With less reliable demand data, increased use must be made of "supply" data to monitor traffic performance.

2.4 Methodology for Passenger Transport

2.4.1 Method Developed for Passenger Movements

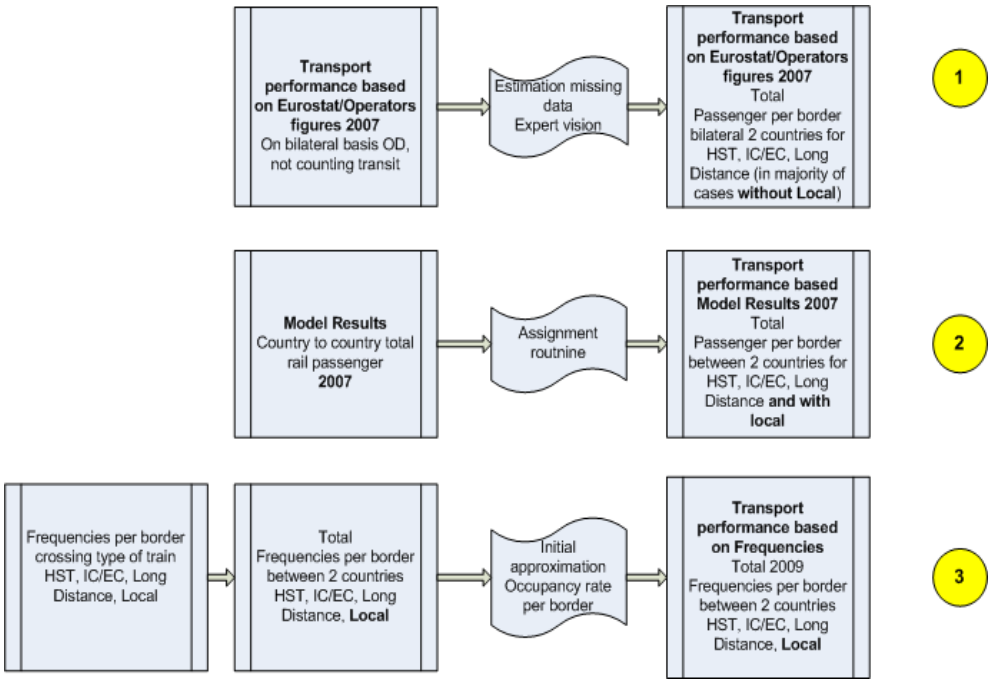
In order to estimate passenger movements (within EU27 and third countries) a special method has been developed in this study. Basically three sources of information are used:

1. The TRANS-TOOLS EU transport model that gives passenger flows in the EU27 in 2005.
2. Eurostat transport statistics that provide data on cross-border passenger rail transport from 2000 up to 2008.
3. Train frequencies based on timetable information from different years.

Figure 2.1 provides a graphical overview of the method described above.

In this study priority is given to the first two sources, which reflect the demand for rail passenger transport. If the first two sources resulted in (very) different numbers, then calculations based on train frequencies from timetable information have been used as a third reference. The timetables were the source for analysing the supply.

Figure 2.1 Method applied for passenger movement



Source: NEA

Methodology of Combining the TRANS-TOOLS and Eurostat Origin-Destination (O-D) Data

The differences between the sources led to interesting results. Eurostat figures do not always give a complete picture, as several services (mostly short-distance PSO services) are not reported in Eurostat. The results of the TRANS-TOOLS model, in this case, reinforce the analysis. If both the TRANS-TOOLS model and trip frequencies are higher than Eurostat, then the TRANS-TOOLS data are taken as the reliable figure, otherwise the Eurostat figures are taken. Expert opinion has been used as a check in the cases where specific circumstances could be identified that had not been taken into account within the TRANS-TOOLS modelling.

Methodology for Calculating Demand at a Cross-Border Level

As the next step, cross-border figures were created. In TRANS-TOOLS they are available as O-D matrices are assigned onto the network. In cases where in the previous step it had been decided to use sources other than the TRANS-TOOLS data, the cross-border data have been revised accordingly. Also, by using expert opinion some changes have been made to transit traffic; this relates to links where the TRANS-TOOLS data are (in the opinion of the experts) obviously too high.

Supply: Train Frequencies

Thomas Cook European Rail Timetables provided information on the daily numbers of cross-border services in the following categories: high-speed and Intercity Express (HST/ICE), Intercity/Eurocity/Interregio (IC/EC), other long-distance trains (LD) and regional trains.

These border crossing sections are an important element in bringing supply and demand together. The frequencies on these border sections are available for different years. This will provide information on the development in "supply" of trains. Comparing supply with estimates of demand across borders makes it possible to calculate occupancy (number of passengers per train) at borders.

2.4.2 Application of the Methodology

The above-described method using the three different sources has been applied to international train passenger services between EU27 countrees and to services to and from third countries. Results for selected services are presented in Table 2.1 and are explained in the text below. It should be noted that only a selection of border crossings are included in this table. Annex 3 presents a full overview of all border crossings and the related analysis of international rail passenger trips.

Table 2.1 Examples of determination of international rail passenger trips between neighbouring countries (million passengers per year)

Border crossing	Source 1: Trips Model results TRANS-TOOLS 2007 Cross-border	Source 2 : Eurostat 2007 O-D information	Source 3: Demand derived from frequencies using standard occupancy by type of train	Outcome of analysis
UK-FR (EU 27)	8,177	16,025	3,504	8,177[9]
FR-BE (EU 27)	11,627	7,369	12,863	11,627
DE-CH (non-EU)	6,396	5,868	3,789	7,771
IT-CH (non-EU)	5,316	3,838	4,409	5,560

Source: NEA

The differences between the three sources led to interesting results. If the trip frequencies deviate from Eurostat this could have resulted from:

1. Services that are not counted in Eurostat (for example short-distance PSO services[10]).
2. An over-estimation (or in some cases under-estimation) of the occupancy when computing the total number of passengers.
3. Third country traffic is included in the data, based on frequencies; it is not included in the Eurostat figures as traffic between neighbouring countries.

In the first case shown in Table 2.1 (UK-FR) the Eurostat figures include the Eurotunnel shuttle figures; this is not the case in TRANS-TOOLS. The data based on frequencies (without the shuttle) present a lower figure. Here the TRANS-TOOLS data are chosen and the figure presented excludes the Eurotunnel shuttle.

In the second case (FR-BE) Eurostat shows lower figures compared to TRANS-TOOLS or data based on frequencies. Eurostat does not include transit traffic, which is important on this relation (Eurostar London-Brussels, Thalys Paris-Amsterdam/Cologne). Therefore the TRANS-TOOLS figures have been used.

In the third case (DE-CH) the Eurostat figure is slightly below the TRANS-TOOLS figure, but when looked at in more detail it is found that the TRANS-TOOLS data contains considerable transit traffic (DE-IT). Here the Eurostat data are taken for the O-D traffic and the transit from TRANS-TOOLS is added. In the fourth case a similar approach has been followed.

The study team has analysed the data of all international relations and has on each occasion chosen that data which appeared to be the best estimation when comparing the three sources. The results of the method applied are used for the analysis in this report. The above method leads to a harmonised transport

[9] It should be noted that the shuttle services between the UK and France are not included, as these provide services for cars and are not included in this study. The volume of passenger traffic on the shuttle is about 7 million passengers in 2008 (see case study).

[10] A number of reasons that Eurostat does not reflect the correct volume of cross-border passengers, as set out, some PSO services are not included. Furthermore, Eurostat data does not contain information on transit passengers. For example, passengers from Amsterdam to Paris not disembarking in Belgium should be counted as crossing both the Dutch-Belgian and the French-Belgian borders.

performance at the level of border crossings. This could be considered as a potential input for RMMS; besides measuring supply (frequencies) this also allows the measurement of volumes of passenger rail transport.

2.5 Methodology for Freight Transport

The Geographical Focus

The study includes the analysis of rail freight transport in relation with third countries. This has been carried out for rail freight transport to non-EU countries. A division has been made into four border crossing areas with EU27 countries, according to their more or less similar problems in terms of interoperability:

1. Firstly, the border crossings of the *EU27 with Norway/Sweden* are distinguished, as these have few problems of interoperability. Notably Switzerland is included in important corridors in Europe, e.g. from Rotterdam to Genoa.
2. Secondly, *the Baltic Rim*, i.e. the border crossing with the EU27 countries of Estonia, Lithuania, Latvia and Finland and Eastern Europe is analysed. These countries have a 1,520mm track gauge but in general there are minor interoperability problems within this region.
3. Thirdly, the border crossing sections of *EU27 with Ukraine, Russia (small section with Kaliningrad), Belarus and Moldova* are considered. The EU countries that border these countries are Poland, Slovakia, Hungary and Romania. On these border sections there are interoperability problems, caused by the change to 1,520mm track gauge in the third countries.
4. Fourthly, *the Balkans and Turkey connection* is considered, i.e. the EU27 countries that have borders with the non-EU Balkan countries, which are Croatia, Serbia, Kosovo, Bosnia and Herzegovina, Macedonia, Montenegro and Albania, as well as Turkey. The EU countries bordering here are Slovenia, Hungary, Romania, Bulgaria and Greece. There are no problems in relation to the gauge of the track, but there are significant issues in relation to the organisation of rail transport.

These four border crossing categories with third countries are analysed in the section on freight analysis.

Data on Freight Transport

More and better quality transport data is available for freight transport than for passenger transport. Railway undertakings in the EU, both private and public, are required to report their freight movements to the statistical offices, which are then transferred to Eurostat. However, with the opening of the rail market, the performance data of railway undertakings have become commercially sensitive information. Consequently, in most cases, not all detailed information is provided and often with a delay of a few years. Nevertheless, in essence this report represents a generally complete overview of freight movements. This in contrast to rail passenger transport, where information from some operators is clearly missing, e.g. from a number of operators that carry out PSO. Furthermore, in the case of freight transport, data includes origin and destination (O-D) relations, providing a clear indication of where freight flows are transiting. Moreover, the focus for freight transport is on links between the EU and third countries. Consequently, freight transport analysis is less complex

as intra-EU transport is excluded; this is in contrast with passenger transport analysis where intra-EU transport is included. The freight flows for 2005 obtained from Eurostat are confirmed by the TRANS-TOOLS model[11]. For the 2020 forecast of the freight flows to and from the third countries the TRANS-TOOLS forecasts are used.

In most of the third countries there is one single incumbent railway operator, which provides actual and precise statistical information on their transport performance. This information covers all rail transport as they remain the single operator in these countries. In the EU, in some cases, it is more difficult to get information from private rail freight undertakings and as a result the full overview is lacking.

Another difference is that passenger services are, in most cases, scheduled services. Freight services, however, are to a large extent organised on an "ad hoc" basis[12]. Moreover, if there is insufficient loading of the freight train the operator can decide not to run a train, or to combine trains. Given the variety of services and not knowing to what extent these services are really carried out, the number of freight trains is difficult to determine. In addition, limited information is available on empty trains. A large imbalance between directions is generally considered unfavourable for rail freight transport. The description of freight services is carried out on the basis of the volume of tonnes passing the border crossings.

2.6 Case Studies

The study is supported by qualitative and quantitative analysis based on statistical data. Where data is not sufficient, analysis is enriched with case studies. The case studies provide more detail which otherwise would not be obvious from observing data alone. Hence the cases are included to support the analysis.

A total overview of all case studies is included in Annex 6. Throughout the text of the report, references are made to these case studies in special text boxes; this is to underline and support the analysis. The case studies have been selected based on their ability to reinforce the analysis and to present a coherent view of all aspects of cross-border rail traffic which might be less clear from solely describing data and information. An overview of the selected case studies is presented at the beginning of the report.

[11] A comparison with TRANS-TOOLS leads to similar figures as Eurostat. A disadvantage of TRANS-TOOLS is that countries outside Europe are grouped and that single countries like Kazakhstan and Uzbekistan cannot be identified. So in this case individual country data had to be used.

[12] Freight transport can also be scheduled according to a fixed timetable such as container block trains.

Section 2
EU International Passenger Transport

3 Evolution of International Rail Passenger Demand and Supply

3.1 Background

This chapter, which presents the evolution of international rail passenger traffic, is divided into seven sections. After this background section, Section 3.2 analyses the supply side of the international rail passenger market, by using the frequencies of international rail services in 2001 and 2009. Section 3.3 compares the international rail passenger demand in 2001 and 2007. In Section 3.4 the competitive position of rail, as compared to other modes of transport, is presented for 2007 and for the year 2020. Section 3.5 contains the analysis of high-speed demand, which is the fastest growing segment in European cross-border transport. Section 3.6 focuses on the analysis of specific niche markets, e.g. night trains, covering both conventional sleeper services and car sleepers. Conclusions on the development of rail passenger supply and demand are presented in Section 3.7.

This chapter contains references to a number of case studies, which can be found in full detail in Annex 6. The case study of the link between Sofia and Belgrade represents an example of long-distance passenger travel between an EU12 and a third country with limited growth and low volumes. The amount of regional cross-border services has grown substantially. The case study on tri-national rail passenger transport between Switzerland, Germany and France illustrates this growing submarket. Two case studies provide further insight into this market - the example of Rail Baltica and a descriptive outline of the development of intercity services between EU15 and EU12[13].

As the Eurotunnel shuttle service is of a specific nature, all data (demand and supply) are presented without this shuttle service. The shuttle nowadays carries approximately eight million passengers per year; the supply is not fixed (trains operate with a minimum guaranteed frequency, but most of the time operate more frequently).

3.2 The Supply Side of the International Rail Passenger Market

This section analyses the development of international rail passenger supply for various submarkets between 2001 and 2009, by using train frequencies of different train types. The following aspects are taken into consideration:

- Trains which travel across borders, but do not provide a service between the adjacent countries, are not included in the analysis.
- Train services are categorised into (i) high-speed trains (HST); (ii) Eurocity/Intercity (IC/EC); (iii) long-distance trains (LD) and (iv) regional

[13] The EU15 are "old Member States"; the EU12 are the "new Member States" that became EU members in 2004, with the exception of Bulgaria and Romania that entered the EU in 2007.

trains (Reg). HST includes the following operators: Hispeed, Eurostar, X2000, Thalys, ICE and Cisalpino.

Cross-border rail transport takes place between a total of 35 country pairs with 107 border crossings within EU27 in 2001 and 106 in 2009. Between EU and third countries there are 25 country pairs and 55 border crossings. For example, between the Netherlands and Germany there are six border crossings for passenger rail transport (Leer-Groningen, Oldenzaal-Bad Bentheim, Enschede-Gronau, Arnhem-Emmerich, Venlo-Kaldenkirchen and Geleen-Aachen[14]). Detailed tables with service frequencies for each country pair can be found in Annex 5.

Table 3.1 summarises supply figures for each submarket for 2001. It can be observed that in 2001 1,506 train pairs crossed borders daily; about two-thirds within the present EU27 countries and one-third between EU and third countries.

Table 3.1 International passenger trains (train pairs per day) in 2001

Summary 2001	Number of links	HST	IC/EC	LD	Reg	Total trains	Average number of connections /day/link
EU15 – EU15	54	88	191	70	409	758	14
EU15 – EU12	26	0	30	25	119	174	7
EU12 – EU12	27	0	19	60	42	121	4
Total EU27	**107**	**88**	**240**	**155**	**570**	**1,053**	**10**
EU27 – CH/NO	23	38	43	64	225	370	16
EU27 - Eastern Europe	32	0	7	60	16	83	3
Total EU27 – non-EU	**55**	**38**	**50**	**124**	**241**	**453**	**8**
Total train connections within EU27 and EU27 – non-EU	**162**	**126**	**290**	**279**	**811**	**1,506**	**9**

Source: Thomas Cook European Rail Timetable, 2001

Table 3.2 provides a summary of the train frequencies in 2009. The table shows that the average daily number of train pairs per border crossing has increased from 9 to 10. However, there are big differences between the various parts of Europe. There are on average approximately 16 train services each way per link per day between neighbouring EU15 Member States. Services between new EU countries (EU12 - EU12) are less frequent, i.e. on average four per day. The same applies for services between EU27 and neighbouring countries in Eastern Europe, i.e. on average three per day. There are 19 links, each with an average of 14 train pairs per day between the EU27 and Switzerland and Norway. Services between EU15 and EU12 countries are on average at the level of 12 train pairs per day.

[14] Coevoerden-Bad Bentheim is used for freight transport only. Plans for admitting a regional passenger line are considered.

High-speed services only operate between EU15 Member States and on routes to Switzerland. These services represent 15 percent of the connections involving EU15 Member States and 20 percent of the train pairs in relation to Switzerland.

Table 3.2 International passenger trains (train pairs per day) in 2009

Summary 2009	Number of links	HST	IC/EC	LD	Reg	Total trains	Average number of connections day/Link
EU15 – EU15	54	130	176	41	508	855	16
EU15 – EU12	27	0	49	35	227	311	12
EU12 – EU12	25	0	37	29	40	106	4
Total EU27	**106**	**130**	**262**	**105**	**775**	**1,272**	**12**
EU27 – CH/NO	23	65	52	14	182	313	14
EU27 - Eastern Europe	30	0	9	51	30	87	3
Total EU27 – non-EU	**54**	**65**	**61**	**67**	**207**	**400**	**8**
Total train connections within EU27 and EU27 – non-EU	**160**	**195**	**323**	**172**	**982**	**1,707**	**10**

Source: Thomas Cook European Rail Timetable, 2009

Table 3.3 presents the comparison of services between 2001 and 2009.

Table 3.3 Change of international passenger trains (train pairs per day) in % from 2001 to 2009

Submarkets	Change in number of links	HST	IC/EC	LD	Reg	Total trains	Trains/ Link
EU15 - EU15	+0%	+48%	-8%	-41%	+24%	+13%	+14%
EU15 - EU12	+4%	0%	+63%	+40%	+91%	+79%	+71%
EU12 - EU12	-7%	0%	+95%	-52%	-5%	-12%	0%
Total	-1%	+48%	+9%	-32%	+36%	+21%	+20%
EU27 - CH/NO	0%	+71%	+21%	-78%	-19%	-15%	-13%
EU27 - Eastern Europe	-6%	0%	+29%	-15%	+88%	+5%	0%
Total EU27 – non-EU	-2%	+71%	+22%	-46%	-14%	-12%	-13%
Total international passenger trains within EU27 and EU27 – non-EU	**-1%**	**+55%**	**+11%**	**-38%**	**+21%**	**+13%**	**+11%**

Source: NEA

Supply in terms of number of international trains increased between 2001 and 2009 by 13 percent.

Notably between EU15 and EU12 Member States, a considerable increase in the number of regional trains per day (+91 percent) has been recorded. An

exception is between Italy and Slovenia, for which a decrease was observed[15]. The overall increase is mainly caused by European integration, as the EU was enlarged in 2004. Box 3.1. presents examples of the development of supply of international rail services.

Box 3.1 Case studies on the development of supply

The development of intercity services between EU15 – EU12, as described in detail in Annex 6 - Case 6, illustrates that large changes in supply took place between old and new Member States between 2001 and 2009. These changes are not just higher frequencies, but also improved travel times due to infrastructure investments and removal or simplification of border crossing delays. However, more investments are still necessary and it is planned to bring the quantity and quality of the EU15- EU12 connections to the same levels as the connections between EU15 countries. The case study in Annex 6 describes the development of several cross-border relations between large conglomerations at both sides of the border between EU15 and EU12 Member States, including: Vienna (AT)-Budapest (H); Vienna (AT)-Bratislava (SK); Dresden (D)-Prague (CZ); Berlin (D)-Stettin (PL) and Trieste (I)-Ljubljana (SL). Most of these cases show a positive development.

The last example (Trieste-Ljubljana) forms an exception to the above-mentioned positive development. This link is underused; its development is described in a separate case study (see Annex 6 - Case 1). There are no longer any daytime connections between these two countries. Slovenian trains terminate in Nova Gorica and a change time of 40 minutes by bus or by taxi is needed in order to transfer to Gorizia Central station in Italy. During the past few years, there has been investment in road connections between Italy and Slovenia, while railway links still need enhancement. Budget allocation per mode in recent years highlights the high level of spending on motorway development and the modest spending on rail. The planned new Trieste-Divača high-speed line provides an opportunity to improve rail connections and therefore could facilitate passenger cross-border movements by rail.

Source: NEA

High supply increases have been recorded in the submarket for high-speed rail within EU27 (+48 percent), as well as in the submarket for EU27 – non-EU (+71 percent). Between EU Member States and Switzerland several conventional long-distance services have been replaced by high-speed connections. Furthermore, an increase in regional cross-border services (+36 percent) has been realised in EU27 Member States, whereas traditional long-distance services have decreased by 32 percent.

Between EU15 countries frequencies have also increased, but not by as much as between EU15-EU12. The highest growth rate can be recorded in Germany (NL-DE, BE-DE), as a result of growth of HST and regional (mostly PSO) trains. Between EU12 countries frequencies have been stable or have declined since 2001; notably Hungary-Slovakia has recorded a considerable decline.

[15] See case studies 1 and 6 in Annex 6 and Box 3.1

Box 3.2 includes a number of services that cross more than one border. Also there are trains that cross borders and do not provide international transport (Box 3.3), for example from East to West Austria passing through Germany without stopping. This latter type of train is not included in the above tables on rail passenger supply.

Box 3.2 Services crossing more than one border used for passengers between neighbouring countries

A few frequent services between neighbouring countries via third countries exist:
1) France (Paris)–Germany (Cologne) by Thalys via Brussels, about 2-hourly.
2) Belgium-France (Metz, Strasbourg) and further to Switzerland (Basel) via Luxembourg, about three per day.
3) Germany-Switzerland: the four per day Munich-Zurich EC calls at Bregenz (AT).
4) Artesia de Nuit (night train) covers international routes through Switzerland between France and Italy.

Source: NEA

Box 3.3 Examples of trains crossing borders without cross-border services

International trains not (primarily) intended for passengers between neighbouring countries:
1) A 2-hourly fast service between Vienna-Salzburg and Innsbruck (all Austria) running about 100 km through Germany (without stopping).
2) A twice daily service from Germany through Poland with final destinations in Russia not taking passengers in Poland.
3) Through services through Lithuania linking Kaliningrad (Russia) with Minsk (Belarus) and Moscow (Russia).

Source: NEA

3.3 The Demand Side of the International Rail Passenger Market

3.3.1 International Rail Passenger Traffic in 2001 and 2007

As illustrated in Chapter 2, the following data sources were used to obtain the international rail passenger demand:
1. TRANS-TOOLS data relating to 2005.
2. Eurostat data from 2001 and 2007 and data collected by the project team from various other direct sources.
3. Train frequencies by type of train for 2001 and 2009.

Table 3.4 presents the development of the demand between 2001 and 2007 on cross-border links for different submarkets, as has been determined following the methodology described in Chapter 2.

Table 3.4 International rail passenger demand for 2001 and 2007 in 1,000 passengers

Submarkets	Rail passenger demand in 1,000 passengers for 2001 (cross-border)	Rail passenger demand in 1,000 passengers for 2007 (cross-border)	Growth of rail passenger demand between 2001-2007 (in %)
EU15 - EU15	67,582	84,036	24%
EU15 - EU12	6,415	9,679	51%
EU12 - EU12	4,120	5,344	30%
Total EU27	78,293	99,059	27%
EU27 - CH/NO	15,745	20,386	29%
EU27 - Eastern Europe	4,341	6,092	40%
Total EU27 – non-EU	19,988	26,478	32%
Total rail passengers within EU27 and EU27 - non EU (in 1,000 pass)	98,248	125,536	28%

Source: NEA analyses based on Eurostat, TRANS-TOOLS and various other sources

In the category of trips between EU15 Member States major growth between 2001 and 2007 took place between the UK, France and Belgium and between Sweden and Denmark. The growth between other EU15 countries was considerably lower (on average below 10 percent).

The growth of the traffic between the EU15 and EU12 Member States is considerable and illustrates the ongoing EU integration process. However, absolute figures are still modest. Most of the growth regarding rail passenger demand between EU and non-EU Member States is related to trips to and from Switzerland. More details are presented in Annex 5.

The demand on cross-border links takes into account the traffic between neighbouring countries, but also traffic between non-neighbouring countries (that crosses several borders within one trip) and additional border crossings for trips between neighbouring countries through a third country (as for instance Cologne-Paris by Thalys via Brussels). Some 21 million additional border crossings in 2007 have been calculated on top of the O-D volumes between neighbouring countries. Given the facts that (i) a third country trip crosses at least two borders between non-neighbouring countries and (ii) about one million trips between neighbouring countries are made through a third country, the amount of trips between non-neighbouring countries is not more than 10 million trips a year, which equates to around 10 percent of all international rail trips.

In general, the passenger volumes and market shares of rail between non-neighbouring countries are low, with a few exceptions. Direct services between non–neighbouring countries are also generally either non-existent or infrequent (one or two per day). The exceptions are described below:

1. United Kingdom–Belgium: the frequent Eurostar services between London via Lille (Fr) to Brussels.
2. France–the Netherlands: the Thalys services between Amsterdam and Paris (5-6 per day in 2007, planned to be increased to 10 shortly).
3. Germany–Italy: several fast regular-interval services (mostly two-hourly) between Southern Germany and Northern Italy via Switzerland (Gotthard);

direct fast two-hourly services between Munich and Northern Italy via Austria (Brenner).

As presented in Table 3.5, the top three O-D relations by rail between non-neighbouring countries carried 7.3 million passengers in 2007.

Table 3.5 Top three O-D relations by rail between non-neighbouring countries

Additional 3rd country relations	Eurostat 2007 in 1,000 passengers
UK-BE	4,513
FR-NL	1,537
DE-IT	1,232
Total	7,282

Source: Eurostat

3.3.2 Occupancy at the Border Crossings

The development of the train occupancies can be calculated from the data on demand and supply. Table 3.6 shows the occupancy per submarket in 2007.

Table 3.6 Train occupancy (passengers per train) at border crossings by submarkets in 2007

Submarkets	Rail passenger demand in 1,000 passengers for 2007 (cross-border)	Total number of train pairs (per day)	Train occupancy (passengers/ train)
EU15 - EU15	84,036	855	135
EU15 - EU12	9,679	311	43
EU12 - EU12	5,344	106	69
Total EU27	99,059	1,272	107
EU27 - CH/NO	20,386	313	89
EU27 - Eastern Europe	6,092	87	96
Total EU27 – non-EU	26,478	400	91
Total	125,536	1,672	103

Source: NEA analyses

The average occupancy is 103 passengers per train at the border crossings at all crossings in which an EU Member State is involved and 107 on the internal EU border crossings. The occupancy is higher than average at EU15 - EU15 crossings (due to the high occupancy of several high-speed trains) and lower than average at EU15 - EU12 and EU12 - EU12 border crossings.

Table 3.7 presents the development of the occupancies over time, i.e. comparing 2001 and 2007 figures. In general, occupancies at the borders have increased; demand has increased more quickly than supply. However, it can be observed that occupancies have decreased at the EU15 - EU12 border crossings; here the increase in supply was larger than the increase in demand.

Table 3.7 Change in train occupancies at the borders between 2001 and 2007

Submarkets	Train occupancy (passengers/ train 2001	Train occupancy (passengers/ train 2007	Change in train occupancy between 2001-2007
EU15 – EU15	122	135	10%
EU15 – EU12	51	43	-16%
EU12 - EU12	47	69	48%
Total EU27	102	107	5%
EU27 - CH/NO	58	89	53%
EU27 - Eastern Europe	72	96	34%
Total EU27 – non-EU	60	91	50%
Total	89	103	15%

Source: NEA analyses

3.4 Modal Competition of Railways in 2007 and 2020

3.4.1 Modal Shares in 2007

The modal share of railways is calculated using the rail border crossing data presented in previous paragraphs and TRANS-TOOLS data for road and air travel between neighbouring countries. Results are presented in Table 3.8. Due to differences in definitions between the passenger numbers in the various modes (with regard to short-distance traffic and to transit traffic) the presented modal split can not be taken as absolutely accurate. However, the figures can be used for comparisons between submarkets and for comparisons over time (as will be done in Section 3.4.3).

Table 3.8 Mode share between neighbouring countries for 2007 by submarket, in 1,000 passengers and %

Submarkets	Mode share 2007, in 1,000 passengers			Mode share 2007, in %		
	Rail	Road	Air	Rail	Road	Air
EU15 – EU15	84,036	650,014	164,309	9%	72%	18%
EU15 – EU12	9,679	187,272	25,585	4%	84%	11%
EU12 - EU12	5,344	121,972	24,898	4%	80%	16%
Total EU	99,059	959,258	214,792	8%	75%	17%
EU27 - CH/NO	20,386	85,886	17,694	16%	69%	14%
EU27 - Eastern Europe	6,092	20,496	10,514	16%	55%	28%
Total EU27 – non-EU	26,478	106,382	28,208	16%	66%	18%
Total trips within EU27 and EU27 – non-EU	125,536	1,065,640	243,000	9%	74%	17%

Source: iTREN using TRANS-TOOLS

Based on the overall calculations, the overall share of rail between neighbouring countries within EU27 is 8 percent; between EU27 and the neighbouring countries of Switzerland and Norway it is 16 percent. No reliable data on other modes was available in relation to the Eastern European neighbouring countries on a country-to-country level. Therefore, the detailed tables in Annex 5 are included only for the EU27 countries. Furthermore, it should be mentioned that the modal share of rail for non-neighbouring countries is very low, as hardly any transit by rail occurs, with a few notable exceptions such as UK - Belgium, France - the Netherlands and Germany - Italy.

3.4.2 Forecasts 2020 and 2030

Forecast 2020

Table 3.9 presents the projected overall growth of passenger travel between neighbouring countries for all modes between 2007 and 2020.

Table 3.9 Change in total passenger demand (all modes) between 2007-2020

Submarkets	Total demand in 2007 (in 1,000 pass)	Total demand in 2020 (in 1,000 passengers)	Change between 2007-2020, in %
EU15 – EU15	898,359	998,679	11%
EU15 – EU12	222,536	242,479	9%
EU12 - EU12	152,214	187,227	23%
Total EU	1,273,109	1,428,386	12%
EU27 - CH/NO	123,966	138,171	11%
EU27 - Eastern Europe	37,102	39,481	6%
Total EU27 – non-EU	161,068	177,652	10%
Total trips within EU27 and EU27 – non-EU	1,434,176	1,606,038	12%

Source: NEA

It is forecast that in the period 2007-2020 the overall passenger transport volume (all modes) will increase by 12 percent between neighbouring EU27 countries and by 10 percent between EU27 and the non-EU countries.

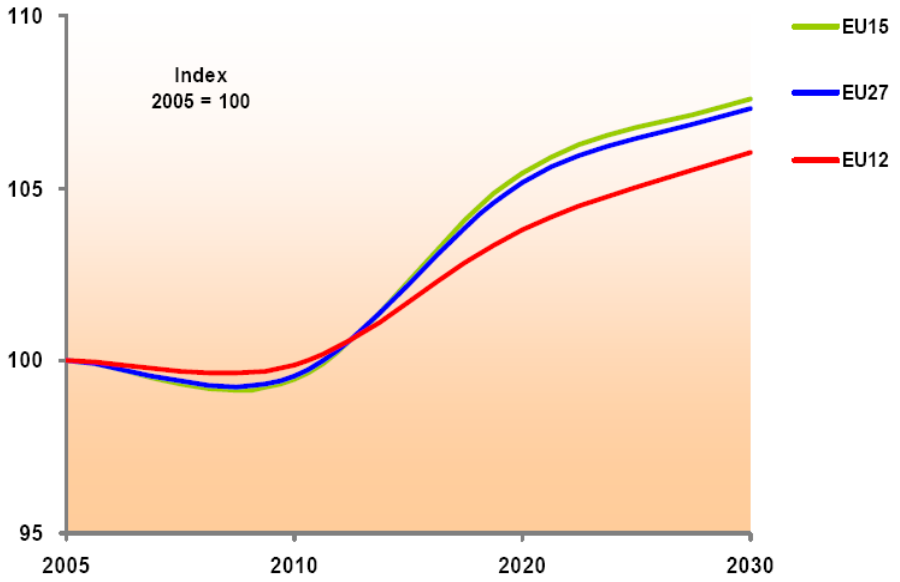
The scenario applied can be characterised as the reference scenario of the iTREN project and contains the following elements:

- In terms of pricing and taxation the disparate and unbalanced level of charges and taxes across countries and modes is maintained. Hence, the opportunities for harmonisation provided by the various EC directives have not been fully exploited in most Member States.
- The Trans-European Transport Networks (TEN-T) networks are slowly being implemented following the TEN-Connect project. No acceleration of the implementation of this network by 2020 is expected within the iTREN reference scenario.
- CO_2 emissions trading has not been extended to the transport sectors. The regulation of road emission standards is not transferred to other modes, in particular to rail and air.

- Although the development of Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) vehicles and fuel supply will increase, new vehicle concepts will not significantly enter the market.

Some further developments up to 2030 are presented in Figure 3.1, originating from the iTren study and using TRANS-TOOLS; the results are not restricted to neighbouring countries but present overall developments.

Figure 3.1 Number of trips originating in the EU27 countries (2005 = 100)



Source: iTREN

Regarding the evolution of passenger transport performance (measured in passenger kilometres) the growth rates are considerably higher than the growth rates for passenger transport numbers. The highest growth is expected in the EU12 Member States, where motorisation and personal income is expected to develop more dynamically than in the EU15 Member States and where the current level of mobility is further away from saturation levels than in the EU15 Member States. OVer the period 2007-2030, total passenger transport demand is forecast to increase by 11 percent in the EU15 Member States and by 23 percent in the EU12 Member States.

The strongest growth is recorded for air transport, particularly in the EU12 Member States. Road passenger transport is also expected to increase considerably by around 40 percent in EU12 countries. Rail transport forecasts indicate a 21.6 percent increase in EU15 countries and a 5.7 percent increase in EU12 countries. This relatively large difference can be explained by the fact that in EU15 countries several new, highly competitive high-speed links will be put into operation in the period 2005-2030, which are capable of enhancing the attractiveness of the rail mode.

3.4.3 Modal Shares in 2020

In this section the overall forecasts of future modal shares and rail demand, as produced in the iTREN project, are presented (see Table 3.10). The forecasts are then compared (in Table 3.11) to the passenger flows in 2007. Both Table 3.10 and 3.11 focus on traffic between neighbouring countries. The increase in rail passenger demand, as estimated by the TRANS-TOOLS model, can be explained by growth particularly in long-distance travel.

The regional market also offers great potential for growth. A condition for such growth is more financial involvement from authorities, which is not taken into account by the TRANS-TOOLS model. In this context, the case study of the S-Bahn Basel in the border triangle of Germany, France and Switzerland presents a good example of promoting regional cross-border rail services. In the Swiss case, the Swiss railways (Schweizerischen Bundesbahnen SBB) are promised public financial support for extending their regional services.

The lack of infrastructure investment is one of the reasons for untapped market potential, as the case study of the link between Italy and Slovenia illustrates[16]. Furthermore, technical and operational barriers, such as the experience of a Dutch tour operator described in a further case study[17] results in inability to capture market potential.

Table 3.10 Forecasts of passenger flows per mode for 2020 (at border crossings)

Submarkets	Modal share 2020, in 1,000 passengers			Modal share 2020, in %		
	Rail	Road	Air	Rail	Road	Air
EU15 – EU15	98,492	706,618	193,570	10%	71%	19%
EU15 – EU12	11,204	199,139	32,136	5%	82%	13%
EU12 - EU12	5,793	150,868	30,566	3%	81%	16%
Total EU	115,490	1,056,625	256,272	8%	74%	18%
EU27 - CH/NO	25,085	91,991	21,094	18%	67%	15%
EU27 – Eastern Europe	6,865	20,614	12,002	17%	52%	30%
Total EU27 – non-EU	31,950	112,605	33,097	18%	63%	19%
Total trips within EU27 and EU27 – non-EU	147,440	1,169,230	289,369	9%	73%	18%

Source: iTREN using TRANS-TOOLS

Evolution of Rail Modal Share

Table 3.11 presents forecasted growth of rail passenger demand (in number of passengers and in modal split) by submarket.

[16] See Annex 6, case 1.
[17] See Annex 6, case 2.

Table 3.11 Comparison of rail passenger flows for 2020 with 2007[18]

Submarkets	Rail passenger demand 2007, in 1,000 passengers	Rail passenger demand 2020, in 1,000 passengers	Change between 2007-2020 in %	Change in % modal share rail
EU15 – EU15	84,036	98,492	17%	+1%
EU15 – EU12	9,679	11,204	16%	+1%
EU12 - EU12	5,344	5,793	8%	-1%
Total EU	99,059	115,490	17%	-
EU27 - CH/NO	20,386	25,085	23%	+2%
EU27 - Eastern Europe	6,092	6,865	13%	+1%
Total EU27 – non-EU	26,478	31,950	21%	+2%
Total trips within EU27 and EU27 – non-EU	125,536	147,440	17%	-

Source: iTREN using TRANS-TOOLS

Rail passenger transport volumes between neighbouring countries, measured in number of trips, are expected to develop at a moderate pace, with higher growth rates between EU15 Member States (+17 percent) than between EU12 Member States (+ 8 percent). This difference is partly due to demographic trends. For EU15 Member States a neutral population growth is expected while for EU12 Member States a population decline is expected.

The overall rail modal share at border crossings remains at 9 percent[19]. The development of the international high-speed network is a driving force, especially in the western part of Europe. It is only in the submarket between EU12 Member States that a small drop of the modal share can be observed. Here the share of railways is estimated to be only 3 percent in 2020, the lowest share of all the submarkets under investigation. In the New Member States, the scope of investment in the railway infrastructure is relatively modest and hence is not expected to result in a significant increase in rail passenger transport performance in the period up to 2020.

3.5 Analysis of High-speed Demand

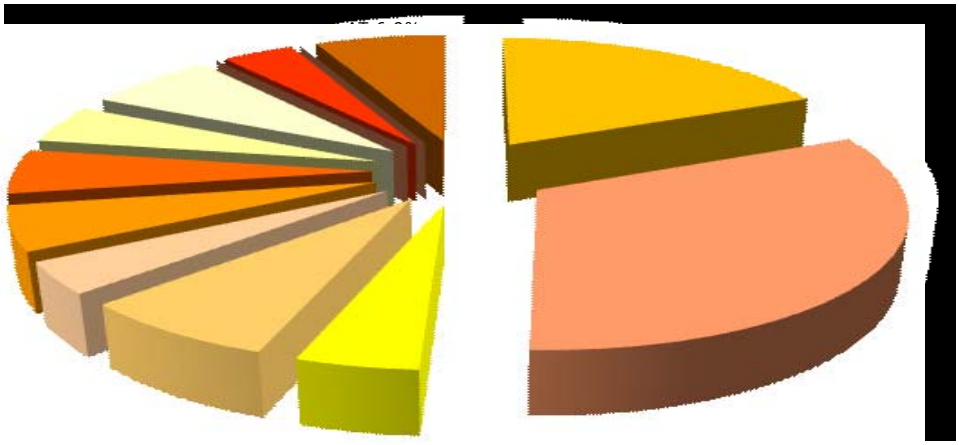
This section presents an overall analysis of the high-speed submarket. Annex 6 presents a case study on intermodal competition between the Eurostar high-speed link via the Channel Tunnel and air, bus and ferry alternatives.

Except for high-speed services on routes to and from Switzerland (FR-CH, DE-CH and IT-CH) HST/ICE services are only available between EU15 Member States. In Central and Eastern European Member States there is a lack of high-speed links and regional trains still have the largest market share.

According to the data collected, the highest number of HST/ICE train services is between France and Belgium, as shown in Figure 3.2.

[18] In 1,000 passengers, % growth of number of passengers and % change of modal share at border crossings.
[19] Taking the first decimal into account a rise from 8.8 percent to 9.2 percent can be observed.

Figure 3.2 HST/ICE services in Europe



Source: PWC

The entire rail passenger transport service between France and UK is served by HST/ICE train services, as is 47 percent of total rail passenger transport between France and Belgium and 45 percent between Belgium and Germany.

According to the "European High Speed Rail – An easy way to connect" study (European Commission, 2009), France still has the largest share of high-speed trains in Europe, notwithstanding the huge decrease in share observed over the past ten years (51 percent in 2007; 64 percent in 1997). The average distance covered by HST/ICE passengers is estimated to be 372 km.

The main operators of high-speed trains are national railway companies (Deutsche Bahn, RENFE, Société Nationale des Chemins de Fer Français (SNCF) Trenitalia and Statens Järnvägar) and common affiliates of national railway companies (Thalys, Lyria, Eurostar, Artesia, Alleo, Cisalpino and High Speed Alliance).

Further market development of high-speed train services in EU Member States can be expected to be influenced by the following two main factors:

- Open access rights for international rail passenger services, including cabotage by 2010, following the adoption of the third railway package.
- Development of the TEN-T in the long run. The envisaged total length of the TEN-T high-speed network is 30,000 km, out of which 20,000 km are expected to be in operation by the year 2020[20].

[20] Source: European Commission

However, it is to be expected that in the short term, the main impacts of the opening of the railway market will be on high-speed rail services in those EU Member States that already have coherent high-speed rail networks. France, Belgium, the Netherlands and Germany are particularly exposed to competition on busy international routes.

According to the railway press, a number of operators have already applied for paths to operate high-speed services on international routes. It was reported that Trenitalia has applied for four paths on the Paris-Milan route[21], and consequently could compete in the Paris-Lyon market.

Routes most likely to be attractive in terms of the ability to carry a mix of domestic and international passengers are (Paris)-Brussels-Cologne/Amsterdam, Paris-Strasbourg-Stuttgart and Paris-Saarbrucken-Frankfurt. However, all these routes are currently operated by consortia involving both SNCF and DB.

There are barriers to the development of competition in high-speed rail. One barrier is the high level of track access charges on some routes[22]. More importantly, full competition may simply lead to lower occupancies, lower fares and less profitable services. Based on modelling work, it is expected that in the long-run the market can only sustain full competition on very profitable routes with moderate track access charges[23]. Thus in those countries where open access into commercial passenger rail operations is already permitted (Germany, and to a limited extent Britain), new entrants have generally sought to develop niche markets, for instance offering direct trains to and from locations not directly served by the incumbent operator.

In short, limited new entry into international high-speed passenger services on the most profitable routes can be expected. At the same time, some development of new services serving origins and destinations not directly served by existing operators can be expected. Whilst this would not constitute a revolutionary change, it should reinforce the trend towards growth in international high-speed rail traffic.

Box 3.4 outlines two case studies that show on the one hand a rather successful development of high-speed services, i.e. the case of the Eurotunnel[24], and on the other hand a case in which the decision was made by a tour operator not to enter the high-speed market[25].

[21] Railway Gazette International (May 2009) p.25
[22] Union Internationales des Chemins de Fer: Infrastructure Charges for High Performance Passenger Services in Europe. UIC, Paris 2008
[23] Preston, J: Competition for Long-distanceLong-distance Passenger Rail Services: The Emerging Evidence. 18th international symposium on transport economics, International Transport Forum, Madrid, 2009
[24] See Annex 6 – case 7 for detailed case description.
[25] See Annex 6 – case 2 for detailed case description.

Box 3.4 Case studies on high-speed services in Europe

The Eurotunnel connects Folkestone (UK) to Calais (France) by rail. The tunnel is 50.5 kilometres long and is used by high-speed Eurostar passenger trains, shuttle trains carrying road vehicles and international freight trains. Eurostar trains are operated by SNCF (France), Société Nationale des Chemins de fer Belges (SNCB, Belgium) and Eurostar (UK) Ltd. In 2008, 16.1 million passengers used the tunnel, 7.0 million using the shuttle and 9.1 million using Eurostar. During 2008, 1,254,282 trucks (14.2 million tonnes) and 2,718 freight trains (1.24 million tonnes) used the tunnel.

The Costa Brava is a popular holiday destination for Dutch tourists. The modes used are private car, bus and charter flight. A large Dutch tour operator was interested in exploring the possibility of a high-speed day train charter service. Once the Perpignan-Barcelona high-speed link is open, almost all the journey from the Netherlands to the Costa Brava will be possible on high-speed infrastructure. A study in 2005 identified many barriers and the operator decided not to enter the rail market. It is worth considering whether under the present regime of market opening of international passenger services the outcome of such a study would be different.

Source: NEA

3.6 Analysis of Niche Markets: Night Trains and Car Sleepers

This section presents an analysis of two niche markets in rail passenger transport.

Night trains are operated throughout Europe on longer distance routes. These trains offer an affordable service for travellers that do not require sleeping accommodation. Additional facilities making the journey more comfortable are available on most night trains; these services are charged additionally. In present day Europe, a substantial number of night trains continue to operate, though these trains face strong competition from high-speed day trains, low-priced buses and budget airlines. Trains are extensively split and recombined en route, making it possible to offer many connections with a relatively modest number of trains.

The demand for car-carrying sleeper trains increased up to 2000; after that the market stabilised with a rather fixed group of travellers. These services offer the advantage of removing the problem of carrying luggage as it is left in the car. In the past it was advantageous to take the car sleeper for stays of longer than two weeks. However, car rental rates have fallen significantly and are often combined with air tickets. Nevertheless, these trains are very useful for people with reduced mobility who need specially equipped vehicles, which may not be available in the car rental market. To operate car sleeper services, an extensive infrastructure is required to load and unload the cars. This infrastructure hinders potential operators from launching new short-term international routes.

In general, although their numbers have decreased in recent decades, both night trains and car-carrying sleeper trains retain a powerful ability to provide travel that is both reasonably comfortable and potentially time-saving,

especially for distances that can be covered in a simple overnight trip (for instance, with dinner at the beginning of the journey and/or breakfast at the end). Travelling overnight by train allows travellers to save a hotel night and to gain a full day of activities.

Specific traffic data on night trains and car sleepers are not available for all the selected cross-border routes. The night trains between Italy and Switzerland, jointly operated by Ferrovie dello Stato (FS) and SBB, illustrate the difficult market position. In this example, the number of passengers fell between 2002 and 2009 from 300,000 to 90,000 annually, resulting in a decision to cease operation.

With regard to car sleepers, the development of (seasonal) supply originating from Belgium, Germany and the Netherlands between 2001 and 2009 is presented in Table 3.12. Most car-carrying sleeper services are available once a week and only during the peak holiday season. Other international car sleeper services are available, e.g. between Austria and Italy, former Yugoslavian destinations, Greece and Turkey. Domestic services in France originating from Calais were targeted at British users; these services have recently been abandoned.

Table 3.12 Development international car-carrying sleeper trains 2001 - 2009 (number of connections) originating from Belgium, Germany and the Netherlands

	Origin	2001 number of connections	2001 countries of destination	2009 number of connections	2009 countries of destination
BE	Denderleeuw	17	FR-IT-AT		-
	Liege	7	FR-IT		-
DE	Berlin	8	FR-IT-AT	9	FR-IT-AT-CR
	Bremen	1	FR		
	Cologne	11	FR-IT-AT		
	Dortmund	4	IT-AT		
	Dusseldorf	5	FR-AT	12	FR-IT-AT-CR
	Frankfurt	8	FR-IT-AT	6	FR-IT-AT-CR
	Hamburg	11	FR-IT-AT	12	FR-IT-AT-CR
	Hildesheim	9	FR-IT-AT	8	FR-IT-AT
	München	3	FR-IT	2	FR-IT
	Stuttgart	2	FR	1	FR
NL	's-Hertogenbosch	12	FR-IT-AT	3	FR-IT
	Total	98	FR-IT-AT	53	FR-IT-AT-CR

Source: Thomas Cook European Rail Timetable, 2001 and 2009

A relatively recent innovation is the car sleeper service from several German cities to Rijeka (Croatia) showing the renewed popularity of that Balkan coastal area as a holiday destination. The general trend, however, is for a decline with fewer services to more traditional destinations in France, Italy and Austria.

Examples of railway operators in the niche markets of night trains and car sleepers are: CityNightLine, a daughter company of the Deutsche Bahn with offices in Switzerland, servicing the Netherlands, Austria, Germany, and

recently, Denmark; and Ferrovie dello Stato, with offices in Italy, that operates an extensive network of trains with sleeping cars.

Box 3.5 summarises two case studies that illustrate the position of the niche markets night trains and car sleepers[26].

Box 3.5 Case studies on night lines and car sleepers

CityNightLine is an European overnight sleeper train company, which is owned by German Railways DB AutoZug GmbH. This company controls the business of DB Autozug (motorail services) and is commercially responsible for EuroNight and D-Nacht. CityNightLine services operate overnight on an extensive range of routes, providing consistently high standards. Most CityNightLine sleeper trains have a special bicycle compartment with space for several bikes. Additional services for passengers on some routes include car sharing facilities at the route ends and bicycle loan facilities at destination cities.

International car sleepers with destination France provides an overview of motorail (car sleeper) trains; they cover both domestic and international destinations in Western and Eastern Europe. Motorail trains carry cars, motorbikes, small trailers and roof boxes and sometimes over height 4x4 vehicles and people carriers. This case study first gives an overview of car sleepers in Europe in general. More details are then provided for services destined for France. Finally, the car sleeper service operated by Dutch Motorail between ' s-Hertogenbosch (the Netherlands)-Avignon (France) is examined further.

Source: NEA

The market position of railway operators in the niche markets of night trains and car sleepers will be enhanced by focusing on new standards in travel, design and style and through the introduction of new sleeper trains (for instance, attractive design, high-quality materials and careful planning could be more attractive for passengers in providing a pleasant ambience during their journey). However, services will continue to focus on a limited number of city pairs that have a strong demand and the distance to combine good asset utilisation with a reasonable number of hours sleep for users.

3.7 Conclusions

Developments during this Decade

Supply

The number of passenger trains crossing borders between EU Member States and between EU and non-EU countries increased by 13 percent over the period 2001-2009.

Between the EU27 Member States, an increase in high-speed trains (+48 percent) and regional cross-border services (+36 percent) has been recorded, whereas traditional long-distance services have decreased by 32 percent.

[26] More information on these case studies can be found in Annex 6, case 8 and 9.

Between EU15 and EU12 Member States a considerable increase in the number of regional trains (+91 percent) has been recorded.

With regard to the EU27 – CH/NO submarket, an increase of 71 percent in the number of high-speed trains has been observed. In the case of services to Switzerland, several conventional long-distance services have been replaced by high-speed services.

Demand
Nearly 100 million international border crossings were made by rail passengers across internal EU27 borders in 2007, 27 percent more than in 2001. The borders between the EU15 Member States cover 85 percent of this traffic. The growth here is dominated by the developments in high-speed traffic between France and various countries and by the traffic between Denmark and Sweden. At other EU15 borders the average growth has been below 10 percent.

The growth in the markets between the old and the new Member States has been 50 percent, which is higher than the total EU27 average.

Traffic between the EU27 and neighbouring countries totalled another 26 million passengers in 2007; 20 million to and from Switzerland and Norway, and 6 million to and from the Balkan countries and Eastern Europe.

Over 90 percent of international rail passenger transport is between neighbouring countries. With regard to the traffic between non-neighbouring countries (the other 10 percent) the share of rail is very low. The main exceptions to this rule relate to services between France and the Netherlands, those between the United Kingdom and Belgium and between (Southern) Germany and (Northern) Italy, where attractive (mostly high-speed) services can compete with other modes. In 2007 these three cases accounted for over 70 percent of the traffic between non-neighbouring countries.

Occupancy
The average number of passengers travelling by train at border crossings increased from 89 in 2001 to 103 in 2007; the highest average occupancy is at borders between EU15 Member States (135), due to high-speed trains on various routes. The lowest average is at EU15-EU12 borders (43); here the average occupancy has dropped as supply between 2001 and 2007 has grown faster (+79 percent) than demand (+51 percent).

Developments 2007-2020
By using the TRANS-TOOLS model it is foreseen that up to 2020 growth of 17 percent will be recorded in rail passenger border crossings between the EU27 Member States and between EU and non-EU countries. The share of rail in the total mobility market will grow slightly.

Looking at the different submarkets, various developments can be observed. On routes on which high-speed infrastructure investments are made and better high-speed services are offered, growth of over 20 percent can be realised.

Regional international traffic can grow at a higher rate than forecast by the TRANS-TOOLS model if regional and local authorities contribute more strongly to the financing of operational costs.

Traffic between neighbouring EU12 countries shows relatively low growth between 2007 and 2020 (8 percent) and a low market share in 2020; the modest level of investment in faster international services is an important factor here.

The Market for high-speed Transport

High- speed services are operated on a commercial basis and new entrants are expected to take a share of this market in the future. At the same time, there are signs that the incumbent state-owned operators, which have hitherto cooperated in the running of international services, are beginning to compete with each other as well. Where they run services jointly, there is a trend towards doing this through a separate jointly owned subsidiary company (rather than through jointly operated services). This concept is believed to lead to better marketing and a more flexible approach to market developments. Increased competition and the completion of new infrastructure will facilitate further strong growth; any implementation of transport policy measures aiming to internalise the external costs of the airline industry could enhance this growth even further.

Niche Markets-Night Trains and Car Sleepers

Night trains represent a niche commercial market where developments are less positive. Competition exists from low-cost airlines, low-priced buses and accelerated day trains. Moreover, aging rolling stock, relatively low levels of service and security incidents contribute negatively to the attractiveness of night trains. Incumbent operators that have cross-financed these services as part of their total concessions are no longer obliged to do so, nor are they prepared to offer loss-making services. Several services have ceased operation in recent years. Private operators are taking a larger share of this market.

4 International Rail Operators in Passenger Transport

4.1 Background

This chapter provides insight into the rail operators that provide international passenger services. A categorisation of the different types of operators is proposed in Section 4.2; here the emphasis is on the ownership relationships and the financing of border crossing operations. In Section 4.3 the key national operators that provide international passenger services are presented. An overview of the remaining categories of railway undertakings that provide cross-border services is then provided in Section 4.4. The final sections of this chapter give an overview of the future development of operators and present the conclusions.

4.2 Categories of Operators in International Rail Transport

In this section operators are classified according to their ownership and their financial situations. A special methodology for classifying operators has been designed for this study. For each border crossing the classification has been applied in such a manner that a complete overview is obtained for the present situation. For the development of the RMMS (Railway Market Monitoring System) this overview could be considered as a base case against which future developments can be monitored.

4.2.1 Overview of Ownership and Financial Set-up of International Services

Operators are analysed from two perspectives. Firstly Table 4.1 distinguishes operators according to type of ownership, specifying six categories of international operators and providing examples for each category. Table 4.2 concentrates on the financial arrangements for international rail services.

Table 4.1 Operators per type of ownership

Group	Ownership of operator	Example
I	State-owned operators	This is the classical form and still exists in almost all Member States
II	Subsidiaries of state-owned operators: These are formed to carry out specific services. Sometimes a minority share is in the hands of other parties.	NS-Hispeed and CityNightLine (now owned by DB-Fernverkehr)
III	Joint ventures of state-owned operators (or their subsidiaries). These are formed to operate specific international services.	Thalys and Cisalpino
IV	Joint ventures of state-owned operators and private owners.	Eurostar; the original British shares have been privatised. Eurostar runs a commercial service.
V	Operators owned by regional authorities. In general these are regional services supported by PSO contracts.	Examples of international operations of this type are found between Spain and France (Euskotrain) and between Switzerland and Italy (Rhatische Bahn, FART).
VI	Private operators	These are run either commercially (as Tallinn-Moscow) or under PSO (such as Arriva on Groningen-Leer). Also many private operators work in the rail freight sector.

Source: NEA

Table 4.2 distinguishes six different categories of operators, based on how international services are financed and links the financial set-up to the type of ownership which was presented in Table 4.1.

Ticket revenues on border crossing operations can vary from 100 percent coverage of the operational costs, to just providing marginal income compared to the cost. To compensate the costs which are not covered by ticket income, costs can be included within PSO contracts or else the services can be cross-subsidised within the incumbent operator. Table 4.2 presents six categories, ranging from completely commercial (1) to specifically contracted services (6).

Table 4.2 Operators per financial set-up

Group number financial	Description of type of service per financial set-up	Group number ownership	Ownership of operator
1	Cross-border services organised commercially by private operators	VI	Private operators.
2	Cross-border services organised commercially by a rail operator owned by the incumbent operators	III IV	Joint ventures of state-owned operators (or their subsidiaries). Joint ventures of state-owned operators and private owners.
3	Joint operations on cross-border services, sharing revenues and costs (reciprocity principle of EuroCity). This is not necessarily a joint venture as in Group 2, but can also be a PSO contract (Group 4). The difference is the focus on the joint service, e.g. Benelux train, with Belgian locomotives and Dutch carriages.	I-VI	In principle all forms are possible.
4	Cross-border services in a national PSO contract (mostly regional services)	I	State-owned operators.
5	Cross-border services organised in a regional PSO contract (regional services)	I V VI	State-owned operators. Operators owned by regional authorities. in general these are regional services supported by PSO contracts. Private operators (e.g. Arriva).
6	(Additional) Cross-border services of commercial lines which are co-financed by a region or city across the border	I-VI	In principle all forms are possible.

Source: NEA

The six types of services and their financial set-ups, as shown in Table 4.2 are described below.

1 Cross-border services organised commercially by private operators

These commercially run passenger trains are managed by private operators (non-incumbents) who operate the services on a commercial basis. Examples are:

- Go Train running between Tallinn and Moscow (run by a travel agent).
- Alp Express (ski trains).
- Holiday car & sleeping trains.

2 Cross-border services organised commercially by a rail operator owned by the incumbent operators

The neighbouring incumbent operators establish a joint venture to operate cross-border passenger trains, mostly for one type of service (e.g. high-speed trains). These joint ventures operate commercially. Examples are:

- Thalys (subsidiary of SNCF, NMBS, DB and NS Hi-speed).
- Eurostar (subsidiary of SNCF, NMBS and Eurostar UK).
- Cisalpino (subsidiary of SBB and FS).

3 Cross-border services organised between incumbent operators sharing revenues and costs (reciprocity principle of EuroCity)

All traditional long-distance passenger trains work along this EuroCity principle. Costs are generally shared between the incumbent operators. The number of coaches is divided between the operators. The costs are calculated on the axle–kilometre principle. The technical details of these calculations are quite complex. If the final costs do not balance between the operators, this discrepancy will be compensated for. This could entail losses incurred on these services being cross-subsidised from national operations.

Another option is that the international passenger activities of the incumbent operator are organised commercially by a company that is 100 percent subsidiary. This company runs only these trains, on which it is making a profit. Examples include the ICEs operated by DB and by NS International.

A recent development is the involvement of a different operator instead of the incumbent operator in joint services. An example is the announced cooperation on the Brenner route between DB, Österreichische Bundesbahnen (ÖBB) and the Italian company Ferrovie Nord Milano (FNM).

4 Cross-border services in a national PSO contract (mostly regional services)

This model can be found most especially in the Central and Eastern European Member States. In general the regional border crossings are divided between the two incumbent operators on both side of the border.

5 Cross-border services organised in a regional PSO contract (regional cross-border services)

This category is mostly found in Western European countries. Within a regional PSO the Terms of Reference include the obligation to run cross-border services. The costs are shared between both border regions. In general these trains only travel to the first border town.

6 *(Additional) Cross-border services by commercial lines which are co-financed by a region or city across the border.*

This involves payment of a subsidy to an operator in order to upgrade a specific service, for example the extension of a high-speed service into a neighbouring country. Cities or regions on the other side of the border have an interest in extending the services to their city or region. Examples of this structure are:

- The TGV services which run to certain Swiss cities.
- The TGV to Oostende.
- The direct link between Maastricht and Brussels.
- The high-speed line between The Hague and Brussels (which will be in operation from 2010): the city of The Hague negotiated additional services with the Dutch national railways NS on top of an existing contract, increasing the service from 4 to 16 trains per day. There are two different authorities involved - the Dutch national authority (for the national PSO) and City of The Hague (for the contract for the additional service).

It can be concluded that only a few cross-border operations cover their costs. As indicated, only the border crossing operation between Estonia and Russia is purely commercially run. More services are run by joint ventures of incumbents (category 2). These aim to run commercially, though it is not clear who compensates for losses if this is necessary. Moreover, the joint ventures might use services provided by their ultimate owners at reduced costs.

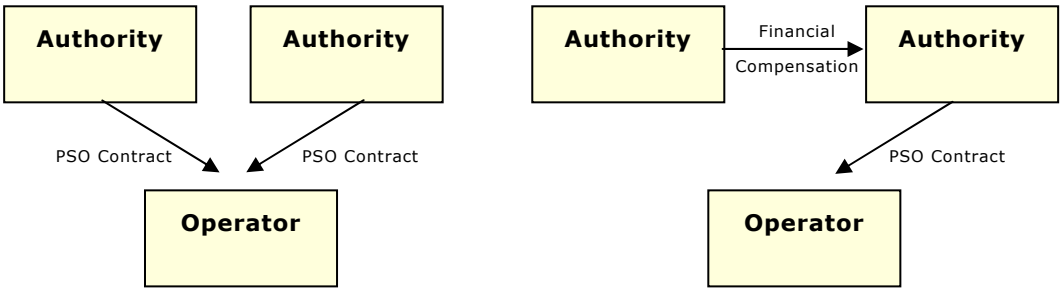
International PSO Contracts – Different Options

As mentioned in Table 4.2 under points 4 and 5, PSO contracts are used for financing cross-border rail operations, both for regional cross-border transport and cross-border (intercity) lines. The border crossing between Nieuweschans (NL) and Leer (DE) is an example of a regionally financed PSO contract[27]; the intercity Oslo (NO) and Stockholm (SE) is an example of a PSO contract at national level. In these situations the operator has a PSO contract with the authorities on both sides of the border.

However, it is also possible to conclude the PSO contract for cross-border operations with only one of the authorities. This authority is then financially compensated by the authority of the other side of the border. One such example is the service between Enschede and Gronau. These trains are run by both German Prignitzer Eisenbahn and DB Regio under German PSO contracts. The Dutch Twente region and the province of Overijssel financially compensate the German authority, i.e. the Dutch authorities pay a certain percentage of the PSO contract. Figure 4.1 provides an overview of the two PSO options.

[27] The Nieuweschans-Leer border crossing is described in detail in the case studies.

Figure 4.1 Different options for cross-border services PSO contracts



Source: NEA

The general pattern is that the long-distance trains are run under the system of sharing costs (category 3) and the regional cross-border trains are compensated within regional or national PSO contracts. Most regional PSO contracts can be found in Western Europe, whereas most new Member States use national PSO contracts to finance their regional cross-border services.

Box 4.1 presents various examples of operators, illustrating the above categorisation of operators. The full case studies can be found in Annex 6, case studies numbers 10 – 14.

Box 4.1 Case studies on operators

Copenhagen–Malmö Case study

The case study of the rail services between Copenhagen - Malmö represents an example of regional and long-distance services provided by different operators. The Oresund Railway (Swedish: Öresundbanan, Danish: Øresundbanen) is a railway between Copenhagen in Denmark and Malmö in Sweden via the Oresund Bridge. There are two franchises for this rail link; the first franchisee is an example of Group IV (joint venture between state-owned operator and private owners); the DSBFirst partnership consists of the Danish state railway DSB (70 percent) and the UK-based transport operator FirstGroup (30 percent). DSBFirst took over the operation of train services in the Øresund region of Denmark and Southern Sweden in January 2009. The second franchisee, an example of Group I (state-owned operators) is SJ who operate X2000 high-speed trains between Stockholm–Malmö–Copenhagen. The railway infrastructure on the Swedish side is managed by Banverket and on the Danish side by Banedanmark.

Arriva Case study

The case study of Arriva provides an example of regional services by a private operator under PSO contract (Group VI). The border crossing link between Nieuweschans in the Netherlands and Leer in Germany is operated by Arriva Netherlands as part of a concession acquired through tendering. The concession includes a network of 6 lines in the North of the Netherlands. There is a PSO contract issued by authorities in both countries, the Province of Groningen (NL) and Landesverkehrsgesellschaft Niedersachsen (DE) under the terms of which Arriva is responsible for the revenues (net costs contract); the cross-border service receives an annual subsidy as specified in the concession contract paid by both authorities.

Cisalpino Case study

Cisalpino AG is a jointly-owned subsidiary of Trenitalia SpA and SBB AG founded in 1993. Both companies hold an equal share in Cisalpino AG. Cisalpino operates international services between Italy and Switzerland. In September 2009 however, SBB and Trenitalia decided to terminate the Cisalpino arrangement as from the new 2009/2010 timetable. Hence, this case study represents an unsuccessful example of Group IV in Table 4.1. All services will be transferred back to SBB and Trenitalia.

Railteam Case study

Seven European high-speed rail operators have formed an alliance to provide seamless high-speed rail travel across Europe. Railteam benefits from high levels of comfort, punctuality and reliability offered by the high-speed services of its members such as ICE, TGV, Eurostar, Thalys and TGV Lyria. Further advantages of this alliance of operators are the better coordination of departure and arrival times, rebooking of missed connections and the single ticketing and reservation system.

Eurostar Case study

Eurostar is a joint-owned subsidiary of SNCF (France), SNCB (Belgium), and Eurostar (UK) Ltd and provides high-speed rail passenger services from London to Paris and Brussels via the Channel Tunnel. The Eurostar trains use high-speed lines in France, Belgium and UK. With the opening of the European rail network in 2010 Air France/KLM has indicated that it wishes to operate high-speed rail services between Paris to London, and Paris to Amsterdam. Deutsche Bahn (DB) has announced plans to run ICE trains from Germany to London.

Source: NEA

4.2.2 Financing Cross-Border Operations

Table 4.3 illustrates how rail links with border crossings within the EU27 are financed.

Table 4.3 Financing cross-border operations by category

EU27-EU27 submarkets 2009/ Number of links	Total number of links	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
EU15 - EU15	54	1	5	25	9	21	1
EU15 - EU12	27	0	0	14	4	20	0
EU12 - EU12	25	0	0	15	11	3	0
Total	106	1	5	54	24	44	1

Source: NEA

About half of the international rail links between the EU27 are operated by the incumbent operators. The second largest group of services is organised through regional PSO contracts. The third group constiutes services under national PSO contracts. In the group of new EU Member States most international rail links are provided by the incumbent rail operators. National PSO contracts play a more important role than in the old EU Member States. By contrast, very few operators in the new EU countries have a regional PSO contract. Annex 9 provides an overview of how rail operations (EU27 – EU27) are financed border for each border crossing, using the same categories as described earlier.

Table 4.4 illustrates how border crossing rail links between EU27 and non-EU countries are financed.

Table 4.4 Financing EU27 and non-EU cross-border operations, by category

EU27 – non-EU submarkets 2009/ Number of links	Total number of links	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
EU27 - CH/NO	23	0	2	11	0	17	0
EU27 - Eastern Europe	30	1	0	24	9	1	0
Total EU27 – non-EU	53	1	2	35	9	18	0

Source: NEA

As for rail trips between EU27 and non-EU countries, generally most rail links are operated by incumbent operators, especially for those routes involving Eastern Europe. For the routes to and from Switzerland and Norway, regional PSO contracts are most relevant. National PSO contracts play a minor role. Annex 10 provides an overview of how the services are financed for each border crossing, using the same categories as described earlier.

4.3 Analysis of International Rail Passenger Operators

In this section an overview of rail passenger operators is provided. The main operators that provide cross-border rail passenger services between EU27 countries and to and from neighbouring countries are analysed. These operators

have been selected because they provide international services as part of their activities, in addition to their domestic services. The other cross-border services are mostly provided by cooperation/joint ventures between different operators; these are described in the next section and in the form of case studies. In the description an attempt has been made to separate international activities from domestic activities, however, this has proved difficult. Furthermore, an overview is presented of different aspects such as:

1. Routes Operated.
2. Customer interface.
3. Service offered to customers.

In each of the items above the following topics are addressed (where information could be found): revenues; profits; marketing; customer interface; intramodal and intermodal competitiveness of services; cost/fares; frequencies; journey times; punctuality/reliability; information to customers on timetables and fares; passenger rights granted, including compensation in case of delays and /or damage.

Table 4.5 provides an overview of the operators which are described in this section and their areas of operation.

Table 4.5 Overview of selected international rail passenger operators and their area of operation

Submarket	International rail passenger operator
EU15 – EU15	DB Fernverkehr, Danish State Railways, NordOstseeBahn GmbH, SJ, SNCF, Iarnród Éireann, Trenitalia, Comboios de Portugal, RENFE, Veolia(active in different countries) Eurostar (an exception as this is a joint venture)
EU15 – EU12	PKP Polish Railways, Ceske Drahy, MÁV, Slovenske Zeleznice
EU12 – EU12	PKP Polish Railways, Ceske Drahy, MÁV, Slovenske Zeleznice, BDZ, Lithuanian railways, Latvian Railways
EU27 – CH/NO	SJ, Veolia, Ofotbanen AS, Merresor, RENFE, Slovenske Zeleznice
EU27 - Eastern Europe	PKP Polish Railways, BDZ, Lithuanian railways, Latvian Railways Slovenske Zeleznice, AS Gorail (Estonia)

Source: NEA

Table 4.5 illustrates that some companies are active in different submarkets in Europe. Notably PKP Polish Railways is active in most segments. It should also be noted that the EU12 railway undertakings have experience of cross-border operations in relation to the third countries.

Annex 8 presents a description of the main international rail passenger operators. Table 4.6 provides a summary of the information presented in Annex 8.

Table 4.6 Overview of main international passenger operators

Operator	Routes Operated	Customer interface	Service offered to customers
DB Fernverkehr,	• The CityNightLine is operated by DB and runs for example between Copenhagen-Hamburg [DK–DE] (overnight). There is one train/night.	• Booking online from EU and outside of EU is possible.	• CityNightLine sleeper trains. Journey time is 6 hours.
Danish State Railways	• Copenhagen-Hamburg (12 trains per day) • Arhus-Hamburg (9 trains per day)	• DSB customer interface highly developed. Tickets can be bought online through German DB website.	• In 2008 91.8% of long-distance and regional trains arrived within 5.59 minutes of scheduled time. • Comfortable ICE trains.
NordOstseeBahn GmbH	• NOB is a subsidiary of the German Veolia Group.	• Service between DK–DE: Tonder-Niebull (9 trains per day)	• Journey time: 1.75 hours
SJ	• Copenhagen–Stockholm (6 trains per day) • Copenhagen–Goteborg (13 trains per day)	• Tickets sold through user friendly website in 3 languages; trip planner; online and printed timetables; ticket machines available; purchases from 7-11 outlets; mobile e-ticket service.	• X2000 High-speed Train; Air con; Wi-Fi; radio; quiet zone; cinema (night trains only); carpets; tinted windows; adjusted blinds; fully adjusted seats; buffet hot and cold light meals; 1st class attendant at seat; separate compartments for luggage; seat reservation service online or by telephone.
SNCF	• SNCF operates services to all France neighbouring countries: Most of them are operated by SNCF, some in cooperation with other operators.	• Accessible website with timetable and e-booking facility.	
Iarnród Éireann	• Dublin-Belfast	• Cross-border services are marketed as a part of incumbent's overall national rail service. Services like: user friendly website • Journey planner	• Air conditioning; carpets; tinted windows; adjustable blinds; fully adjustable seats; buffet hot and cold light meals; 1st class attendant at seat; • Ticket sale: seat reservation service online or telephone. • Journey times: Just over 2 hours. • Punctuality/reliability of international passengers trains: 90% within 0-10 minutes of advertised time
Trenitalia	• International connections (Eurocity, Euronight) to all neighbouring countries	Three types of customer interface: • Travel agencies with a Website (Italian and English version) • Call centres	Ticketing services: • On-line ticketing services: • Booking • Change booking • Online refund • Postoclick • Ticket less • Mobile ticketing
Comboios de Portugal	• international connections with Spain and France.	• Travel agencies and railway offices found throughout Portugal • Customer Assistance Offices for passengers in stations • Call centres (information on train timetables and circulation, etc.)	Following services: • Ticketing service • On-line ticketing services: • Booking • Wide range of tariffs offered: • Special rates for frequent travellers • Special offers train and hotel • Interrail cards for young people
RENFE	• international connections (high-speed/long-distance) with France, Portugal, Switzerland, Italy.	• Travel agencies and railway offices • Website (Spanish version, timetable available also in English) Call centres (ticket sales, information on train timetables and circulation, etc.)	• Ticketing service On-line ticketing services: • Booking Wide range of tariffs offered: • Reduction for groups, young people, etc. • Special offers for exhibitions and conventions' organisers On board service: • Bar/Restaurant services • Carriage of animals • Carriage of bikes
Veolia	• International routes are run for example between Norway and Sweden. • Vannas-Narvik (2 trains per day) • Ostersund-Trondheim (2 trains per day)	• Can book e-ticket online through Veolia's website www.bokatag.se. This website is only partially in English. • Clear and accessible on website.	• Ostersund-Trondheim: Ticket price: 279SEK; journey time: 2 hours 56 minutes • Vannas-Narvik: Ticket price: 191 SEK; journey time: 2hours 51 minutes
Eurostar	• Service between UK–F: London to Paris; Brussels; Disneyland Paris; Brussels (16 trains per day)	• Accessible website with timetable and e-booking facility.	• High-speed train. 7 days a week service. • Tickets can be bought from 4 months in advance from user friendly website, www.eurostar.com. Seat reservations possible. • From central London to central Paris, Eurostar is faster than flying, as well as more punctual, comfortable and convenient. Eurostar has now captured over 70% of the London-Paris market from the airlines.

Operator	Routes Operated	Customer interface	Service offered to customers
PKP Polish Railways	• international passenger transport connection with Czech Republic, Slovakia, Germany, Belarus, Ukraine, Russia, and Lithuania.	• Travel agencies and railway offices found throughout Portugal • Customer Assistance Offices for passengers in stations • Call centres (information on train timetables and circulation, etc.)	The company offers the following services to its customers: • Ticketing service • On-line ticketing services • Booking • Post sales services: • Timetable via sms and via WAP • Complaint forms online • Wide range of tariffs offered • Reductions for customs and police officers, children, students, etc. • On board service • Bar/Restaurant services Other services: • Disabled passengers assistance
Ceske Drahy	• international connections with Poland, Slovakia, Austria and Germany.	• Travel agencies and railway offices found throughout Czech Republic and in main railway stations • Website (partial English version) where timetables are available and purchasing and the main customer services are described.	• Ticketing service • Online ticketing services: • Booking • Online advance reservation free of charge (payment is made only when collecting the ordered reservation at any issuing office with the reservation system) • Timetable online • Timetable via sms and WAP
MÁV	• international connections with Austria, Bulgaria (via Romania or Serbia) Czech Republic, Slovakia, Greece (via Romania and Bulgaria) Germany (via Austria or via Slovakia and Czech Republic.	• International ticket points found throughout Hungary. • Website (partial English and German version) where timetables are available and the main customer services are described. • Call centre, the MÁVDIREKT Customer Service.	• Wide range of tariffs offered • Reduction for travelling in groups and for young people • Special offers (INTERRAIL, Railplus, etc.) • After sales services • Complaints and customer assistance within the station, by phone and online (through the website)
Slovenske zeleznice	• international connections with Czech Republic, Italy, Switzerland, Croatia, Austria, Hungary, Germany, Serbia.	• Travel agencies and railway offices found throughout Slovenia and in main railway stations. • Website (English version available). • Call centre (for information, complaints, etc.).	• Ticketing service • On-line ticketing services • Booking • Timetable online • Wide range of tariffs offered • Reduction for groups, young people, etc. • Ticket discounts according to the destination (e.g. Serbia, Macedonia and Greece, Montenegro, etc.)
BDZ	• international connections with Serbia-Montenegro, Greece and Turkey, Russia and Ukraine (via Romania) Czech Republic and Poland, Belarus.	• Railways offices and stations found throughout Bulgaria. • Website (English version available). • Call centre for information and complaints.	• Wide range of tariffs offered • Reduction for travelling in groups, for young people, for social groups • Travel related services • Luggage storage at the station • On board service • Bicycle on board service • Transportation of parcels carried out on trains that have luggage wagons in their compositions from and to stations open for this activity
Lithuanian railways	• international passenger transport connection with Latvia, Belarus, Russia and Poland.	• Railways offices found throughout Lithuania and in railway stations. • Website (English version available) where timetables are available and the main customer services are described.	• Ticketing service • Timetable online • Wide range of tariffs offered • Reduction for travelling in groups, for young people, for social groups • Travel related services • car rent, driver's and other services are provided at the Centres of Lithuanian Railway Passenger Service and sales agencies • On board service • Restaurant/bar service
Latvian Railways	• international passenger transport connection with Estonia, Russia, Belarus, Ukraine and Lithuania.	• Railways offices and stations found throughout Latvia. • *Website* (English version available) where timetables are available and the main customer services are described. • Call centre for booking.	• Ticketing services • Mobile ticketing • Wide range of tariffs offered • Eurail promotions • On board service • Sleeping-car compartments on board on international trains
Ofotbanen AS	• Kiruna-Narvik. There are 2 trains per day.	• Ofotbanen uses SJ's highly developed interface for customers to book tickets online. • Tickets sold through user friendly website in 3 languages	• Tickets sold through user friendly website in 3 languages;
Merresor	• Stockholm–Oslo: 1 sleeper per night (during the summer only) • Goteborg–Oslo: 1 sleeper per night	• Clear and accessible on website. • SJ's highly developed interface at www.sj.se	• SJ's highly developed interface at www.sj.se
AS Gorail (Estonia)	• Line operated Tallinn-Moscow		• Ticketing service • Timetable online • sells train tickets to all the CIS and Eastern and Western Europe, long-distance • On board service • Restaurant/bar • wireless internet access

Source: NEA

As shown in Table 4.6 there are considerable differences between the operators in the fields described. The sections below highlight some of these aspects.

4.3.1 International Routes

Operators have different sizes of international networks. The following aspects can be distinguished which determine the size of networks.

Geography: Number of Border Crossings and Network Development
The railway undertakings from the large EU countries operate many more international routes than the smaller ones. France and Germany represent the first category and Portugal, with just one border, the second one. The number of border crossings is also relevant; the more border crossings, the more operations.

Incumbent or Private Operator
Incumbent operators run more international trains than do private operators. Trenitalia is an example of an incumbent which runs Eurocity services to Spain, France, Switzerland, Germany, the Netherlands, Austria, plus Euronight services to Ljubljana, Zagreb, Budapest, Bucharest and Belgrade every night. The private operator only runs those services that are economically viable (e.g. AS Gorail) or which the "local" government is willing to pay for (e.g. Veolia, Ofotbanen AS and Merresor).

Historical Determination of Services
In the past the incumbent operators were the only operators running cross-border services, and although the services are increasingly rationalised, these operators still run the bulk of the cross-border operations in their respective countries, e.g. Polskie Koleje Państwowe (PKP) Polish Railways, Ceske Drahy, Magyar Államvasutak (MÁV, Hungarian State Railways), Slovenske Zeleznice.

4.3.2 Customer Interface

All the operators described have customer interfaces which mioht include a website (including timetables) and provision of information by telephone. However, operators vary in their forms of customer interface. The following aspects can be distinguished in this field.

Incumbent Operator versus Private Operator
Private operators focus on low costs when it comes to customer interface: well-developed websites focusing particularly on e-bookings (Eurostar) or mobile e-ticket services (Ofotbanen). The incumbents that have a national network also use their national sales networks for their international operations (e.g. Iarnrod Eireann have staffed ticket kiosks throughout their network; CP provides customer assistance offices for passengers in stations).

North-Western Operators versus South-Eastern Operators
The North-Western operators rely increasingly on internet and ticket machines for purchasing tickets (Ofotbanen) or on telephone sales (IE), whereas the South-Eastern European operators still predominantly use more traditional methods of customer contact, such as travel agencies for ticket sales and call centres for information (SZ), with websites mainly providing information (LZ).

4.3.3 Service Offered to Customers

Nearly all the operators described have services in common, such as on-board services, customer assistance at stations, facilities for disabled passengers, timetable information to customers etc. However, some differences can be distinguished between certain groups of operators described.

Ticketing Strategies
Some operators apply 'air fare' style ticketing strategies, using Fidelity Cards (TrenItalia) or early booking discounts (Eurostar, MÁV). Other operators still have the more traditional structure of a single fare, but with a wide range of discount categories, such as discounts for children, students, pensioners, customs officers and policemen, etc. (PKP).

North-Western Operators Versus South Eastern Operators
Less prominently visible from the overview is the quality of rolling stock. Some North-Western European operators are very eager to highlight the characteristics of their newer rolling stock: air-conditioning, Wi-Fi, cinema, tinted windows, etc. (SJ) and comfortable ICE trains (DSB). The South-Eastern European operators that we have described are in a less comfortable position, often using old or second hand coaches (BDZ).

Sleeping Cars
International passenger transport is often associated with sleeping cars. For example LDZ provides sleeping car compartments on board its international trains. However sleeping car services are in decline due in part to improved time schedules on day trains. Eurostar and the DB ICE services for example do not offer overnight sleeper accommodation.

4.4 Joint Ventures or Specific Railway Undertakings for Cross-Border Activities

In the previous section the railway undertakings that have international cross-border service as part of their total (mainly domestic) operations were described. This section describes, through a number of case studies, joint ventures or specific railway undertakings that concentrate on cross-border activities.

The above forms of cooperation can take many forms, and hence a number of case studies have been selected and described:

1. Case study of mixed regional/long-distance operators on the Copenhagen–Malmö route.
2. Arriva Case study: a private operator under PSO contract.
3. Case study of joint operators: Cisalpino/Italy-Switzerland rail passenger services.
4. Case study ofjoint operators: the Railteam alliance of operators.
5. Case study of joint operators: Eurostar.

These case studies are described in more detail in Annex 6. Although the case studies on mixed regional/long-distance operators are diverse, these operators have some features in common[28]:

- All the operators mentioned have been established durin the past ten years, after the European Community rail reforms.
- They use specific business concepts for dedicated lines; regional transport, high-speed lines, etc.
- They run their services on a commercial basis. Commercial operators operate under PSO contracts, e.g. Arriva, DSBFirst. Incumbent operators have established joint ventures to run specific services, e.g. Cisalpino, Eurostar.

4.5 Operator Trends in International Rail Passenger Transport

Various trends in international rail passenger transport can be distinguished, based on the information provided in the previous paragraphs.

Changes in Financial Perspective

Traditionally, incumbent operators of neighbouring countries have organised cross-border connections as part of their nationwide concessions. Most of those services were jointly operated and a bilateral arrangement on sharing costs and revenues was put in place. If the operation ran at a loss, this was covered either by the general profitability of the company or through the compensation of the overall loss of the company by the State. Under the pressure of opening of the market, the relations between the incumbent operators and the State have changed. Arrangements for covering losses at the end of the year have been replaced by contracts relating to exclusive rights, obligations and compensations for specific services. Operators are no longer willing to provide loss-making services that are not made mandatory by the concession or the contract. The former practice of cross-financing loss-making services by profitable services has been discontinued. International long-distance main-line services are, in several cases, profitable and will continue to operate; new entrants may offer additional services which are also based on profitable operation. For non-profitable main-line services and regional services, specific provisions for financing have had to be made. In many countries the responsibility for branch-lines has passed to the regions, which can finance loss-making services from their budget; in other cases state finances have remained responsible.

Impact on International Lines – Development Stages

Through these developments the financing of loss-making international lines had to be arranged more specifically. As international lines lie within the geographical territory of several authorities (on both sides of the border) making arrangements is more complicated than is the case for domestic services.

Member States are at different stages of these developments. In Germany, Denmark, Sweden and the Netherlands, all loss-making services are in principle covered by contracts and concessions. The incumbent operator runs a core network (where some cross-financing may still be the case) and the other lines

[28] Except Railteam which is a sales organisation for different operators.

are regionally contracted cross-border regional services that are not part of the services agreed upon in the core network contract and are generally tendered and covered by bi-national PSO contracts. The Groningen–Leer case study has been given as an example where this development has led to improvements in services; a regional operator now promotes the line which was neglected by the incumbents under the former regime. Regional trains on the Copenhagen-Malmo route are also organised under a PSO contract. These examples can be seen as the standard for future contracts for those international services that run at a loss.

In the case of Belgium and France, the incumbent operator still has a nation-wide concession and also runs (its share of) international services; increasingly these companies are also asking for specific financing if services run at a loss. Developments here will follow the pattern adopted in Germany and the other countries mentioned above and this can guarantee a continuation of these services or even lead to a revival of services that were neglected under the former regime. The case study of the Italy-Slovenia route, for example, shows the planning of such a revival.

The same process is developing in the new Member States, though here financial restriction may lead to a different outcome. Here most incumbent railways make considerable losses, which – due to limitations in the general financial situations in these Member States – are not or are only partially covered by the State. This has led to the situation that several services are now of a poor quality, with old rolling stock, bad infrastructure and a restricted number of trains per day. In several countries this is currently leading to a reduction in services, both domestic and international. The financial position of most regions here makes them unwilling or unable to finance PSO contracts and it is questionable whether priority will be given to rescuing cross-border rail services. Many cross-border main-line connections in these regions are run at a loss and PSO compensations are required. Consequently, many cross-border passenger rail transport links in Eastern Europe face an insecure future.

4.6 Outlook on the Future Development of Operators

In relation to the opening of the international rail passenger market in 2010 it is generally assumed that market opening leads to more competition, more market entry by private operators and reduced involvement of the national incumbent operators. However, the reality is far more complex.

The market entry of new entities into the railway passenger market is complicated because of the existing railways as service providers, the characteristics of the railway market and the type of services provided. One special characteristic of the railway market is that new companies will always have to deal with the scarcity dilemmas that the infrastructure imposes on the market. Two decades ago, all railways were fully government-owned and national governments still have an influence on the openness of the market for new entrants. In addition, despite the best efforts of the EU to remove such barriers, many regulations remain that can form entry barriers regarding the qualifications of personnel or the technical requirements for train operation. Whilst legistaion by from the European Commission is liberalising and opening up the rail market for competitors step by step, this leaves room for each country to decide on the speed and degree of market opening.

If the most common market entry strategies do not apply, then depending on the organisation of the market, there are several options for entry, as follows:

- Acquiring a company that is active in that specific country.
- Bidding for a concession in that specific country.
- Forming an alliance with a company active in that specific country.
- Producing a competitive bid to a government for a concession that the government wants to award directly.

All these options require in-depth knowledge of both the EU regulations and the legislation in the specific country concerned.

The following private sector companies are identified as being potential private sector operators for international rail passenger services[29]:

- Veolia Transport: French-owned Veolia operates an 82 km regional service between Berlin and destinations in Poland. The company also has several regional concessions in Germany and runs a domestic open access service under the Interconnex brand; this links Leipzig and Berlin with Rostock and Warnemunde.
- Arriva: The group has experience with rail operations in Denmark, the UK, Germany, Sweden and the Netherlands. From December 2007 it has run regular international services between Munich and Prague under a "classical agreement" with Czech Railways.
- Air France-KLM: Reports surfaced in mid-2007 of a proposal to launch passenger services through the Channel Tunnel in competition with Eurostar, possibly in partnership with a British franchisee.
- FirstGroup: The group has no plans to run international open access services, but in June 2007 the company won a concession to operate rail services between Copenhagen and Southern Sweden via the Oresund fixed link in partnership with DSB.
- Keolis: A well-established French contract operator for public transport.
- Nuovo Trasporto Viaggiatori: an Italian rail operator, which obtained an operating licence in February 2007, has signed a contract with Alstom for 25 AGV train sets. Services proposed are initially limited to domestic routes.
- Rail One: a company related to the airline Air One, is behind this Napoli based company which plans to compete against Trenitalia between Roma and Napoli from 2009.
- The Train Company: This operator runs a weekly seasonal overnight train between Brussels and the Austrian Alps.

The Association of European Passenger Train Operators was formed to coordinate the interests of private-sector companies in Europe. Members are Arriva, FirstGroup, Veolia, Barraqueiro, Keolis, National Express, Stagecoach, Transdev and Transdev-Connexxion.

[29] Source: Railway Gazette International

4.7 Conclusions

There is great diversity in the types of ownership and financial arrangement for rail passenger operators. The predominant group is the category of national incumbent operators, who draw up bilateral agreements for international rail passenger services. Sometimes they have set up jointly owned subsidiaries and it is argued that these have a greater ability to respond quickly to market conditions.

A key problem in the international rail passenger market is that most market segments, with the exception of some high-speed rail services, are barely profitable. In some cases, particularly on high-speed lines, high track access charges contribute to the financial problems, especially where competing modes – in particular air – do not pay their marginal social costs.

Regional services require subsidy through PSO contracts, but these are more challenging to negotiate internationally than for the domestic market, as they usually involve more than one franchising authority. Two models of cross-border services PSO contracts can be distinguished: (i) a contract between an operator and authorities on both sides of the border; (ii) a contract with just one authority; this authority is financially compensated by an authority on the other side of the border through a bilateral agreement between the authorities. This agreement is not included in the contract with the operator.

Technical requirements to operate in more than one country may raise the cost of rolling stock provision, forming a barrier to entry unless the franchising authorities themselves provide the rolling stock. A further problem is the delay in the implementation of previously passed rail legislation which leads to processes which favour incumbents over new entrants.

Assessing the situation of private and incumbent operators in the medium-term market based on empirical evidence, the incumbent operator seems to be in a winning position. It is very rare for two private railway undertakings to be involved in any one international rail business relationship.

5 Barriers to Development

5.1 Background

This chapter focuses on the barriers that exist towards the development of international rail transport. Organisational barriers, notably in relation to administration or the implementation of EU and international legislation, will be presented in Section 5.2. Technical barriers will then be the focus of Section 5.3 including the problem of differences in track gauges. A case study of rail freight transport between Ukraine and Poland (see Annex 6) shows that the difference in track gauges also presents a technical barrier for the railways in Eastern Europe. In addition, this section focuses on the differences in electrification of rail networks. Section 5.4 presents future considerations in relation to both organisational and technical barriers. Finally, Section 5.5 summarises the key findings of this chapter.

5.2 Organisational Barriers

The opening of the international rail passenger market on the one hand creates opportunities for new market entries and on the other it creates opportunities for closer international cooperation. This section analyses the organisational barriers which currently challenge international rail business development. The analysis has considered the following aspects in particular:

- Implementation of EU and international legislation.
- International competition.
- Administrative barriers.
- Intermodal and intramodal competition.

Regarding the implementation of EU and international legislation, most EU Member States are still lagging behind with the implementation of the first and second railway packages. The main points of contention are the lack of independence for the infrastructure manager in relation to the railway operators, the inadequate implementation of the directive related to the infrastructure access charge and the low levels of efficiency of railway networks. Further problems relate to the lack of proper incentives for cost and tariff reduction on the part of the infrastructure manager, and the lack of charging systems based on the direct costs of railway service provision. Non-compliance with the provision concerning the creation of an independent control body which has the necessary competencies to solve all problems related to railway competitiveness is also considered problematic.

When analysing the barriers towards the opening of the rail passenger market the differences between the countries in the EU27 have to be taken into account. For example, Spain plays a leading role in the high-speed rail market. The rail market in the Netherlands is characterised by a large share of commuter traffic. In contrast, international rail passenger travel in Finland is almost irrelevant due to its peripheral geographic situation. Table 5.1 presents the barriers to international rail business development for a selection of rail operators. More detailed information on rail operators can be found in Annex 8.

Table 5.1 Organisational barriers of operators

RU/Country	Analysis of barriers
UK	• Currently, open access for commercial operators in Britain is subject to the Regulator being satisfied that such services primarily generate new rail revenue rather than abstracting revenue from franchised operators. • Other barriers to development are the level of charges and safety requirements for use of the Channel Tunnel (currently only the Eurostar trains satisfy the latter) and border controls (which currently preclude use of the trains by domestic passengers within Britain).
Danish State Railways	• Denmark has implemented the requirements of the second railway package so that foreign and domestic railway undertakings have open access to the Danish network. The website of rail infrastructure operator Banedanmark clearly describes the licensing process involved in obtaining a licence.
SJ (Sweden)	• Sweden is relatively advanced in liberalisation, with all relevant aspects of the Directives of the second railway package guaranteed by law before 2007. • International competition: the market shares of external railway undertakings are the highest in Europe (with the exception of UK). Sweden is an attractive market for commercial railway undertakings. Long-distance passenger transport under a public service contract is put out to public tender with exclusive rights by the national transport authority Rikstrafiken.
SNCF (France)	• RFF assigns central infrastructure management tasks to the incumbent RU (SNCF) which means that the latter company also acts as infrastructure manager on behalf of RFF. SNCF is the sole provider of passenger rail services providing all services including long-distance and high-speed services.
Iarnród Éireann (Ireland)	• Ireland was given exemption status in respect of implementation of the first railway package: there is no competition.
Trenitalia (Italy)	• Lack of international cooperation. • Long and non-transparent procedures for railway licenses, as well as for safety certificates and homologation of rolling stock.
Comboios de Portugal	• Lengthy and non-transparent procedures for railway licenses, as well as for safety certificates and homologation of rolling stock.
RENFE (Spain)	• Low infrastructure quality (infrastructure quality affects quality of services which are provided by the RU and hence the competition with other modes of transport).
Ceske Drahy (CZ)	• Discrimination in access to rail related services (e.g. in terminals, rolling stock maintenance, etc.).
MÁV (Hungary)	• Discrimination in access to rail related services (e.g. in terminals, shunting yards, rolling stock maintenance, etc.).
BDZ (Bulgaria)	• Weak financial situation of railway undertakings.
Latvian Railways	• Unclear information about access conditions to infrastructure and service.
Ofotbanen AS (Sweden and Norway)	• Access for international groupings is open as defined in Directive 91/440/EEC. Apart from this, external railway undertakings can provide rail passenger transport in Norway only if they provide their own infrastructure or on lines that NSB no longer operates for economic reasons.

Source: NEA

Despite the diversity of the situations in the various European countries, there are some common impediments to the evolution of a deregulated market. Firstly, the delays in implementing the railway packages 1 and 2 represent a threat to competition from a legal perspective. Secondly, the opening of the rail market increases the competition among operators in relation to services, quality and price. Operators will need to come up with competitive strategies, for example in ticket pricing, to make their services attractive to customers. The yield management system, as applied in the air industry, where the ticket price depends on the date of purchase and seat availability, may serve as an example. This also requires appropriate staff training. A good example in this context is the SJ Service Academy (Sweden) where new and current employees receive regular training. The degree of competition can be measured by the number of market entries. The UK is currently the country with the highest number of external railway undertakings, followed by Germany and Sweden.

In Box 5.1 a case study is presented that shows how different organisational barriers have been addressed in three countries in order to facilitate cross-border rail operations between these countries[30].

Box 5.1 Case Study Germany-Basel: regional border crossing transport with a non-EU country

The case study gives insight into the regional rail passenger transport in the border triangle of North-West Switzerland, South-East France and the South-Western part of Germany, operated by the Swiss Railways SBB AG, their German subsidiary SBB GmbH, DB Bahn and SNCF. In the centre of the metropolitan cross-border coordination is the rapid transit railway Regio S-Bahn Basel. The case study gives an overview of the cooperation between operators in the tri-national region. Various technical barriers had to be solved, such as signalling, electrification and safety. After a long period of preparation the system became operational in 1997.

Source: NEA

5.3 Technical Barriers

Tables 5.2 and 5.3 introduce the main problems in relation to technical interoperability of rail services within the EU, and suggest possible solutions.

[30] A more detailed case study description is included in Annex 6, case 4.

Table 5.2 Rail interoperability problems

Problems	Main problems area:
1 Track gauge	Western European 1,435mm standard; problems F-E and connections with RU/BY/UA/LT/LV/ES/MO.
2 Current system	Different standards in different countries; AC-DC; AC 16 2/3/1,500v and 50Hz/25000V; DC 1,500/3,000V.
3 Signalling system	Different standards in different countries; ERTMS future standard.
4 Loading gauge	UK loading gauge narrower; Channel tunnel broader.
5 Legal	Should not exist as from 2010.

Source: NEA

Table 5.3 Possible solutions to interoperability problems

Solutions	Solves problem nr	Example
1 Standardisation	in principle all	HSL NL-B
2 Multi-system locomotive/train: can operate under several different systems of electrification.	2–3	Thalys
3 Loco change at border	2–3	IC Schiphol-Berlin in Bentheim
4 System border in terminal station	1-2-3-4-5	Various regional services
5 Diesel traction	2	Freight transport
6 Use smallest profile	4	Eurostar
7 Talgo system: A train axle system with variable gauge wheels	1	Paris-Madrid service
8 Replace wheels	1	Several trains West-Europe/ Russia, Ukraine and Belarus
9 Transhipment	1	Several freight trains F-E and to Russia, Ukraine and Belarus
10 Extend line across-border	1-2-3-4-5	High-speed line France-Spain, or Rail Baltica - 1,520mm gauge extension from Ukraine, Slovakia to Austria.
11 Running with less power	2	Possible to run under 1,500V by a 3,000V train.

Source: NEA

Box 5.2 presents the Ukraine-Poland case study. This case study deals with different solutions for differences in gauge[31]. As mentioned in Table 5.3, the different solutions are considered in the case study.

[31] A more detailed case study description is included in Annex 6, Case 15.

Box 5.2 Case study on technical barriers: Ukraine–Poland

The Ukraine-Poland case study combines various barriers in one border crossing: gauge, safety systems, border procedures, etc. This case study elaborates on the technical barriers in rail freight transport in Eastern Europe due to the differences in gauge between Poland and Ukraine. Several options for the removal of technical and administrative bottlenecks on this border exist:
a) Construction of a new rail section, with 1,435mm gauge size, between Lviv (Ukraine) and Peremishl (Poland).
b) Modernizing an existing, but non-operational 1,520mm gauge rail line from the Ukrainian border to Slavkuv in Poland and constructing missing sections as far as Germany.
c) An installation of the automatic switch system between 1,520mm Ukrainian gauge and 1,435 European gauge at the border.

Source: NEA

Box 5.3 presents the case study of rail passenger services between Sofia and Belgrade, which illustrates the technical barriers of rail services between an EU Member State (Bulgaria) and a non-EU country (Serbia)[32].

Box 5.3 Case study passenger long-distance train Sofia–Belgrade

The daily night train from Sofia to Belgrade is jointly operated by BDZ (Bulgarian Railways) and the Serbian Railways; the rail connection is mostly used for personal trips rather than for business purposes. Rail passengers on this link have to accept frequent delays due to numerous speed restrictions and the poor condition of the track. Two locomotive changes represent a further technical barrier: the sections between Sofia and Dimitrovgrad and between Nis and Belgrade are electrified, but diesel traction is needed for the central section. The border crossing procedures are carried out on the train during the journey by separate Bulgarian and Serbian teams. The train faces fierce competition from both cars and buses. Therefore, it is not surprising that, by estimation, the revenues generated cover less than 7-8 percent of total costs.

Source: NEA

[32] A detailed outline of the case study can be found in Annex 6 (Case study 3).

5.3.1 Differences in Track Gauges

Table 5.4 presents an overview of the various track gauges used in EU27.

Table 5.4 Overview of track gauges in the EU27[33]

Track gauge in mm	1,435	1,520	1,600	1,000	1,668
Country	BE, CZ, DK, DE, HE, ES, FR, IT, LU, HU, NL, AT, PL, RO, SL, SK, SE, UK	EE, LV, LT, FI	IE, N-IRL	HE, ES, FR, PT	ES, PT

Source: Union Internationale des Chemins de Fer, railway companies, Eurostat

Box 5.4 presents the Rail Baltica case study. This case study foresees connecting the Baltic States (Lithuania, Latvia and Estonia) by a railway built to 1,435mm gauge.

Box 5.4 Case study Rail Baltica: rail transport with Baltic countries

This case study refers to passenger and freight rail movements on "Rail Baltica" (between Warsaw and Tallinn) as an example of rail links to and from the Baltic countries. The main principle behind Rail Baltica is to develop high–quality links for passenger and freight to enhance sustainability of transport. Despite being relatively small in size, density and economy compared with other EU countries and neighbours, the Baltic State networks carry significant flows of international and transit freight traffic. With regard to passenger transport, the bus is the biggest competitor to rail for both national and short-distance international travel.
The change in track gauge is a crucial interoperability problem along the Rail Baltica corridor. The completion of work on the Rail Baltica corridor will increase passenger train speed to 160 km/h (with the possibility of increasing to 200 km/h) and freight train speed to 120 km/h.

Source: NEA

Depending on the type of train, different solutions for interoperability problems can be found, and these are described below.

High-speed trains are multi-system. As multi-system trains are far more expensive than uni-system trains, most of the time a dedicated subset of the overall fleet of trains is provided for each multi-system combination. The interoperability related to gauge differences between Spain and France will be solved by building dedicated new lines in Spain, using the 1,435mm gauge. The EUROSTAR trains are the only passenger trains that are legally permitted to operate between the UK and the continent (France and Belgium).

For *EC and IC services* several solutions are used. Multi-system electrical locomotives are the most costly solution. More common is change of locomotives at a border station, taking about 15 minutes. On diesel operated services multi-system signalling equipment can be used; this is much less costly compared to multi-system power.

[33] Notes: 1,435mm = standard gauge.
Note ES: new lines have a gauge of 1,435mm and an electric current of 25000 volts, 50Hz.

Other *long-distance services* use a change of traction in most cases when different electrification systems are involved. Night trains and car sleepers are generally slow and 15 minutes additional time for traction change does not affect their attractiveness. A diesel train running on completely electrified lines is no longer common in passenger transport.

Regional trains are generally operated within a system on one side of the border and stop at the system border. This is usually at a station near the border where several systems are supported. A change of a signalling system can be overcome by using multi-system trains at relatively low cost. In various cases there is a change of signalling systems at the real border. The change of electrical current system at a station allows cross-border services to use the current system of one country and the signalling system of the other (for a short-distance). Trains operate at reduced power between Belgium and the Netherlands, where Belgian 3,000V trains can run in the Netherlands under 1,500V.

5.3.2 Differences in Electrification of Rail Networks

Given the list of problems indicated above, the problem of different systems of railway electrification should be highlighted as an example of an important technical barrier towards interoperability. Within Europe there are five main systems of electrification. Direct Current (DC) is used in older systems. In countries where both DC voltages and AC voltages are used, new main lines use the more powerful Alternate Current (AC).

Two AC systems are common: (16 2/3Hz 1,5000V and 50Hz 25,000V). Interoperable operations between these two standards require multi-system trains. Table 5.5 gives an overview of the different systems used in EU27.

Table 5.5 Overview of European systems of railway electrification

geo	16 2/3 Hz/1,5000 V	50 Hz/25,000 V	DC1,500 DC 1,500 V	DC3,000 DC 3,000 V	Other direct current (DC)
Country	SE, NO	BE, BG, CZ, HE, ES, FR, LT, HU, RO, SL, SK, FI, HR, MK, TU	CZ, ES, FR, NL, SK	BE, CZ, EE, ES, PL, SI, SK, HR	FR, LV, PL

Source: Eurostat

The different systems of railway electrification have to be seen against the share of the electrified rail network in the total rail network in each country (Table 5.6). Hence, in countries with a high percentage of electrically powered trains the different current systems create a larger interoperability problem.

Table 5.6 Length of electrified network in 2007 and share of electrified railway network in total railway network in EU27 and CH, NO, HR and TU

geo/time	km of electrified network in 2007	share of electrified network in 2007
AT	3,545	61%
BE	3,002	89%
BG	2,806	68%
CH	3,536	100%
CZ	3,060	32%
DE	19,544	58%
DK	636	24%
EE	131	16%
FI	3,047	52%
FR	15,133	51%
HE	199	8%
HR	980	36%
HU	2,793	35%
IE	52	3%
IT	11,731	70%
LT	122	7%
LU	262	95%
LV	257	11%
MK	234	34%
NL	2,028	73%
NO	2,552	62%
PL	11,831	61%
PT	1,435	51%
RO	3,979	37%
SE	7,848	72%
SL	503	41%
SK	1,577	44%
TU	1,920	22%
UK	5,313	33%

Source: based on Eurostat

Tables 5.7 and 5.8 give insight into the situation of electrification at the EU27 and non-EU border crossings. Information is provided on electrification, coded as [D] = a non-electrified border crossing and; [E] = an electrified crossing. A detailed table of border crossings can be found in Annex 7, where [E*] indicates a change in voltage or frequency.

Table 5.7 Electrification at EU27 rail border crossings

EU27 – EU27 submarkets 2009/ Number of links	Total number of links	[D] = a non-electrified border crossing	[E] = an electrified crossing	[DE] or [ED] = change from diesel to electric
EU15 - EU15	54	13	40	1
EU15 - EU12	27	15	11	1
EU12 - EU12	26	14	12	0
Total	107	42	63	2

Source: NEA

Table 5.8 Electrification at non-EU border crossings

EU27 – non-EU submarkets 2009/ Number of links	Total number of links	[D] = a non-electrified border crossing	[E] = an electrified crossing	[DE] or [ED] = change from diesel to electric
EU27 - CH/NO	23	1	20	2
EU27 - Eastern Europe	30	18	9	3
Total EU27 – non-EU	53	19	29	5

Source: NEA

5.4 Future Orientation

Organisational Barriers

Based on the organisational barriers, as outlined in previous sections of this report, the following future developments should be considered:

- *Need for fair competition between rail operators*. Access to the market should be available to companies which are not receiving government subsidies. This will enable operators to compete on an equal basis.
- *Capacity problems*. The advent of competition is increasing the pressure for investment. The opening of the rail passenger market stimulates demand and brings the main lines to their capacity limits. In order to keep up with this growing demand, expansion and upgrading of the rail network requires strong political support.

Technical Barriers

Regarding technical interoperability problems, the traditional arrangements for carrying out international rail passenger transport require a change of staff and locomotive at the border, where coaches and wagons are handed over to the other company. Although the changeover at the border may take about 20 minutes, this is still regarded as the cheapest way of organising cross-border rail transport. However, the task of organising cooperation with a foreign railway company, including the coordination of a changeover at the border and harmonisation of timetable, creates a barrier for new market entrants.

One way of overcoming differences in the gauge system is to build new lines according to the system of the neighbouring country, e.g. the high-speed line in Spain between Seville-Madrid has been constructed to the European standard (i.e. 1,435mm) instead of the broader Spanish gauge. Hence whilst the Spanish high-speed lines comply with European standards, intra-national barriers can be created in relation to existing parts of the railway system which use the broader Spanish gauge.

An alternative to the changeover procedure at the border is the use of multi-system locomotives which can operate under several different voltages and current systems. However, multi-system locomotives require a higher investment compared to single-system locomotives.

For the foreseeable future, a standardisation of the EU electricity, signalling and gauge systems is not very likely, because of the relatively small amount of passengers in international rail traffic compared to national traffic. Furthermore, the changes toward the EU standard, e.g. ERMTS, may lead to new national interoperability problems. One example is the Utrecht-Arnhem line in the Netherlands where Prorail (the Dutch infrastructure manager) would like to remove level crossings in order to increase the speed and thus the capacity, especially for its regional and intercity trains. Since this section is part of the international rail network, EU legislation foresees the implementation of ERMTS, which is incompatible with the system required by Dutch regional and intercity trains. Consequently, a European standardised system seems most useful where there are separate tracks for national and international trains.

To summarise, cross-border technical barriers can be overcome either by using multi-system locomotives or by changing the locomotives at the borders. However, while these solutions improve technical interoperability, they also create organisational barriers i.e. barriers to market entry due to high investment.

5.5 Conclusions

The development of international passenger transport faces organisational and technical barriers. Organisational barriers are linked to (i) the implementation of EU and international legislation; (ii) international competition; (iii) administrative barriers and (iv) intermodal and intramodal competition. The technical barriers involve a range of issues such as differences in track gauge and electrification systems.

Problems related to barriers are particularly relevant in some new Member States and Eastern Europe, where poor quality infrastructure, inadequate funding of public service obligations and continuing delays at borders make international services non-competitive and loss-making.

The lack of interoperability remains a problem; solutions exist but they raise costs. Any decision as to a future EU standardisation of systems for electrification and signalling has to be balanced against new intra-national operability problems.

A considerable number of cross-border services are operated by diesel traction trains which have a poor environmental performance compared to trains with electric traction.

Differences in track gauge and electrification systems represent the main technical barriers. Possible solutions are multi-system locomotives or the traditional method of changing locomotives at borders.

Section 3
EU-Third Countries Rail Freight Transport

6 International Rail Freight Demand Between EU27 and Non-EU

6.1 Background

The international rail freight market is more advanced regarding the opening of the market than the passenger market. Rail freight is by its nature more border crossing oriented. Consequently, the merits that come with opening of the market are more tangible for freight transport. Since the beginning of 2007, the rail freight transport market has been opened completely within the EU, for both national and international services. This means that any licensed EU railway company with the necessary safety certification can apply for capacity and offer national and international rail freight services throughout the EU. This has led to new companies entering the market, lower prices and initially, growth in volume, although in the recently economic crisis volumes have dropped severely. The position and ownership structure of rail freight operators within the EU has also seen drastic changes. For example, Veolia Fret has taken took over Rail4Chem in 2007 and more recently Veolia itself has been acquired by SNCF Fret. It would be interesting to study the various stages of the market opening process over time; as the market opening process for international passenger transport is lagging behind the international rail freight process, lessons could perhaps be learned from the developments in freight transport described above.

In this report analysis is restricted to rail freight between the EU27 countries and third countries. The third countries discussed here comprise all non-EU countries with a railway connection to the EU. For the analysis, we not only consider those countries bordering the EU, such as Russia, Belarus, Ukraine, Turkey and the Balkan countries, but also consider more distant countries such as China and countries involved in the TRACECA[34] (Transport Corridor Europe Caucasus Asia) programme, as rail freight with these countries is emerging and freight volumes along those long distance rail corridors continue to grow.

This chapter firstly presents an overview of the freight market demand to and from the third countries (Section 6.1). Then in Section 6.2 a state of the art overview of the market opening process in third countries is provided. This is relevant for the development of rail freight markets, as more liberalised markets allow establishment of more competitive services. In Section 6.3 an overview is given of those operators active in the third countries, i.e. local freight operators, as well as relevant activities of railway undertakings from the EU. In mostly third countries, one single national operator carries out the

[34] The legal basis for the TRACECA programme as a multilateral framework of cooperation was established in September 1998 at a summit in Baku where the "Basic Multilateral Agreement on International Transport for Development of the Europe-Caucasus-Asia Corridor" (MLA) was signed by Heads of State. The signatory States of the MLA are Armenia, Azerbaijan, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Romania, Tajikistan, Turkey, Uzbekistan and Ukraine and the Islamic Republic of Iran. Turkmenistan is a participating country in the Tacis TRACECA programme, but is not a member of the MLA.

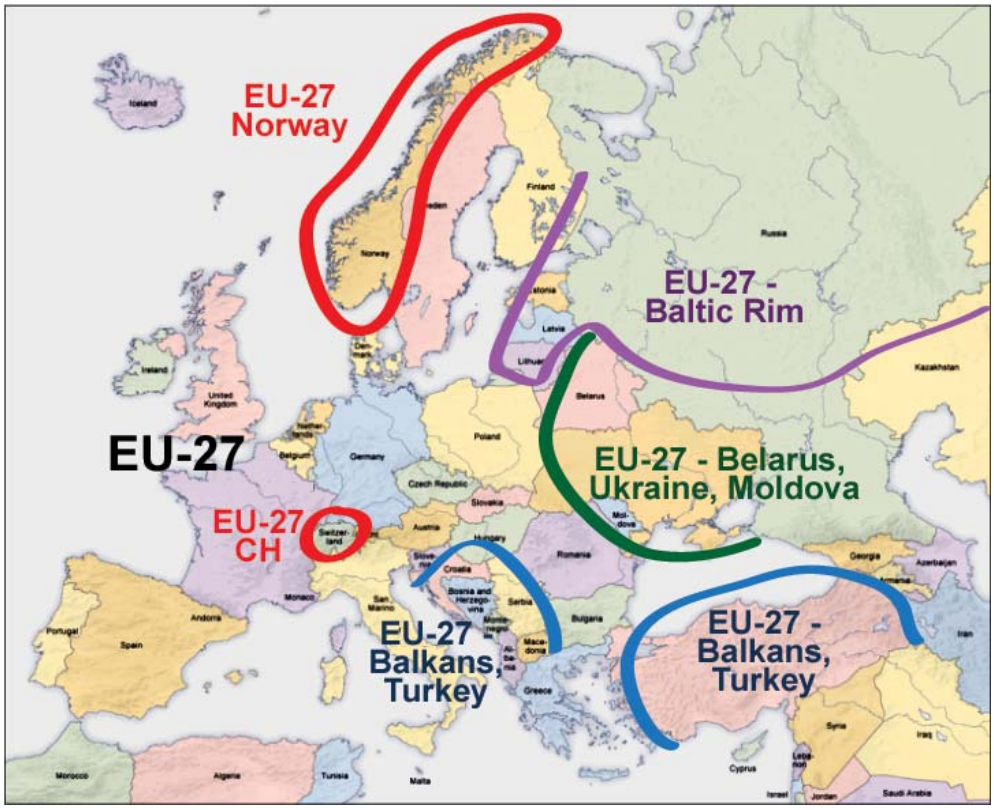
freight operations within the national borders. In Section 6.4 an overview is given of interoperability problems in relation to the third countries. Section 6.5 presents the conclusions from this chapter.

Given the different stages of development in different parts of Europe, this analysis is structured around a categorisation into four zones in order to allow generalisation of results. These zones are as follows (see also Section 2.5):

1. EU27-Switzerland and Norway; freight markets across these borders are well-developed and no significant interoperability problems exist. Switzerland is important as a transit country on the key European corridor between Rotterdam and Genoa.
2. The EU27 (Baltic Rim) borders with Eastern Europe, where there are no interoperability problems due to track gauge, because Finland, Estonia, Latvia and Lithuania all use 1,520mm gauge.
3. The EU27 borders with Ukraine, Belarus, Moldova, where a change from 1,435mm gauge to 1,520mm gauge results in interoperability problems.
4. EU27 connections with the Balkans and Turkey, where railways use 1,435mm gauge but there are other interoperability problems that are more specific to the region.

Figure 6.1 presents a map showing the four above-mentioned areas.

Figure 6.1 Four regions of third countries



Source: NEA

6.2 Recent and Expected Development of the Rail Freight Market

Recent Developments

Table 6.1 shows the development of rail freight flows between EU27 and third countries between 200 and 2007, according to the four submarkets. Transit flows through third countries are not included. For example, the EU27–Switzerland and Norway category does not include the transit flows through Switzerland, which are relevant for freight flows between Germany, France and Italy. As stated earlier, Switzerland and Norway are well integrated in the EU rail freight network. Similarly, transit flows through Serbia, which for example result from transport flows between Italy and Bulgaria, are not included. For this information, the reader is referred to the case study of Serbian freight transit (see Section 7.3).

Table 6.1 Development of rail freight demand 2001 – 2007, per submarket

Submarkets in EU27 – non-EU	Rail volume in 1,000 tonnes			Change in freight tonnes lifted from 2001-2007, in %
	Rail 2001	Rail 2005	Rail 2007	
EU27 - CH/NO	21,976	25,506	25,855	18%
EU27 - Eastern Europe (1,520mm gauge, Baltic Rim)	82,803	85,647	77,280	-7%
EU27 - Eastern Europe (1,520mm gauge, Ukraine, Belarus, Moldova)	31,550	28,390	33,874	7%
EU27 - Eastern Europe (1,435mm gauge, Balkan and Turkey)	1,495	10,001	11,193	649%
Total EU27 – non-EU	137,824	149,544	148,202	8%

Source: Eurostat, TRANS-TOOLS and data collection within the study

The overall increase in freight volume between 2001 and 2007 was some 8 percent. The four submarkets show different patterns. A steady growth of 18 percent over this period has been achieved in the EU27 – CH/NO case, where technical barriers are lower (e.g. no changes in track gauge) and economic growth has generally been strong until recently. Growth has not been sustained on the routes between the EU and Eastern Europe, especially between Russia and the Baltic Rim, where traffic has dropped in recent years. Notably the rail freight flows in relation with Russia, Belarus and Kazakhstan that are handled in the Baltic Rim are mostly determined by raw materials such as ores, oil and coal. The flows are unbalanced; the East-West flows are substantially larger than the West-East flows. The transit routes for the goods handled in the Baltic Rim are based on good connections to the ports by rail. It should be noted that Russia is also developing port capacity in the St Petersburg area, which may mean that these transit flows will decrease in the future. The development of freight flows in the Baltic ports depends on the Russian policy concerning the logistics of their export flows. It is expected that demand for raw materials will increase and that ports in the Baltic region will grow in the long run. Port investment plans in the Baltic Rim are based on this view.

The land route crossing the border of Belarus, Ukraine and Moldova is more dependent upon flows to and from Poland and intermodal transport with the rest of the EU. This border crossing is characterised by the gauge change between 1,435mm and 1,520mm. Different solutions are available to solve the interoperability problems. Technical solutions involve exchange of wagon bogies, reloading at the border or else extending the 1,520mm gauge network. Schemes to extend the 1,520mm gauge into the EU from former Comecon members that already use that gauage have been proposed in recent years.
Box 6.1 presents the Slovak and Polish cases.

Box 6.1 1,520mm networks in EU

The 1,520mm gauge network currently ends at the city of Kosice in Eastern Slovakia and in Katowice in Poland. PKP LHS is a company of the PKP Group responsible for freight transport on the "Broad-gauge Metallurgy" Line. The line runs for about 400 km from the Polish-Ukrainian border at Izow-Hrubieszów to Katowice. In 2008 the LHS line on average ran 6.4 trains daily, transporting about 8.3 million tonnes of cargo per annum, i.e. some 0.7 million tonnes of exports to Russia (mainly coal) and 7.6 million tonnes of imports from Russia (mainly ores).

The 1,520mm gauge ending at Kosice is related to U.S. Steel (formerly the VSŽ Steelworks) near Kosice. At the moment a plan is being developed to construct a line to 1,520mm gauge connecting Kosice with Bratislava and Vienna. In 2008, TransContainer, a subsidiary of Russian Railways, took out a long-term lease on a transhipment terminal along the railway line. It is believed by some stakeholders that this line could form an important container transport link with Russia, though at present the volume of containers is low (not more than 4,000 TEU).

Source: NEA

The relatively high growth on the EU-Balkan-Turkey axis reflects recovery from a very low traffic base since the end of conflict in this region.

Expected Development of the Rail Freight Market

Table 6.2 presents rail freight data according to the mode of transport for 2007 compiled from TRANS-TOOLS and Eurostat. The forecasts for 2020 represent the output of TRANS-TOOLS model runs in which European transport policy and investments in infrastructure have been considered.

TRANS-TOOLS forecasts an overall growth of 26 percent in freight demand between EU27 and non-EU countries, measured in tonnes, over the period 2007-2020. Within the total, modal performance is forecast to vary significantly, with rail traffic growth being roughly equal to the modal average, but with road freight increasing by a higher proportion and water transport growing more slowly.

This modelling assumes that the mode share will be impacted by more competitive rail services in certain market segments and by market opening which will lead to a greater efficiency and a 10 percent reduction in rail freight costs for 2020 (compared to 2005 levels). On the basis of this modelling work, rail is expected to retain its current market share; road will tend to increase its share and the water share will decline slightly. Major influences on these trends

are the changing nature of freight, as economic development continues, with a shift away from bulk commodities towards smaller, more valuable consignments and an increase in co-modality.

Based on transport volumes and modal trends, the most challenging prospects for growth in rail freight are in the Eastern European subsectors and particularly in the Baltic and Russian cases where the economic prospects and the difficult technical barriers pose significant hurdles to the development of the rail freight market. Therefore, several case studies are presented in this report, which highlight the nature of the problems facing rail freight in these areas. Resulting from these forecasts, the estimated modal shares for each submarket are shown in Table 6.3.

Table 6.2 Rail demand forecasts for 2020 in EU27 – non-EU

Submarkets in EU27-non-EU	Freight lifted in 2007, in 1,000 tonnes			Total freight lifted in 2007, in 1,000 tonnes	Freight lifted in 2020, in 1,000 tonnes			Total freight lifted in 2020, in 1,000 tonnes	Change in freight lifted 2007-2020, in %			
	Rail	Road	Other (Sea/ IWW)		Rail	Road	Other (Sea/ IWW)		Rail	Road	Other (Sea/IWW)	Total
EU27 - CH/NO	25,855	136,126	139,960	301,941	29,504	153,787	125,631	308,922	14%	13%	-10%	2%
EU27 - Eastern Europe (1,520mm gauge, Baltic Rim)	77,280	31,939	29,960	139,179	101,774	37,250	33,480	172,504	32%	17%	12%	24%
EU27 - Eastern Europe (1,520mm gauge, Ukraine, Belarus, Moldova)	33,874	46,498	45,531	125,902	40,559	70,567	61,859	172,985	20%	52%	36%	37%
EU27 - Eastern Europe (1,435mm gauge, Balkan and Turkey)	11,193	40,189	70,197	121,579	18,509	80,489	116,035	215,032	65%	100%	65%	77%
Total EU27 – non-EU	148,202	254,751	285,647	688,601	190,346	342,093	337,004	869,444	28%	34%	18%	26%

Source: iTREN using TRANS-TOOLS

Table 6.3 Mode share in 2007 and 2020 in EU27 – non-EU

Submarkets in EU27-non-EU	Mode share 2007, in %			Mode share 2020, in %		
	Rail	Road	Other (Sea/IWW)	Rail	Road	Other (Sea/IWW)
EU27 - CH/NO	9%	45%	46%	10%	50%	41%
EU27 - Eastern Europe (1,520mm gauge, Baltic Rim)	56%	23%	22%	59%	22%	19%
EU27 - Eastern Europe (1,520mm gauge, Ukraine, Belarus, Moldova)	27%	37%	36%	23%	41%	36%
EU27 - Eastern Europe (1,435mm gauge, Balkan and Turkey)	9%	33%	58%	9%	37%	54%
Total EU27 – non-EU	22%	37%	41%	22%	39%	39%

Source: iTREN using TRANS-TOOLS

It should be noted that in TRANS-TOOLS modelling, the specific market segment of rail traffic to and from Asia (notably China) has not been considered in detail. For example, the effect of the improvement of the land bridge with Asia cannot be modelled in TRANS-TOOLS[35]. This is also the case for the Trans-Siberian route and the route through China-Kazakhstan ("the second Eurasian land bridge", see Section 7.4). Table 6.4 highlights the transport to and from Kazakhstan and China (the tonnages presented below are also included in Table 6.1 above). Almost all EU rail transport to and from China and Kazakhstan takes place through the Baltic countries and Finland as there are fewer interoperability problems in relation with these countries (notably the track gauge is 1,520mm, see also Section 6.4). Table 6.1 indicates a total volume of about 85.6 million tonnes in 2005. Table 6.4 shows that 4.25 million tonnes in 2005 is related to China and Kazakhstan. Consequently, some 5 percent[36] of EU-Baltic Rim transport finds its origin in China and Kazakhstan.

Table 6.4 Rail freight transport from China and Kazakhstan in relation with the EU in 2005 and 2007 in 1,000 tonnes)

Country relation/year	2005	2007
Kazakhstan-EU	3,162	5,440
EU-Kazakhstan	770	1,019
China-EU	183	Na
EU-China	136	Na
Total	4,251	6,459

Source: NEA

There is considerable potential for rail freight traffic growth in these markets if the railway connections with Western Europe were to be enhanced. This requires an in-depth study of the corridors linking these countries to the EU.

6.3 Rail Reform in the Neighbouring Countries

Rail Reform Process

The rail reform process for freight in the neighbouring countries is described for the four subregions selected in this report (as set out in Section 6.1). Table 6.5 illustrates the status of the rail reform process and the main rail freight operators in the neighbouring countries[37]. In Annex 11 a detailed overview of the rail reform process per country is provided.

[35] The infrastructure network for modelling includes neighbouring countries.
[36] 4.25 out of 85.6 million tonnes
[37] Source data: press articles, reform programmes, working group presentations of SEETO, etc. The information sources vary; hardly any official data is available.

Table 6.5 Status of the reform process and overview of the main operators in neighbouring countries

Country	Reform Process	Main operators acting in the national rail freight market
Norway	The rail reform process is ongoing, considered as being on schedule.	The dominant operator CargoNet shares the market with a few other private companies
Switzerland	The rail reform process is ongoing, considered as being on schedule.	The national operator SBB shares the market together with several private companies (the share of private companies is up to 30 percent).
Russian Federation	The reform process is at its end stage. The aim of the reform is to reorganise JSC Russian Railroads and to introduce competition in freight and passenger transport.	RZD via its subsidiaries (First Cargo Company, Second Cargo Company, Transcontainer, etc) still largely dominates the freight market. Several private operators are functioning in particular niches.
Ukraine	Beginning of the reform process - the main objective of the reform is the restructuring of Ukrzaliznytsa into a vertical structure.	Ukrzaliznytsa is the only incumbent operator in the rail freight and passenger market.
Republic of Moldova	No concrete decisions about the reform process.	CFM is the only incumbent operator in the rail freight and passenger market.
Belarus	The possibility of the reform is being discussed.	Belarus Railroad is the only incumbent operator in the rail freight and passenger market.
Turkey	In the framework of Turkish EU accession, the concept of railway reform is already elaborated and is planned to be realised.	TCDD is the only incumbent operator in the rail freight and passenger market.
Serbia	The reform process has been initiated, particularly the separation of the infrastructure from operations. The opening of the railway market to third parties is envisaged in three steps.	Public enterprise "Railway of Serbia" is the only incumbent operator in the freight and passenger market.
Republic of Macedonia	The reform process is at an advanced stage. Separation of infrastructure from operations took place in 2007.	JSC Macedonian Railways Skopje is the only incumbent operator.
Albania	The reform process is in its initial stage and a planned New Railway Law in 2010 is expected to incorporate all the main EU Directives.	HSH Albanian Railways is the only incumbent operator.
Bosnia and Herzegovina	The reform process is initiated, but progress is slow, with no alignment with EU Directives yet.	In line with the political and territorial division of Bosnia and Herzegovina, two different operators are in charge of rail transport in the country: ZFBiH (Railways of the Federation of BiH) and ZRS (Railways of Republika Srpska).
Kosovo	The reform process is ongoing. Separation of infrastructure and operations now exists at the legislative level, but not yet in practice.	JSC Kosovo Railways is the only incumbent operator.

Country	Reform Process	Main operators acting in the national rail freight market
Montenegro	The reform process is in progress. Alignment with the EU Directives is almost complete.	Railways of Montenegro is the only incumbent operator.
Croatia	Reform process is in advanced stage. State Railways were separated into 4 companies. Croatia is ready to open the railways market to third parties.	HZ Cargo as part of HZ holding.

Source: NEA

With reference to Table 6.5, the country cases are described in more detail below.

Both *Norway and Switzerland*, even though not a part of the EU, are following very similar steps in the rail reform process as the majority of EU Member States. The main directives of the EU Railway packages are being accepted by both these countries.

The first years of rail reform have led to clear results in *Switzerland*. In the liberalised freight market the share of the competitors to the historic operator has grown constantly since the beginning of the freight market opening, reaching 8.8 percent in 2002 and 12 percent in 2003. The share of train path kilometres travelled by third parties was 6.5 percent in 2003. Rail freight operators from other European countries have had open access to Swiss infrastructure since 1 January 2007.

CargoNet is the main rail freight operator in *Norway*. From the beginning of its operation CargoNet has faced limited competition from new market entrants. Its business volumes in Norway and Sweden are growing steadily, mainly due to the operator's provision of intermodal services which have taken some of the market from road transport. On 1 January 2007 Norway completely opened up its rail freight market to competition. Although in recent years several new freight carriers have started rail operations in the fields of wagonload and system cargo, in terms of volume share these are still marginal and CargoNet preserves its dominant position. In addition to CargoNet, Malmtrafikk AG (a subsidiary of the Swedish LKAB group) and Ofotbanen AS provide rail freight operations in the Norwegian market.

The *Russian Federation* is currently in the final phase of its reform process. The continuation of reform is actively discussed within the Government. The results of the reform are already clearly visible. The general profitability of the railway sector has increased considerably and noticeable modernisation of railway infrastructure and rolling stock has taken place. Since 2002 private companies have entered the rail market in the Russian Federation. Currently around 80 private operators are providing transport services on the Russian rail network with total rolling stock of some 352,800 wagons (36.2 percent of the total Russian rolling stock). By 2007 their share in the total rail traffic of Russia had already reached 36.4 percent (compared to 20.8 percent in 2003). Moreover, in the segment of highly profitable goods, such as oil, fertilisers and ore, private companies now dominate the market. For example the share of private operators in transport of oil is around 60 percent, while in the less profitable

transport of coal it is only 5-10 percent. Besides freight traffic, private operators are slowly entering the market of passenger transport, e.g. between Moscow and St Petersburg. Even though the share of private operators in some rail market niches is rather high, the market remains highly controlled by OAO RZD.

In *Ukraine, Belarus and Republic of Moldova* the rail freight market has not yet been liberalised and state-owned operators are providing all rail freight and passenger transport within national borders. Ukraine is currently at the beginning of the reform process. The principles of restructuring Ukrzaliznytsa were set out and ratified at the end of 2009. Some discussions on the reorganisation of Belarus Railroad are also taking place but no concrete decision has been taken so far. At the time of this report, there are no active discussions about railway reform in Moldova.

Finally, all the *Western Balkan countries and Turkey* have already initiated the reform process, but the level of progress varies from country to country.

Rail Reform and the Role of COTIF

Besides the reform process it is also important to consider liability issues for freight transport, and COTIF is relevant here. The manner in which liability is arranged in case of loss or damage of the load represents a further barrier to effective market operation. COTIF/CUI stands for the Contract of Use of Infrastructure in international rail traffic. This is an international convention between 42 States in Europe, the Near East and North Africa which regulates the aims and method of operation of the Intergovernmental Organisation for International Carriage by Rail (OTIF) and (through seven appendices) the international carriage of persons, goods, dangerous goods, the use of vehicles and the use of infrastructure as well as the standardisation and approval of railway equipment.

Figure 6.2 provides an overview of the status of COTIF ratification in the EU Member States and in neighbouring countries.

Figure 6.2 Scope of application of COTIF

Scope of application of COTIF and its Appendices[1]

	COTIF	COTIF without CUI/APTU/ATMF	COTIF not ratified
EU	Poland	Denmark, Finland, France, Germany, Luxembourg, Netherlands, Spain, United Kingdom — EF: 2006-07-01 Belgium — EF: 2007-08-14 Hungary, Portugal, Slovenia — EF: 2008-01-01 Greece — EF: 2008-06-02 Austria, Bulgaria, Estonia[2], Latvia, Lithuania, Slovakia — EF: 2009-01-01 Czech Republic, Romania — EF: 2010-01-01	Ireland Italy Sweden Cyprus[3] Malta[3]
Not EU	Albania Algeria Bosnia and Herzegovina Croatia Iran Liechtenstein FYR of Macedonia Monaco Serbia Switzerland Syria Tunisia Turkey Ukraine[2]	Norway — EF: 2008-01-01	Morocco Iraq[4] Lebanon[4] Montenegro[5]

EF = entry into force of the declarations

[1] This table shows the legal situation at State's level. A large number of railway undertakings decided to apply at their level the CIV or the CIM Uniform Rules on a contractual basis (see the list of declarations published on www.cit-rail.org).
[2] Application on specific lines only (see OTIF's list of lines).
[3] Cyprus and Malta have no railway infrastructure.
[4] Iraq and Lebanon's OTIF membership is suspended at the moment.
[5] Not yet member of OTIF.

Of the third countries, Norway, Ukraine, Serbia, Republic of Macedonia, Albania, Bosnia and Herzegovina, Turkey and Croatia are members of OTIF. The Russian Federation has submitted an application and is expected to join OTIF in 2010 and COTIF and the CIM Uniform Rules[38] will enter into force for the Russian Federation at the same time.

[38] CIM Uniform Rules provide rules in respect of the contract for international carriage of goods by rail (Appendix B of COTIF). The CIV Uniform Rules (Appendix A of COTIF) provides rules concerning the contract for international carriage of passengers by rail. The remaining appendices RID (Appendix C), APTU and ATMF are regulations dealing respectively with the carriage of dangerous goods by rail, the validation of technical standards and specifications applicable to railway material intended to be used in international traffic, and the technical acceptance of railway material used in international traffic.

All of these countries have signed the COTIF declaration, but often with different remarks. For example, the Russian Federation application contains reservations with respect to Article 28 § 3 (Arbitration) and the first sentence of Article 42 § 1 of COTIF relating to Appendices A, C, D, E, F and G, as well as a reservation as to the scope of application in accordance with Article 1 § 6 of CIM.

It has also been agreed that, initially, Russia will allow the carriage of goods under the CIM Uniform Rules on a only small part of its railway infrastructure, i.e. from the landing platform at the Baltiysk ferry terminal to the railway station near the port of Baltiysk and from the landing platform at the Ust-Luga ferry terminal to the railway station near the port of Luzhskaya, subsequent to the Sassnitz-Baltiysk-Ust-Luga ferry connection. Depending on its experience following accession, Russia will then examine whether it would be useful to add further lines to this regime.

A similar situation applies to Ukraine, where Uniform Rules apply only to certain infrastructure sections for the time being[39]:

- Halmeu / Dyakovo–Batyovo–Chop / Cierna and Tisou and Chop / Zahony–112 km.
- Epereszke / Batyovo–Mukacheve – 34 km.
- Medyka / Mostiska II–Mostiska I – 13 km.
- Dorohusk / Yagodin–Kovel – 66 km.
- Dorneşti / Vadul–Siret – 7 km.

Belarus and the Republic of Moldova are not part of COTIF and do not apply COTIF on their territory. Norway applie COTIF with the exception of several appendices.

6.4 Rail Freight Operators in the Markets of Neighbouring Countries

In this section an overview is given of the operators that are presently active in the third countries. Within most of the third countries there is one incumbent operator for freight, an exception being Norway in which private rail freight operators are active. In Annex 12 a complete overview is given of national rail freight operators in third countries.

Table 6.6 presents the main operators that are located in the EU and which carry out rail freight traffic with third countries.

[39] Declarations and reservations, Convention concerning International Carriage by Rail of 9 May 1980 as amended by the 1999 Protocol, 30.11.2009, Intergovernmental organisation for international carriage by rail.

Table 6.6 International rail EU freight operators

EU27 – non-EU	Rail freight operator	Ownership	Remarks
Finland-Russia	ContainerTrans Scandinavia (CTS)	Joint venture between the Finnish national railways VR and JSC Transcontainer[40].	Weekly container shuttlebetween Kotka–Hamina-Kouvola-Moscow; shuttle train between Helsinki and St Petersburg being planned.
Norway-Sweden	Hector Rail AB	Norwegian rail freight operator under five year contract from paper mill Stora Enso.	Wood transport from loading points in Tynset, Koppang, Otta, Lillehammer, Sørli, Elverum and Kongsvinger to paper mills at Skoghall and Billerud in Sweden; around 4 trains/week.
Poland-Ukraine	PKP Linia Hutnicza Szerokotorowa (LHS)	Subsidiary of the Polish PKP.	1,520mm gauge trains to Ukraine; in the year 2006 2,000 containers were handled, in 2007 the number increased to 23,000 containers as well as 500,000 tonnes of bulk freight (coal, coke and iron ore) ; total of 8.5 million tonnes (17 percent more than in 2006).
Netherlands -Russia	PKP Cargo	Trains are run under contract from DB Schenker AG.	Intermodal train runs 5 times/week between Rotterdam-Frankfurt (Oder)-Katowice, and continues to Moscow twice per week.
Czech republic-Ukraine	SZDS Slovak (operator)	-	Car components for Skoda; runs from automotive component supplier in CZ to the Skoda factory in Solomonovo in UA; 5 train pairs/week.
Germany-China	Trans Eurasia Express	DB Schenker	Since January 2009 one train/week; route via Mongolia on the Trans-Siberian railway line, Belarus and Poland; duration about 15 days (half as long as by sea).
Austria-Croatia	RoLa (Rollende Landstrasse) Wels-Spacva (HR) operated by Ökombi	Subsidiary of Rail Cargo Austria	Since October 2008 six trains/week; RoLa carried 305,000 lorries in 2007 (10 percent more than in 2006).
Italy-Turkey	Trenitalia Global Logistics (TGL)	-	Refrigerated wagon from Villanova d'Asti to Halkali (TR) operated by TGL on behalf of Intercontainer Interfrigo AG.
Austria-China	Rail Cargo Austria	-	Container train takes 20 days to travel along the 11,000 km long route while serving a number of destinations. The duration is less than passage by sea. Freight can be regionalised by means of RFID.
CH–DE-I	SBB/CFF Cargo	Swiss owned	Steel products, chemical products, road-rail shuttle service
Germany-Turkey	Bosporus-Europe Express (BEEX) oper. by Europe. Intermodal	Joint venture between German Kombiverkehr and Slovenian Adria Kombi.	Links between München-Ljubljana-Halkali.

Source: NEA

[40] Subsidiary of the Russian RŽD.

Table 6.7 presents rail freight operators active in third countries, mostly national. A more detailed description of these operators is presented in Annex 12.

Table 6.7 Overview of freight operators active in 3rd countries

Operators active in 3rd countries
Cargo NET AS-Norway/Sweden
SBB Cargo-Switzerland
RZD-Russian Railways
UZ UkrZaliznyza – Ukrainian railway
BCh – Belarus railway
CFM -The Railway of Moldova
TCDD - Turkish State Railways
Zeleznice Srbije - Serbian Railways
MZ Makedoncki Zekeznici - Macedonian Railways
Željeznica Crne Gore - Railways of Montenegro
Kosovo Railways
HSH Albanian Railways
Hrvatske Zeljeznice - Croatian Railways
ZFBH - Railways of the Federation of Bosnia and Herzegovina
Kazakh Railways (Temir Zholy)
China Railways
OSJD Organisation for cooperation of railways[41]

Source: NEA

The most common approach is to set up joint ventures with other railway undertakings. For example, Russian Railways closely cooperates with Deutsche Bahn AG to improve the range and quality of passenger and cargo services between Russia and Germany. The two companies have not only formed joint ventures, but also liaise closely with each other and the railway companies and authorities of Poland, Lithuania and Belarus. Since 2003, a Memorandum of Understanding and Cooperation on passenger and cargo transport has come into force. The Memorandum makes provisions for the establishment of two joint ventures to increase passenger and cargo traffic and joint measures to increase the competitiveness of railway routes between the two countries and develop the corridor between Moscow and Berlin. Examples of joint ventures are presented in Boxes 6.2 and 6.3.

[41] Although OSJD not a operator, but an organisation of incumbent operators, it has been added for completeness.

Box 6.2 Joint venture between Russian Railways and Railion

Russian Railways and Railion, a subsidiary of Deutsche Bahn, set up a joint venture in 2005 to develop the freight market between East Asia (China and Russia) and Western Europe. The new service began operations in 2005. The joint venture provides an integrated transport service between Russia and Germany and is aimed at:

- Increasing the volume of rail traffic, guaranteeing the balance of transport flows along the transport route from Berlin to Moscow.
- Increasing the competitiveness of international rail traffic by optimising traffic regulation also by reducing the role of intermediaries, which has a tendency to increase tariffs.

The joint venture also offers services relating to convoy, customs and cargo clearance and in addition organises freight deliveries via the railway systems of Russia, Belarus, Poland and Germany. Russian Railways is working closely with the railway companies and authorities in Belarus and Poland to overcome the physical barriers at the borders between the countries and the different customs and border procedures, as well as the different transport legislation systems.

One of the biggest obstacles has been solved; rolling stock is now fitted with advanced equipment that allows it to adjust rapidly between the broad-gauge of 1,520mm used in Russia and the narrower gauge of 1,435mm in Europe while still moving. This replaces the earlier solution of switching bogies and has brought major savings in time and costs.

Source: NEA

Box 6.3 Joint venture between Finnish operator VR and the Russian Freight One Company

The Finnish operator VR and the Russian Freight One Company, PGK, have set up a joint freight services company. The company is called Freight One Scandinavia Oy and is registered in Finland. It provides single wagon and full train export, import and transit transport services between Finland and Russia for freight customers. The Freight One Company, PGK, is a 100 percent owned subsidiary of Russian Railways RZD. The company was established in 2007 and is Russia's largest freight railway operator. Between Januar and June 2009 PGK conveyed 100 million tonnes of freight. VR Group transported some 42 million tonnes of rail freight in 2008, and traffic between Finland and Russia accounted for about 40 percent of this. It is expected that in 2009 VR's volumes in relation with Russia will be significantly below 2008 figures, as a result of the decrease in imports of Russian round timber into Finland.

Source: NEA

6.5 Overview of Barriers

This section describes barriers in terms of interoperability (technically oriented) and other barriers, such as market entry, licensing and organisational barriers. Interoperability problems with neighbouring countries are rather similar to those described in Chapter 5 and those that EU Member States experience internally. However, the extent and significance of the interoperability problems differ substantially, as different legal and institutional frameworks are involved. The most relevant technical interoperability problems and other barriers for each group of the neighbouring countries are described below.

6.5.1 EU27 - Switzerland/Norway

Technical Interoperability Problems
The track gauge of Norway is 1,435mm, which is considered as standard for the European countries. Norway shares the same electrification system (16 2/3 Hz) as Sweden with which Norway has most railway connections. Recently it introduced the ERTMS system. The axle load limit in Norway is 22.5 tonnes.

Switzerland, although not a member of the EU, is one of the leading European countries in terms of ERTMS deployment. As far as the gauge is concerned, both standard gauge (3,652 km of 1,435mm gauge, of which 3,641 km are electrified) and narrow gauge (narrower than 1,435mm) exist in Switzerland.

Other Barriers
With respect to the legal framework, Norway and Switzerland both have a special status of relations with EU and the interoperability of the railways is regulated by different agreements. The access to the national rail infrastructure in Norway is open to railway undertakings with a license and safety certificates for freight traffic. The requirements of these licences and safety certificates are elaborated in line with EU directives. Access to the Swiss railways network is also open to any railway undertaking that can satisfy established technical and legal standards.

Because of the particular relationship status with the EU and steps undertaken in order to make the cooperation and interaction as smooth as possible, there are no particular major political, administrative, institutional or other barriers regarding railway cooperation between these two countries and the EU.

6.5.2 EU27 - Eastern Europe (Baltic Rim)

Technical Interoperability Problems
For historical reasons and technical compatibility of track gauge, the rail freight market in the Baltic States mainly relies on trade with Russia. Increasingly this includes transport flows from Central Asia, through Kazakhstan, China and the Trans-Siberian railroad. On the one hand, the fact that the rail network characteristics are the same as the Russian ones is a benefit to the Baltic States by facilitating transit flows from the Far East to the Baltic Sea and further to Europe. On the other hand, and for the same reason, the Baltic States are not fully integrated into the European railway network. It should be

mentioned that ERTMS is not the highest priority for the Baltic countries in their relation with rail traffic development with Russia. Recent studies relating to the Rail Baltica corridor have shown that the most financially viable option for further development of the railway network in the Baltic Rim is to improve and modernise the existing 1,520mm gauge system. Other options are to establish additional reloading stations or logistics centres or to introduce a new independent rail system with 1,435mm gauge, which will be isolated from existing networks but which would be compatible with the system in the rest of Europe.

The above-mentioned gauge difference issue can be considered an interoperability problem affecting the process of integration of the Baltic rail system into the European railway network. At the same time, it represents an opportunity to develop business with neighbouring countries (Russian Federation) with further potential for the development of a more globally-oriented transport corridor between China, Kazakhstan and the Baltic Sea.

Other Barriers

From the regulatory point of view, there are separate legal systems regulating the international carriage of passengers and freight by rail in the Baltic States: (i) the Uniform Rules concerning the International carriage of passengers and freight by rail (as part of the COTIF convention) and (ii) EU regulations and Agreements signed within the framework of the Organisation for Cooperation between railways (OSJD). These systems establish the relationships between different parties with respect to the carriage of passengers and freight, but they differ in the form and content of the individual provisions of transport law.

Related to the previously elaborated railway gauge difference issue, the performance of Baltic railways to some extent depends on the cooperation principles established with its close neighbours and general macro-economic and political developments between these countries.

In Russia the railway infrastructure is not yet open for access of international railway companies. The only way to operate in the Russian market is to establish Joint Ventures (as described in the case studies of joint ventures between JSC RZD and DB and JSC RZD and the Finnish operator VR).

6.5.3 EU27 - Eastern Europe (Ukraine, Moldova, Belarus)

Technical Interoperability Problems

The difference between the rail gauges is the main interoperability problem between the EU and the Ukrainian, Belarusian and Moldovan railroads. All these countries have a gauge of 1,520mm which requires a gauge change at borders with EU neighbours. This is time consuming and slows down the freight and passenger transport flow. Several options to deal with this situation exist, i.e. installation of automatic switch systems on the borders, construction of new rail sections with 1,435mm gauge within these countries (especially relevant for new railway lines as part of TEN-T corridors) or to support 1,520mm gauge and, thus, improve the position of these countries as transit countries between East and West.

Other Barriers

The level of railway sector deregulation differs significantly between the EU and these countries. Whilst the rail freight market has been liberalised for some time in the EU Member States, the railways in Ukraine, Moldova and Belarus still preserve monopolies in management and operation. In these countries the reform process is concerned only with the restructuring of the state company and currently does not include the opening of railway infrastructure to third party access. Therefore, the main barriers with respect to these countries are mostly related to the border crossing procedures, i.e. customs clearance, administrative arrangements in different languages, differences in legislation and in general in the documentation required.

6.5.4 EU27 - Eastern Europe (Balkans and Turkey)

Technical Interoperability Problems

The main problem of the Western Balkans with regard to interoperability of the railways is that the rail network is very fragmented and the condition of the railway infrastructure in the different countries of the region varies greatly. Hence the performance of any individual railway can depend on the condition of neighbouring railways.

The majority of the Western Balkan railways have a very short haul length. The problem is particularly severe in Albania, Kosovo and Montenegro, where an average haul is less than 100 km. The Western Balkans railways do however have a 1,435mm gauge network that facilitates their integration into the European railway network.

ERTMS has been implemented on some lines in Croatia and Turkey.

Other Barriers

As for compatibility from a legal point of view, the Western Balkan railways are all in the process of adapting their railway legislation in order to meet requirements of the EU Acquis Communautaire. The railway reform process, as well as the adaptation of the legislation, differs significantly from country to country. Some countries, for example Croatia, are considered as ready to open their railway network for third parties. However, as neighbouring Balkan countries are not at such an advanced stage of reform, this opening is limited by bilateral agreements.

In order to reinforce the integration of the Western Balkan countries, the European Commission is negotiating directives for a "Transport Community Treaty with the Western Balkans". The purpose is to work towards an integrated market for road, rail, inland waterways and maritime transport in the Western Balkan region. Exploratory talks on cooperation in the field of transport, which were launched in early 2007, have been successfully concluded.

In the meantime, border crossings and, associated to this, completion of administrative and technical railway formalities required by state authorities, are the main organisational barriers. In some countries specific barriers exist, such as restriction in working hours, insufficient track capacity, lack of traction units and lack of appropriate skilled personnel.

6.6 Conclusions

Development of Rail Freight Demand 2001–2007

For freight transport this study has focused on the market between the EU and third countries. Geographically four submarkets are defined, i.e. (i) EU27-Switzerland and Norway; (ii) EU27-Baltic Rim; (iii) EU27-Ukraine, Belarus, Moldova and (iv) EU27-Balkans and Turkey. In relation to Eastern Europe, rail freight transport is much more important than passenger transport; this is especially the case in the Baltic Rim. The incumbent operators in this region regard freight traffic as the main business and passenger services as a more marginal activity.

Amongst key performance indicators for the period between 2001 and 2007, the following are highlighted:

- For the four above-mentioned submarkets, rail freight demand has grown by 8 percent, i.e. from 137.8 million tonnes in 2001 to 148.2 million tonnes in 2007.
- The biggest submarket, the EU27-Baltic Rim, has declined in size by 7 percent; all other submarkets have recorded growth.

Barriers to Development

On the routes between the EU and Eastern Europe, major problems remain in terms of quality of infrastructure, delays at borders (for operational as well as customs reasons) and lack of interoperability. The main impediments differ between the submarkets. Case studies show that towards Southern Europe (Balkans and towards Asia) the quality of infrastructure, delays at borders and lack of interoperability are important. It is vital to address these barriers if rail is to achieve success in longer-distance intermodal transits where the value of cargoes can be high.

Track gauge differences between countries are a feature of North-East Europe and the Baltic. This will continue to be a long-term problem, but the trend towards intermodality will help rail to succeed, as long as the quick, efficient and cost-effective transfer of unit loads and wagon bogies can be achieved, and as long as rail can interface successfully with road and water modes where appropriate to provide seamless long-distance journeys involving different modes. Similar to gauge changes in Switzerland, the borders with a change to a 1,520mm gauge system in Ukraine and Belarus need to be developed as natural exchange points for rolling stock.

Future Orientation

International rail freight to and from Eastern Europe and beyond is expected to maintain at least its current existing market share, and growth will resume as soon as the recession is left behind. Forecasts made by the TRANS-TOOLS model show large growth (20-40 percent) up to 2020 on the routes to and from Eastern Europe. Whilst bulk traffic is expected to remain important for the foreseeable future, future growth in rail freight will be driven by a diversification of traffic into higher value goods and smaller consignments, involving intermodality.

The transport volume with China is modest at present and is going almost entirely to the Baltic and Finnish ports. The development of rail traffic between China and Western Europe suffers from the gauge differences between China (1,435mm gauge), Kazakhstan/Russia/Baltics/Finland, (1,520mm gauge) and Western Europe (1,435mm gauge). The volumes from Kazakhstan are bigger; this traffic can be routed without gauge changes to Baltic and Finnish ports.

Freight transport is a commercial activity and private operators, as well as joint ventures of private and public operators, will be the main actors in the future. Although the speed of market opening and rail reforms vary between countries in Eastern Europe, the trend is towards stronger private involvement. This will benefit the position of railways in the long run.

The success of some initiatives that have already been implemented shows that good progress can be achieved, but many problems remain and international cooperation will be the key to success. Some impetus to such initiatives will be provided as more countries enter the European Union.

There is a trend toward establishing joint ventures and this can be seen in the case of rail freight. One example is the recent case of PGK, the subsidiary for rail freight transport of the Russian RZD, and the Finnish railway company VR.

Based on empirical evidence, assessing the situation of private and incumbent operators in the medium term, the incumbent operator seems to be in a winning position. Some private RUs have become takeover targets, as for example in the case of the takeover of Veolia Cargo by SNCF.

A range of initiatives and experiments are being developed for rail freight services (usually intermodal services) over very long distances such as China - EU and Pakistan - EU. In the longer term, these can be expected to offer a successful intermediate solution between maritime and air freight and will boost EU/non-EU rail freight. Their success, however, depends on removing many barriers, not only at EU borders and in neighbouring countries but in some cases far beyond these horizons.

7 Regional Rail Freight Corridors involving Third Countries

7.1 Background

This section presents an analysis of four different corridors relevant for freight operations involving third countries:

1. Russian rail freight via Baltic ports.
2. The rail link between Europe and Asia via the Balkans and Turkey.
3. Freight transit through Serbia: the link from Europe to Asia.
4. A new rail freight connection between China, Kazakhstan and Europe.

These corridors are presented in this chapter as extended case studies. The material included solely focuses on rail freight operations and covers multimodal aspects that are related to rail transport. The freight transport flows that have been discussed in the previous chapter are linked with this chapter's corridor case studies.

It should be pointed out that of the third countries, Norway and Switzerland are integrated fully with the EU in terms of rail freight harmonisation and that they can be considered to be incorporated into the liberalised EU rail freight market. This means that in this study the analysis will be focused on (i) the Baltic Rim; (ii) the border sections with Belarus, Russia, Ukraine and Moldova and (iii) the border sections with the Balkans and Turkey.

Switzerland and Norway participate in bilateral and multilateral agreements for setting up freight corridors within Europe. With the market opening in the railway sector, corridor initiatives have grown in Europe. Rail corridors in Europe have been developed in many different ways. Some of them are developed at a general European (network) scale, others relate to a particular corridor or zone. Furthermore, objectives may differ; some are focused on infrastructure, others focus on developing business models or setting up rail freight services. Due to the discrepancies in objectives, scale and stakeholders involved, different corridors have been selected in order to illustrate different practices.

Approach to Developing the Rail Freight Corridor between Rotterdam and Genoa

The development of the rail freight corridor between Rotterdam and Genoa was formally started in 2003 with the signing of a Memorandum of Understanding (MoU) by the ministries of the corridor countries. Since then, many agreements have been reached and actions have been taken by an increasing number of public and private stakeholders. So far, work carried out on the corridor has proven to be successful and the governance approach of this corridor is being recommended to other corridor initiatives in the rail freight domain.

The governance approach on the Rotterdam–Genoa corridor encompasses three principal elements: (i) corridor; (ii) market and (iii) cooperation. The Rotterdam–Genoa corridor is on the North-South axis involving three EU

countries, namely the Netherlands, Germany, Italy and one non-EU country, Switzerland.

With respect to cooperation, in the interest of improving the performance of rail freight services on the Rotterdam-Genoa corridor, there has been intensive and diverse cooperation along the corridor, covering a broad range of corridor condition issues. This cooperation is characterised by three distinctive features. Firstly, cooperation takes place between a large group of stakeholders, comprising policy makers at the European and national levels, trans-national agencies, as well as market players.

Secondly, the cooperation set-ups are confined to a corridor level, through which cooperation is corridor-based and goal-oriented and it is not subject to any national territorial or jurisdictional boundary. On the Rotterdam–Genoa corridor, the management committee, the corridor group and other different working groups were established on the basis of the location of problems and the functions of the stakeholders. Depending on the nature of a particular problem, cooperation may take place not only within a particular group but also between groups.

Thirdly, cooperation is often established in the form of a MoU or a Letter of Intent (LoI), which is a type of multilateral agreement between two or more partners. Though often entailing no legal commitment, the MoUs and LoIs show a convergence of interests and an intended common line of action. On the basis of a MoU or LoI, sub-cooperation is established by setting up various working groups for tackling specific problems.

With the corridor approach, Switzerland is integrated in the EU rail freight network and barriers for border crossing have been reduced substantially.

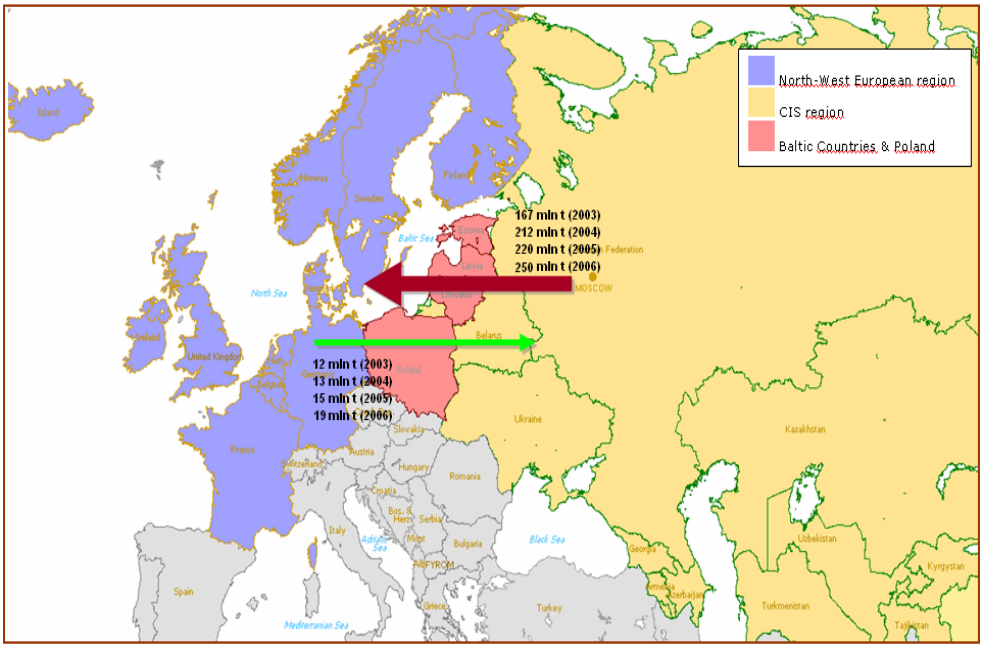
In the next sections the four regional corridor case studies are presented.

7.2 Russian Rail Freight via Baltic Ports

Poland and the three Baltic States – Estonia, Latvia and Lithuania – traditionally offer the most direct and the shortest transit routes for trade between Russia and the West. Future economic growth in Russia offers the prospect of large increases in trade, including the use of rail, on this axis. This case study analyses the role of Russia in relation to transit flows through the Baltic ports. In 2006, over 80 percent of trade volume to and from CIS consisted of trade with Germany, Benelux countries and Scandinavian countries, representing 28 percent, 26 percent and 21 percent of CIS exports and 38 percent, 28 percent and 24 percent of CIS imports respectively. Russian exports of petroleum products and mineral fuels are responsible for a large part of the CIS exports to North-West Europe. Only 6 percent of the volumes exported to North-West Europe originates in the central region of Asia. Whilst the amount of freight doubled in both directions between the CIS countries and the countries in North-West Europe between 2000 and 2006, around 93 percent of this freight moved westwards.

Figure 7.1 presents volumes of goods traded between the North-West European Region (blue) and CIS countries (brown) across the Eastern Baltic area (pink) in the period 2003-2006.

Figure 7.1 Volumes of goods traded between the North-West European Region and CIS countries across the Eastern Baltic area (2003-2006)

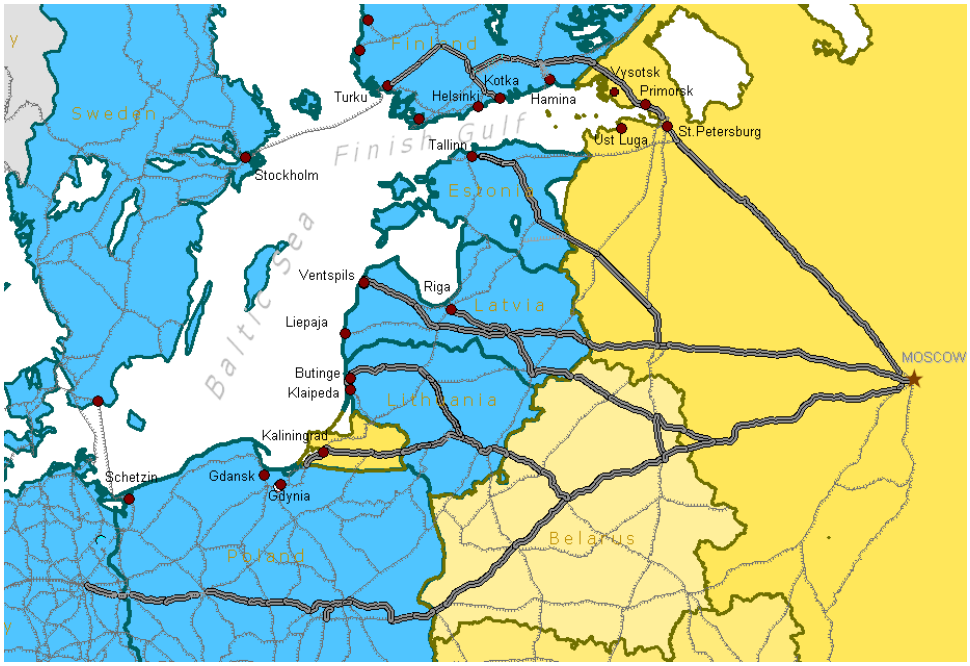


Source: NEA

Of the major ports in the Eastern Baltic, St Petersburg has shown the largest absolute container turnover between 2003 and 2007. However, due to the poor infrastructure and low capacity of Russia's own ports, ports in the Baltic States have traditionally been used for transhipments. Railway routes connecting ports with the hinterland play a major role for such transit flows (in addition to pipelines).

Figure 7.2 shows the trunk railway routes carrying high transit volumes across the Eastern Baltic Rim bound for CIS countries in the hinterland. Both in Finland and in the Baltic States, these routes represent primarily the flows on an East-West axis.

Figure 7.2 Main rail transit routes in the Eastern Baltic region

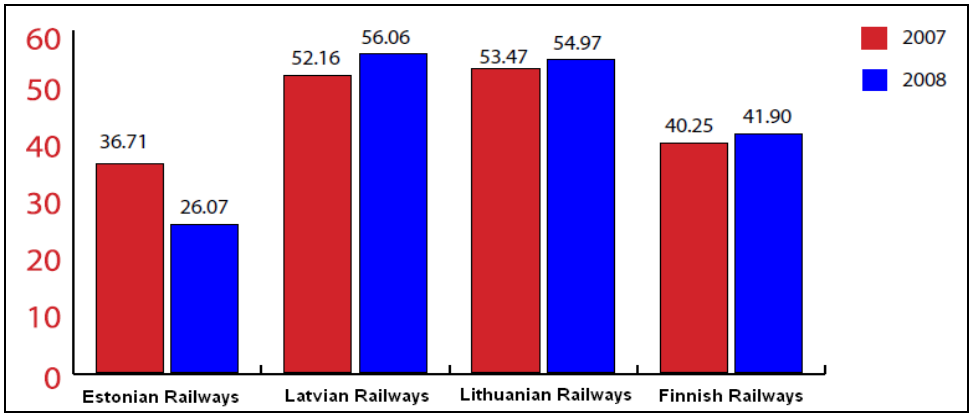


Source: NEA

For Finland and the three Baltic States, railway routes between their seaports and the CIS share the same 1,520mm gauge. Hence no transfer of cargoes between wagons or change of bogies is required throughout the rail leg of such journeys. In contrast, the railway network in Poland, which is used extensively for transit traffic on both North-South and East-West axes, conforms to 1,435mm gauge. Therefore, changing of bogies or transhipments must take place at the borders.

The freight volumes hauled by rail in the region by country for most recent years is shown in Figure 7.3.

Figure 7.3 Volume of goods handled in the Eastern Baltic region on national rail networks in 2007 and 2008 (million tonnes)

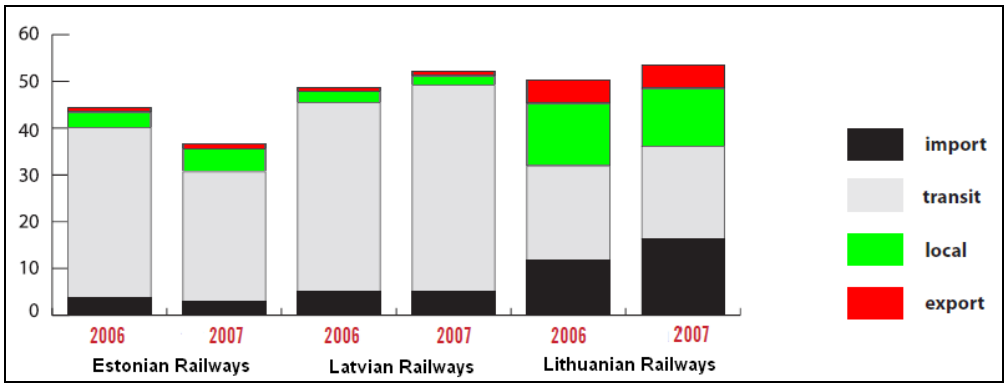


Source: Eesti Raudtee, Latvijas Dzelzcels, Lietuvos Gelezinkeliai,VR Cargo

Notably the Estonian Railways have lately experienced a major decrease in freight volumes. Due to strong reliance upon the transit of CIS related bulk, as well as harsh competition from the parallel routes, the railway freight volumes on the Estonian rail network dropped by more than 10 million tonnes over the period 2007-2008.

Figure 7.4 shows the volumes and structure of rail freight transport in the three Baltic States, in which transportation of international freight plays a crucial role. The share of transit flows differs strongly per country. In case of Latvia, approximately 86 percent is transit. In Estonia the transit share fluctuates around 75 percent whilst on the Lithuanian rail network the transit traffic share in 2008 is only 33 percent. In 2008 about 11.2 million tonnes crossed the Finnish-Russian border by rail representing a 26 percent share of the total volumes handled on the Finnish rail network.

Figure 7.4 Rail freight volumes by operation type handled on the rail networks of the Baltic States in 2006 and 2007 (million tonnes)



Source: Eesti Raudtee, Latvijas Dzelzcels, Lietuvos Gelezinkeliai

A large share of Russia's export of bulk goods has traditionally used transit routes through the Baltic States, Poland and Finland. In the period after the EU accession of Estonia, Latvia, Lithuania and Poland, Russia is reconsidering its export position. Russia actively exports via its own ports on the Baltic Sea. To this end Russia is investing in transport infrastructure and cargo handling facilities to provide the capacity required. A new "Development of the Russian Transport System 2010–2015" programme has recently been adopted, which foresees for example the following priority investments:

- Construction of 4,700 km of new railway, providing 3,200 km of additional track capacity on existing main and 2,700 km of electrification.
- The provision of good access to the ports in the Baltic Sea and further development of rail capacity at St Petersburg (as well as the creation of a high-speed passenger link between St Petersburg and Helsinki).

Further, JSC RZD (Russian Railways) plans to invest up to $57 billion in the improvement of rail access to Russian ports of which $15 billion will be dedicated to the development of access to those ports in North–West Russia.

However, future accession of Russia to WTO can be expected to reverse this discriminatory approach regarding rail transit routes in the coming years. Hence

whilst Russia's own ports will expand and become more efficient, the ports of Finland and the Baltic States will retain a significant role for transit freight to and from Russia.

As well as trying to maintain and develop freight flows to and from Russia, the Baltic States have made serious efforts to attract transit cargoes bound for other CIS countries. Different countries have used different approaches. For instance, Estonia and Latvia are encouraging such countries to invest in their ports. Lithuania has opted for a favourable and flexible tariff policy to attract CIS cargo to its ports.

The transit trade sector of the Baltic countries has also started to adopt a more global perspective, aiming to route Chinese traffic to Europe through Baltic ports. Given the potential size of Chinese trade, the longer-term prospects here are better than those with the Baltic States' more traditional trading partners. Moreover, Chinese trade offers the prospect of large flows of manufactured goods, reducing dependency on low value bulks. The growing volumes of container handling in Asia in recent years seem to support this optimism. Container trainload trials have already been conducted between China and Latvia. Estonia is also exploring options for rail and sea links to tap into this trade. Other long-distance routes to the Baltic are also under development. Lithuania is attempting to develop services on a rail route between Klaipeda and the Port of Iljitchevsk in the Ukraine via Belarus (currently served by the Viking Ro-Ro/container train), allowing access to the Black Sea and Turkey. Poland has also launched a train service between Gdansk and the Black Sea coast of the Ukraine.

As reported by Eesti Raudtee (Estonian Railways) despite the sudden sharp decline in overall operations, containerised freight is the only market that has continued to increase in recent years. A 30 percent growth of containers hauled by rail in 2008 compared to year 2007 has been realised on the Estonian rail network. In particular, a major growth of 50 percent was recorded in the volume of containers going to Russia (West-East direction). A significant part of the containerised freight is carried on the container train between Tallinn and Moscow. A total of 65 full trains departed in 2008. The next major destinations were countries in Central Asia, such as Kazakhstan, Uzbekistan and Kyrgyzstan. In addition, Eesti Raudtee is planning to launch the Zubr container train in cooperation with Latvian and Belarus railways. The train will operate between Estonia and Belarus with a possibility of continuing on to the Black Sea region and Central Europe.

7.3 The Link Between Europe and Asia via the Balkans and Turkey

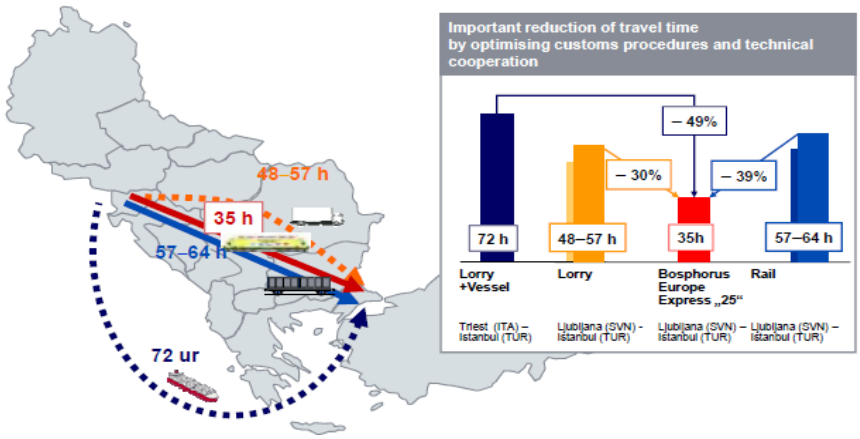
This corridor case study focuses on the underdeveloped freight link between Turkey, Greece and Bulgaria. The link between Europe and Asia is implemented through the Pan-European Corridors, specifically Corridor IV (Greece/Turkey-Bulgaria-Romania-Hungary-Austria-Germany) and Corridor X (Turkey-Bulgaria-Serbia-Croatia-Slovenia-Austria-Germany) linking the countries in Central Europe with Turkey, the Near East and Asia.

International container blocktrains are operated between Turkey and the Netherlands, Germany, Austria, Hungary in the West and Turkmenistan, Kazakhstan, Iran, Iraq and Syria in the East.

The "Bosporus Europe Express" international freight container train, which is now operating on the route between Ljubljana and the Halkali Container Terminal in Istanbul, provides a good illustration of the challenges and complexities of such an operation. The performance of this train depends on the activities of relevant railway undertakings as well as infrastructure managers of the Slovenian, Croatian, Serbian, Bulgarian and Turkish Railways.

According to its present schedule, the train covers a distance of 1,577 km in approximately 60 hours. On its way it crosses five countries; it changes its locomotives eight times due to different power supply systems (3 kV DC, 25 kV/50 Hz) and the lack of electrification on parts of the route and closed national railway systems (only two states are EU members) and it must stop at national borders for the purpose of completing railway administrative and technical formalities, as well as for the purpose of carrying out the formalities required by state authorities. The speed of the train varies according to the different conditions of the infrastructure on the route. Figure 7.5 presents travel times of different means of transport.

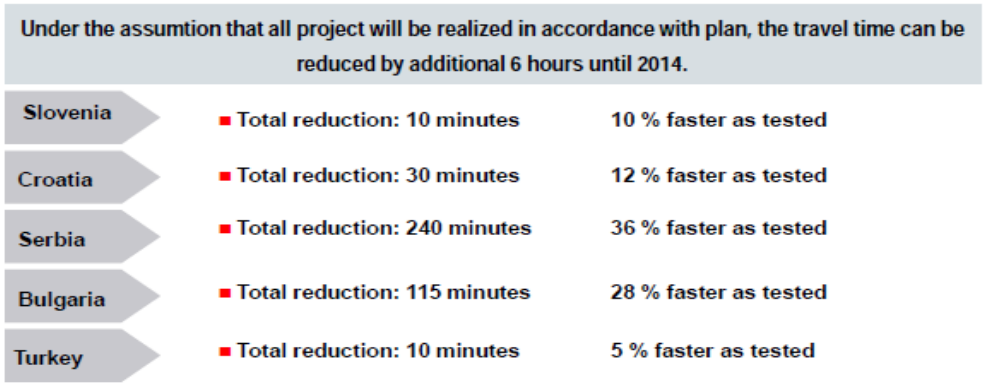
Figure 7.5 Travel time of different means of transport



Source: Business Advisory Council for Southeast Europe

The promotional run of the train, which had been given priority along the entire route (as a non-regular train) needed to demonstrate that joint cooperation between the various relevant entities can lead to success. It was also intended to identify work that needed to be done, calling for common solutions, in particular to realise the goals of agreements such as the European Agreement on Main International Railway Lines (AGC) and European Agreement on Important International Combined Transport Lines and Related Installations (AGTC), according to which train stops should be 30 minutes at most. This entails the development of joint border stations, at which border formalities are performed simultaneously by the railway and state authorities, in particular, acceptance of trains on trust, development of an electronic consignment note and electronic data transfer (announcement of consignments) between the Railways and Customs authorities (at present this is carried out by means of a fax or e-mail) and the introduction of locomotive interoperability. Through such developments and through the realisation of restructuring projects envisaged along the route, travel time savings of more than six hours may be expected in the longer term. Figure 7.6 presents long-term time savings given a realisation of AGC and AGTC.

Figure 7.6 Long-term time savings given a realisation of AGC and AGTC



Source: Business Advisory Council for Southeast Europe

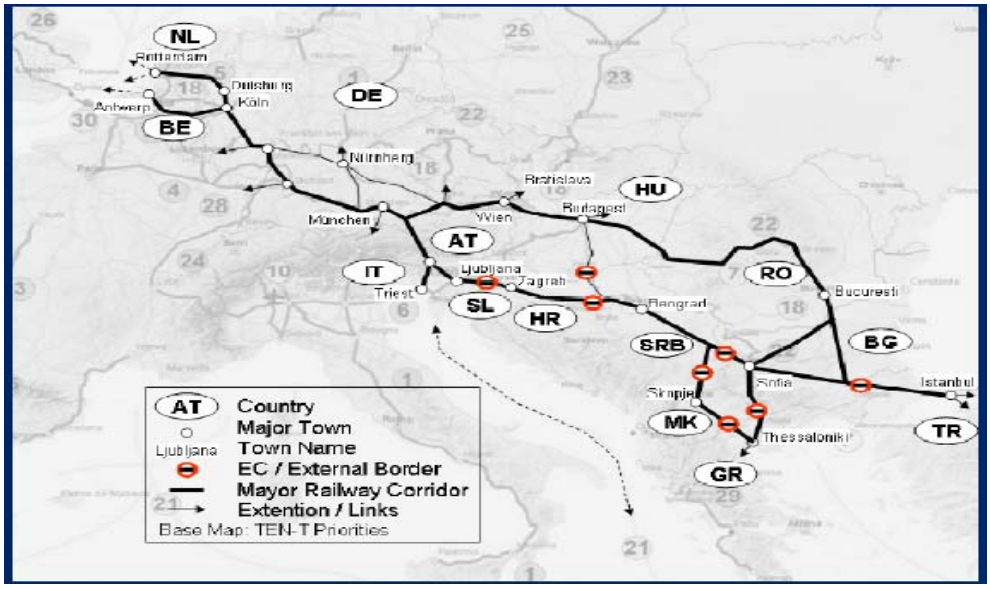
For the further development of this freight link between Europe and Asia it is necessary to:

1. Improve the cooperation between different rail operators.
2. Harmonise the different traffic regulations for international trains.
3. Stimulate interoperability.
4. Improve the technical parameters of lines of international importance.
5. Improvements in border crossing: parallel execution of customs and rail procedures and common border crossing points/stations to perform all border crossing activities.

In Figure 7.7 it can be observed that there are two routes towards Turkey and Greece. One of the routes via Hungary, Romania and Bulgaria is entirely within the EU. The other route runs via Slovenia, Croatia and Serbia. The CREAM project has focused on the route through the Balkans whilst the RETRACK project has focused on the EU route. These projects are both Framework 6 demonstration projects financed by the European Commission and have a

specific aim to reduce barriers to operation on these two corridors. It should be mentioned that the RETRACK project focuses on the Port of Constanta where trade flows from third countries can be handled. At the moment in Constanta rail ferry connections exist with Turkey (Derince). In some cases, the Romanian railway market, although one of the most liberalised, proves difficult for rail freight operations. One of the forwarders chooses at present to stop railway operations at the Hungarian-Romanian border and to transfer into Romania by truck. One of the reasons is the reduced reliability of rail transport in Romania, partly caused by a large programme for rail infrastructure maintenance that is currently being carried out. For example the Bucharest-Constanta section (200 kilometres) can take up to eight hours. Forwarders and railway undertakings (both private and incumbent) are active in developing freight on these routes[42]. One issue in the establishment of viable rail services is the imbalance in freight flows between directions. For the exploitation of a block train 70 percent capacity utilisation (paid payload) is needed on average in both directions. Thus for most Western European parties it is essential to find a backload from Turkey to Europe. With the growing economy of Turkey this situation will improve. The effect of the current crisis has been that, although contracts exist between forwarders and rail operators, the freight volume required is not on offer. The crisis has hit the rail market in Central and Eastern Europe especially hard. While in Western Europe volumes have decreased by a maximum of 20 percent, in Eastern Europe volumes have dropped by 30 percent.

Figure 7.7 Two corridors from Europe towards Turkey and Greece



Source: CREAM-project

As the focus of the study is on third countries, in the next section freight transit through Serbia will be presented.

[42] See for example the CREAM and the RETRACK project websites (see references Annex 1).

7.4 Rail Freight Transit Through Serbia

The pan-European corridor stretching from the Netherlands via Germany, Austria and South-East European countries to Turkey promises some of the highest growth potential in European freight traffic. Being located on the main axis of the TEN Corridor X, Serbia represents an important transit country along this route. TEN Corridor X includes a main axis running from Austria to Slovenia, Croatia, Serbia, Macedonia and Greece, and further links between Austria and Slovenia (branch A), Hungary–Serbia (Branch B) Serbia-Bulgaria (Branch C) and Macedonia–Greece (branch D). However, large parts of Corridor X are still under construction.

Besides Corridor X and its branches, further relevant lines are Belgrade–Vrbnica (-Bar), (Budapest-) Subotica-Niš-Preševo (-Skopje-Athens), Subotica-Vrbnica (Vinkovci- Sarajevo) and Belgrade-Vršac (-Timisoara-Bucharest). Table 7.1 presents an overview of the railway network in Serbia.

Table 7.1 Serbian railway network, in 2006

Rail network lines of Public Enterprise "Serbian Railways"	Network length (in km)
Total network length	3,808.70
Single track lines	3,533.20
Double track lines	275.50
Narrow gauge lines	21.70
Non-electrified lines	2,612.69
Electrified lines	1,196.05

Source: NEA based on Serbian Railways

In 2005 in Serbia, 67 percent of the land freight transport (tonne-km) was carried out by rail, 13 percent by road and 20 percent by pipeline (Serbian Statistical Office). Table 7.2 gives an overview of rail freight transport in Serbia. The table shows that in 2006 32 percent of the rail tonnes lifted and 54 percent of rail tonnes-km were transit traffic. Transit traffic is defined here as rail trips with origin and destination outside Serbia.

Table 7.2 Overview goods transport by rail in Serbia, 2006

	Total	Domestic	International			
			Total	Incoming	Outgoing	Transit
Goods transported, 1,000 tonnes	14,142	3,787	10,355	2,425	3,395	4,535
Tonne-kms (million) on Serbian territory only	4,232	633	3,599	636	660	2,303

Source: NEA based on Serbian Statistical Office

Table 7.3 identifies the main commodity groups transported by rail.

Table 7.3 Serbian rail freight transits by commodity groups in 2006, goods lifted in 1,000 tonnes and freight moved in million tonne-km

NSTR Commodity groups	Goods transported 2006, in 1,000 tonnes			Freight moved 2006, in million tonne-km		
	Total	Direct transit	Percentage share of commodity of total transits goods lifted	Total	Direct transit	Percentage share of commodity of total transits tonne-km
Agricultural products	386	125	3%	144	72	3%
Foodstuffs	491	205	5%	191	109	5%
Solid mineral fuel	2,434	142	3%	539	71	3%
Crude oil	924	106	2%	208	50	2%
Ores, metal waste	1,401	409	9%	351	160	7%
Metal products	1,957	747	16%	650	352	15%
Building materials	1,353	166	4%	256	74	3%
Fertilisers	153	10	0%	20	5	0%
Chemicals	749	378	8%	260	177	8%
Machinery, container	4,293	2,246	50%	1,614	1,233	54%
TOTAL	14,141	4,534	100%	4,232	2,303	100%

Source: NEA based on Serbian Statistical Office

The majority of the freight moved in direct transit is machinery (54 percent), followed by metal products (15 percent). Similarly, regarding tonnes lifted, the predominant commodity group is also machinery (50 percent) and metal products (16 percent). Table 7.4 lists the most relevant countries of origin and destination for Serbia's rail freight transits.

Table 7.4 Main countries of O-D for rail transits through Serbia, in 2007

Main origins of transits through Serbia		Main destinations of transits through Serbia		Main country relations	
Country	Tonnes	Country	Tonnes	Relation	Tonnes
Hungary	1,264,984	Greece	1,090,040	Hungary-Greece	573,845
Bulgaria	605,200	Turkey	862,024	Hungary-Turkey	449,911
Austria	430,332	Bulgaria	852,941	Bulgaria-FYRoM	235,911
Turkey	340,674	Hungary	618,990	Turkey-Hungary	218,845

Source: NEA based on Serbian Statistical Office

In 2008 transit traffic dropped as a result of Romania and Bulgaria joining the EU and thus the border time on competing transit routes dropped; as a consequence Serbia lost half of its transit traffic. Additionally, a number of challenges emerged, especially at the border crossings. The main problems at border stations along Corridor X in Serbia can be summarised as follows:

1. Shortage of traction units (locomotives).
2. Lack of border cooperation between authorities of neighbouring countries (differences in required documentation).
3. Duration of customs and inspection procedures at railway border stations.
4. Restriction in working hours (24 hours coverage for customs inspection not available at all border stations).

Table 7.5 gives a more detailed overview per border crossing.

Table 7.5 Main problems at Serbian rail border crossings, 2007

Country	Station	Main Problems	Planned Measures	Need for further improvement – Proposed (by national delegations) measures
Serbia (M)	Sid	Insufficient (and bad condition of) track capacity. Frequent lack of traction units (locomotives). Layover due to freight operations (weighing, etc.). Layover of trains due to certain customs regulations.	Station development as part of railway line modernisation; Beograd-Sid-Croatian border.	Permanent location of inspection authorities in Sid station, Track capacity overhauling, Empowering workers and work places with contemporary assets for work and training of it.
Serbia (M)	Presevo (passengers) and Ristovac (freight)	Inspection services are at the road border station, Unsatisfactory passenger service level.	Stations development as part of Beograd-Nis–Macedonia border railway line modernisation.	Increase the level of service offered, proportional to traffic needs.
Serbia (B)	Subotica	Insufficient track capacities and their length.	Station development as part of Beograd-Novi Sad - Subotica-Hungarian border railway line modernisation.	-
Serbia (C)	Dimitrovgrad	Frequent lack of traction units (locomotives).	Track reconstruction, signal-security and telecommunication reconstruction is finished with realisation Project of Railway Rehabilitation 1. There are ongoing works on reconstruction of station building and accompanying objects.	Procurement of locomotives.
Bulgaria (C)	Dragoman / Dimitrovgrad	Lack of equipped premises. Need for improvement of communication among the relevant authorities, varying criteria among the wagon inspectors (necessary documentation, invoices and other documents attached to the bills of lading for the declaration of the goods at the Bulgarian Customs office); from the Bulgarian side there are no officials performing phyto and veterinary inspections at night; from the Serbian side there are no officials performing radioactive inspection at night.	Project for reconstruction under preparation.	Strict implementation of the Rules of Procedure at the common station, Improvement of technical equipment of personnel (computers, office equipment). Execution of three month stay analysis at the common station and taking measures for its reduction. Improvement of the organisation for timely servicing and recall of the cargo trains.

Source: Technical Secretariat Pan-European Transport Corridor X (2009). Activity report on cross-border issues and results of the cross-border surveys; M: main axis, B, C: branches of Corridor X.

Table 7.6 shows the change of frequencies at Serbian border stations for freight trains. The overall frequency at Serbian border crossings has almost doubled, from 37 trains to 61 trains per day. The average waiting time for the customs and inspection procedures has been reduced from 88 minutes to 70 minutes per train.

Table 7.6 Change in frequencies and waiting times of freight trains at Serbian border crossings, 2002–2007

Country	Station	Number of freight trains per day		Average waiting times per freight train (minutes)	
		2002	2007	2002/2003	2007
Serbia (M)	Sid	6	12	110	40
Serbia (M)	Presevo	10	12	90	45
Serbia (B)	Subotica	13	23	60	150
Serbia (C)	Dimitrovgrad	8	14	90	45

Based on: Technical Secretariat Pan-European Transport Corridor X (2009). Activity report on cross-border issues and results of the cross-border surveys; M: main axis, B,C: branches of Corridor X

The improvements of the border crossing Serbia-Bulgaria on branch C of Corridor X, between the railway stations of Dimitrovgrad and Dragoman, is due to Integrated Border Management which has been in place since December 2006. The border crossing facility is jointly operated by the administrations of the two countries. This has led to increased international traffic, reduced duration of customs and inspection procedures and more efficient control of border crossing activities (decreased smuggling, trafficking and other cross-border crime). The two stations are located at a distance of 21 km apart. The border procedures for freight trains are jointly performed at Dimitrovgrad station on Serbian territory. The following time savings have been recorded:

- In the Dimitrovgrad–Dragoman direction (towards Sofia) the duration of controls for freight trains has been reduced by 2 hours and 15 minutes, or 38 percent of the time required before the bilateral agreement.
- In the Dragoman–Dimitrovgrad direction, a reduction of 2 hours and 33 minutes, or 41 percent of the previous duration, has been achieved.

To summarise, there are a number of technical and administrative interoperability problems at Serbian border stations. However, examples such as the Dimitrovgrad–Dragoman border crossing demonstrate that integrated border management can lead to significant improvements. For the (distant) future the competition in freight transits could be more favourable for Serbia especially under the condition that (i) bottlenecks within Serbia are removed through progress on completing the Serbian sections of Corridor X and (ii) border waiting times become irrelevant through a possible EU membership of Serbia by 2020. Further growth of rail freight transport may be supported by the country's recovery from the political turmoil of the 1990s, the subsequent years of political isolation and the potential of closer integration with the EU, in particular with neighbouring new EU Members.

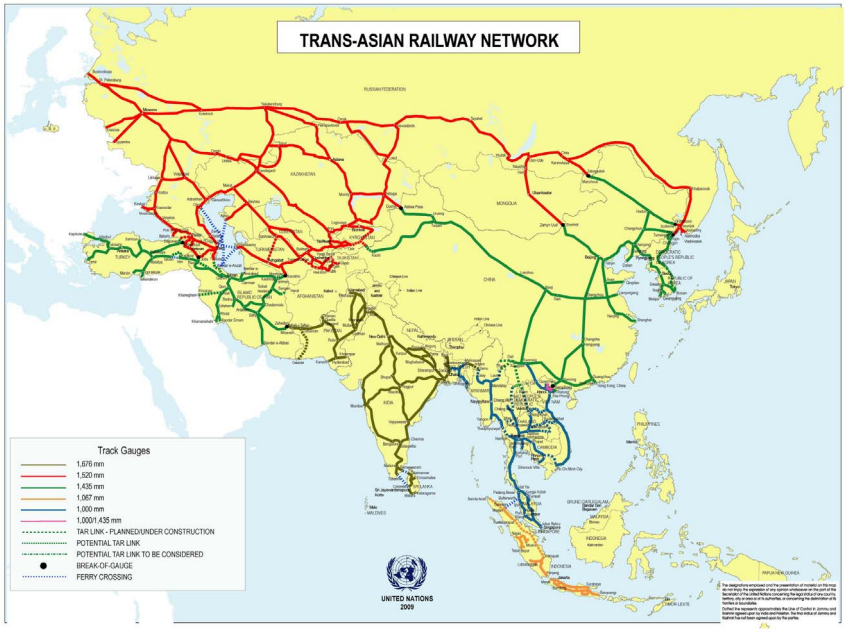
7.5 A New Rail Freight Connection between China, Kazakhstan and Europe

Trade with China offers one of the most promising markets for growth of rail freight transport. Notably, due to the high growth of the Chinese economy, even in times of financial crisis, and the establishment of new production facilities in the West of China, opportunities for rail transport development are being offered. Almost all rail operations in the People's Republic of China are dealt with by the Ministry of Railways (MoR) which is part of the State Council of the People's Republic of China. There are 16 railway bureaus and 2 railway group companies under the Ministry of Railways. International railway transport is carried out jointly by the MoR International Combined Transport Administration, related Railway Bureaus and CRCT (see also China Railways in the freight operators list in Annex 12). The responsibilities for coordination and approval of the transport plan, seeking supply, arranging transportation capacity and the implementation of cargo transport lies with the MoR, CRCT and Railway Bureau respectively. China's international railway transport still needs to implement the "Agreement Concerning International Carriage of Goods by Rail" and other rules administered by the Warsaw Railway Cooperation Organisation.

Present Situation and Development of New Eurasia Land Bridge

As opposed to the Trans-Siberian Land Bridge, the new Eurasia Land Bridge is also called "The Second Eurasian Land Bridge". It begins at Lianyungang, travels along the Long-Hai Railway and the Lan-Xin Railway reaching Alatav, then runs through Kazakhstan and Russia to the ports of West Europe and the ports in the Baltic Countries. It was opened in 1990, measures 10,900 kilometres in length and has been providing international transport service since 1992. Figure 7.8 presents the land bridges, i.e. rail connections, between East Asia and Europe.

Figure 7.8 Europe Asian land bridges



Source: United Nations/UNESCAP

The freight volume through Alatav reached 13,1 million tonnes in 2006, the highest since its opening, though fell to 12,0 million tonnes in 2007. Container traffic handled through Alatav reached 142,900 TEU and 191,000 TEU in 2006 and 2007 respectively. As has been observed in the previous chapter, only a limited amount of this traffic is currently directed to the EU (in 2005 the flows from China to the EU in both directions were 319,000 tonnes, which is a small fraction of the above-mentioned figures). This means that primarily the link caters for traffic between China and its neighbours in Central Asia. Eventually, however, it might become important for the EU. Flows with the EU currently take place on routes where there are no technical interoperability problems; i.e. through the Baltic Rim.

In 2007 the number of trains from Chinese coastal ports (such as Lianyungang, Tianjin, and Qingdao) to Alatav/Alma-Aty reached a total of 755, i.e. two trains per day. The number of trains from Lianyungang to Alatav/Alma-Aty reached 376, i.e. more than one train per day. The international container block train service between Lianyungang and Alma-Ata with a distance of 4,700 km and a runtime of 7-8 days, has laid a solid foundation for future services between China and Europe.

In recent years, there have been various new developments with regard to the New Eurasia Land Bridge.

Changes in the Transport Situation

Firstly, the transport facilities of the New Eurasia Land Bridge are improving. Construction of double-track sections on the North Xinjiang Railway commenced in April 2007. Once the the Lanzhou-Xinjiang electrified railway line (from Jiayu Pass to Alatav), included in the 11th Five-year Railway Plan is completed, the entire Chinese section of the New Eurasia Land Bridge railway will be electrified.

Secondly, there is also a consensus on the need to make better use of the New Eurasia Land Bridge to transport cargo between China, Kazakhstan and Russia. The Sino-Kazakhstan official document signed by the presidents of China and Kazakhstan in August 2007 stated that "The two contract parties will make best use of the potential of transit transport, strengthen port capacity, and promote the construction of international transport corridor in order to protect transport between China and Europe through China and Kazakhstan." Subsequently, the container block train service between Lianyungang and Moscow commenced operation.

Recent Changes in China-Central Asia trade

Recent years have seen rapid growth in container transportation. Since the MoR strengthened the organisation of the international container block train service in 2004, container transportation between China and Europe has grown rapidly. The number of containers through Alatav Port was 93,000 (TEU) in 2005, 143,000 in 2006 and 191,000 in 2007. The number has more than doubled within two years.

Secondly, the ratio of imports to exports has changed considerably. Imports into China from Central Asia have decreased sharply whilst exports have increased enormously. In 2006, the import amount was 10,0 million tonnes, whilst exports amounted to 3,1 million tonnes. In 2007, these figures were 7,0 million tonnes and 5,0 million tonnes respectively.

Thirdly, the composition of this cargo is changing. In terms of imports into China, the amounts of metallic ores, steel and oil decreased by 29.1%, 28.2%, and 49% respectively in 2008. In terms of exports, building materials and industrial machinery needed by Central Asian countries increased by 80% and 100% respectively.

Fourthly, the scope of transport operations on this axis is changing. In the past, cargo from East Asia to Central Asia dominated traffic on the New Eurasia Land Bridge route. Cargo to Russia and Europe has now started to grow. Non-Kazakhstan cargo has also increased. In terms of imports into China, the proportion of non-Kazakhstan cargo has increased from 7% to 16%. In terms of exports, the proportion has increased from 39% to 44%. This increase of non-Kazakhstan cargo means that the New Eurasia Land Bridge is playing an increasing role as an international transport corridor.

Development of a New Corridor in China

For many yaers Lianyungang has served as the eastern bridgehead of the New Eurasia Land Bridge. The development of China's coastal ports and their railway connections in recent years is however changing the pattern of freight transport within China. Now that the Binhai New Area in Tianjin has been designated as a new pillar for growth of the Chinese economy, Tianjin Port will become the major international shipping centre for North China. When railway construction is completed in the hinterland of Tianjin Port, the port is likely to overtake Lianyungang as the entry point to the New Eurasia Land Bridge transport corridor.

Problems of the New Eurasia Land Bridge

The following problems have been identified in connection with the development of the new land bridge:

1. Key rail terminals are struggling to cope with the increasing volume and variety of rail cargo. For example, the recent volumes at Alatav and Dostoc have stretched the Kazakhstan railway customs capacity, causing delays and volume limitations to Chinese export cargo via Alatav.
2. Transport Coordination Mechanisms for the entire New Eurasia Land Bridge are still far from complete and there is a lack of multimodal carriers able to cover the entire route. This results in complex transit formalities and slow and unreliable transit times.
3. Inefficient customs operations along the railway: many factors have led to long transit times and poor efficiency, such as the large number of import/export control points along the route, poor coordination between customs and inspection departments, inadequate and outdated customs procedures etc.
4. The lack of a unified tariff; currently there is no unified tariff applied by the countries along the New Eurasia Land Bridge. For example, the average international container tariff in China at the time of writing this report is no more than $0,2 per container per kilometre, but the figure in Europe is significantly higher - up to $0,5 or more.

Challenges

The following challenges can be identified for the new land bridge route:

- Construction of better infrastructure on the new corridor needs to be accelerated: for various reasons construction of the China-Kyrgyzstan-Uzbekistan Railway project, which is critical for the corridor from China to Southern Europe through Central and West Asia, has not started yet. Tajikistan, Afghanistan and Iran have also signed a Communiqué which proposes the construction of a railway connecting the three countries. This railway route, passing through Kashi (China), Kyrgyzstan, Tajikistan, Afghanistan, and Iran, will total 1,373 km, of which 215 km is in China, 194 km in Kyrgyzstan, 496 km in Tajikistan, and 468 km in Afghanistan. These two railways have many synergies and need to be planned together so as to optimise the railway network.
- Coordination and cooperation between countries along the bridge between New Eurasia and Siberia Land Bridge needs to be strengthened: a mechanism for multilateral cooperation and coordination needs to be put in place in order to balance the interests of each nation, and to develop multimodal transport carriers covering the whole route.

- ReduceD tariffs and better customer service are required: for example EU countries may need to reduce the tariff on long-distance transportation between Asia and Europe to reduce overall transport costs and attract more cargo. Nations along the land bridge should improve their railway facilities and their customs information services, and improve the security of goods in order to provide better service.

In addition to the new land bridge from China through Kazakhstan, as presented in this section, the traditional Trans-Siberian route also offers a connection from the Far East to Europe. Whilst the "New Land Bridge" as described in this section is of greater importance to Chinese trade, the Trans-Siberian route is more relevant for Korean and Japanese trade with Russia and the TRACECA countries. The Trans-Siberian route is shown in Figure 7.9.

Figure 7.9 The Trans-Siberian route: Connecting the Far East to Europe

Source: NEA

The "New Land Bridge" route suffers from the disadvantage of track gauge changes, and one advantage of the Trans-Siberian route is the 1,520mm gauge along its entire length which as discussed earlier is also used in the CIS, Baltics, Finland and also in Mongolia. Furthermore, the Trans-Siberian route is electrified and double-track along its entire length except for a stretch along the Amur River, near Khabarovsk, for which plans for double-tracking have been drawn up. In terms of transport performance, the route carried some 72.2 million tonnes and 424,021 TEU in 2005. It has spare capacity of around 30 percent and the average speed for freight transportation is 45-55 km/h. Based on 1,200 km/day, transit times of 11 days from Vladivostok to Moscow are possible for a container block train. However container transport to and from the Far East requires a complex international multimodal transport system including many aspects such as maritime transport handling in Russian ports, transportation by Russian railways and railway operations in various countries. Hence numerous players are involved. Forwarders assume responsibility and combine the various charges incurred.

Distances over the Trans-Siberian route are shorter compared with Deep Sea alternatives. Most notably the high-speed services using block trains provide a

faster route than Deep Sea services for transport from Japan and Korea to Finland, East Europe and destinations in Russia/CIS. For example, Japan to Moscow takes 20-25 days by the Trans-Siberian route, but 40-45 days by Deep Sea vessel. One of the problems of setting up services on the Trans-Siberian route to Europe is that the European share in the overall tariff is disproportionate. It can be the case that whilst the European share of distance is less than 5 percent, its share of the tariff is more than 30 percent. This is partly the result of interoperability issues, i.e. the changing of bogies and/or transferring containers between trains. A possible reduction of the tariff in this respect is an important factor for the success of the "New Land Bridge" as well as of the Trans-Siberian route.

7.6 Conclusions

The main impediments to greater use of rail differ between submarkets. Case studies show that towards Southern Europe (Balkans and towards Asia) the quality of infrastructure, delays at borders and lack of interoperability are important. It is vital to address these issues if rail is to be successful in longer distance intermodal transits where the value of cargoes can be high.

Switzerland and Norway can, in terms of rail freight organisation and development, be considered integrated within the EU. Switzerland is one of the most active countries in developing rail corridors.

For traffic to and from Turkey, two rail corridors exist, one going through EU Member States (Hungary, Romania and Bulgaria) the other one going through (as yet) non-EU countries (Croatia, Serbia and Macedonia). The route through Serbia is the shortest and most used, despite a number of organisational issues. Forwarders and railway undertakings (both private and incumbent) are active in developing freight on these routes (see for example the CREAM and the RETRACK projects). For traffic to and from Ukraine, Russia and Belarus initiatives have been developed by forwarders and railway undertakings. On the routes to Russia and Turkey volumes have declined considerably as a result of the economic crisis. It is expected that volumes will increase once the crisis abates and will grow in the long-term. Notably the economies of China and Turkey have been less hard hit by the crisis.

Of the major ports in the Baltic Rim, St Petersburg has shown the largest absolute container turnover between 2003 and 2007. It is expected in the future that all ports in the Baltic Rim will continue to handle trade flows from Russia and Kazakhstan, and that this volume will grow so that the Port of St Petersburg cannot handle this traffic on its own. At the same time it is anticipated that the Port of St Petersburg will probably specialise more in high valued goods (containerised) rather than bulks. One important reason is the relative absence of interoperability problems.

In order to develop railway transport in the Baltic Rim, investment in railways needs to focus on providing good connections with the Russian railways, and this is a higher priority than ERTMS development in the short term.

For the development of both the "New Land Bridge" and the Trans-Siberian route for rail traffic into Europe, a better tariff structure needs to be developed. In terms of lead times and distances, both routes have advantages over Deep Sea routes if pricing can be made more attractive. China's interest in developing a second land bridge is not only related to building links with Europe; links with Asian partners are also a key consideration. Volumes are in better balance on this route, with raw materials heading for China and containers moving in the other direction.

For railway connections between the Far East (Japan and Korea) and Europe, the Trans-Siberian is in a better position than the "New Land Bridge" from China. Depending on final European destination, there is either no interoperability problem in the Baltic Rim, or just one gauge change (at the Polish, Hungarian or Romanian border) for traffic going further into Europe. For the route from China one to two gauge changes are needed. Borders where a gauge change is necessary should be developed as the natural exchange points where locomotives, rolling stock and personnel changes and all procedures and checks are conducted simultaneously. Bilateral and multilateral agreements, and eventually a corridor approach, need to be developed to reduce the barriers to efficient operation.

Section 4
Conclusions

8 Conclusions

8.1 General Background

International rail transport is changing. The opening up of the rail market, improved interoperability and the development of the rail infrastructure have resulted in a growth of the rail market during the period examined in this study (2001-2009) and further growth is expected. In this study analysis has been undertaken of the development of international rail passenger transport in the EU27 and between the EU27 and neighbouring countries, as well as of the development of international freight transport between the EU27 and neighbouring countries.

Freight transport and passenger transport services represent entirely different markets. International passenger transport by rail is a small part of the total rail market and, with a few exceptions, is mainly restricted to transport between neighbouring countries. Travel over longer distances is dominated by car and plane. Rail freight transport concentrates much more on long-distance traffic flows, with international traffic forming a larger share of the total and much more of it crossing more than one international border. Furthermore, a strong rail market transports large volumes between sea ports and their hinterlands. Because of these differences, the analysis has been split into separate sections for passenger transport and freight transport.

8.2 International Rail Passenger Transport

International Rail Passenger Demand
Nearly 100 million international border crossings were made in 2007 by rail passengers across internal EU27 borders, which represents an increase of 27 percent compared to 2001. The internal borders between the EU15, i.e. the "old members", account for 85 percent of this traffic. Growth here is dominated by the developments in high-speed services between France and various countries and by the traffic between Denmark and Sweden. On other international crossings across EU15 - EU15 borders, the average growth rate has been below 10 percent over this six year period.

International passenger services are modest in comparison to domestic services. On longer distance trips, i.e. trips of over 400 kilometres, rail has a relatively small market share. For such trips, the car and plane have largely captured the market. In the short-distance regional markets the volume of international rail travel is also modest when compared to domestic travel. Most is related to suburban rail services within agglomerations inside one country. There are a few examples of suburban rail services where international transport takes place; one of them is the S-Bahn around Basel.

Approximately 90 percent of international rail passengers travel between neighbouring countries for distances of less than 300 kilometres. An exception to this are high-speed services, which can be competitive on journeys with

durations of up to four hours, for example between Paris and Amsterdam or London and Brussels.

The average growth in markets between old and new Member States is 51 percent, which is almost double the total EU27 average. Here supply has also grown significantly, especially on cross-border regional services.

Rail traffic between the EU27 and neighbouring countries accounts for another 26 million passengers. Of these, some 20 million cross borders between the EU27 and Switzerland or Norway and 6 million travel to or from the Balkan countries and Eastern Europe. Table 8.1 presents a summarised overview of the developments in international rail passenger demand.

Table 8.1 International rail passenger demand for 2001 and 2007

Submarkets	Rail passenger demand in 1,000 passengers for 2001 (cross-border)	Rail passenger demand in 1,000 passengers for 2007 (cross-border)	Growth of rail passenger demand between 2001-2009 (in %)
EU15 - EU15	67,582	84,036	24%
EU15 - EU12	6,415	9,679	51%
EU12 - EU12	4,120	5,344	30%
Total EU27	78,293	99,059	27%
EU27 - CH/NO	15,745	20,386	29%
EU27 - Eastern Europe	4,341	6,092	40%
Total EU27 - non-EU	19,988	26,478	32%
Total rail passengers within EU27 and EU27 – non-EU (in 1,000 pass)	98,248	125,536	28%

Source: NEA analysis

Market Segments

In this study the following market segments have been distinguished: high-speed, IC/EC trains, other long-distance trains and regional trains.

The market for high-speed trains has grown strongly in recent years. Through the use of new cross-border infrastructure, effectively linking improved domestic networks in France and Germany, more attractive international services have been developed. The increased market share of such high-speed services has reduced the market share of other, slower, long-distance train services.

IC/EC branded trains cover a core network between major cities and provide services offering high quality. Other long-distance trains are slower in comparison and (in most cases) less frequent. Many of such services are not profitable and supply is under pressure. The niche markets of night trains and car sleeper trains face strong competition from low-cost airlines and low-priced buses. Car sleeper services are also suffering from the availability of affordable car rentals at holiday destinations.

The international market for regional train services that cross borders is relatively small, as in many cases border areas are not densely populated. In such cases, international Public Service Obligation (PSO) contracts are commonly applied to cover operational deficits.

Occupancy

Despite the growth in traffic, average train occupancy (measured in number of passengers per train) at the borders between EU15 and EU12 Member States is (still) only 43, suggesting that many of these services remain financially insecure. This compares with an average occupancy of 135 at borders between EU15 Member States. The international high-speed train services contribute strongly to the average occupancy at EU15 - EU15 borders. At the same time, the development of the supply of regional trains financed by PSO contracts has been most notable on routes across EU15-EU12 borders and on these types of services occupancy at borders is generally far below average.

Future Orientation

Using the TRANS-TOOLS model, it is estimated that passenger border crossings between the EU27 Member States will increase by 17 percent by 2020 (compared with the base year of 2007) and passenger border crossings between EU and non-EU countries will increase by 21 percent.

Looking at different submarkets, different developments can be observed. High-speed services are operated on a commercial basis and new entrants are expected to take a share of this market in the future. At the same time, there are signs that the incumbent state-owned operators, which have hitherto cooperated in the running of international services, are beginning to compete with each other as well. Where they run services jointly, there is a trend towards doing this through a separate jointly owned subsidiary company (rather than through jointly operated services). This concept is believed to lead to better marketing and a more flexible approach to market developments. Increased competition and the completion of new infrastructure will facilitate further strong growth; any implementation of transport policy measures aiming to internalise the external costs of the airline industry could enhance this growth even further.

Night trains represent a niche commercial market where developments are less positive. Competition exists from low-cost airlines, low-priced buses and accelerated day trains. Moreover, aging rolling stock, relatively low levels of service and security incidents contribute negatively to the attractiveness of such trains. Incumbent operators that have cross-financed these services as part of their total concessions, are no longer obliged to do so, nor are they prepared to offer loss-making services. Several services have ceased operation in recent years. Private operators are taking a larger share of this market.

The market for regional trains financed under PSO contracts is growing. In this market several services have enjoyed a revival, after being neglected by their incumbent operators for many years. In many Member States private operators compete with incumbent operators to win PSO contracts and in other Member States this is expected to happen in the near future. Cross-border PSO contracts require a high degree of cooperation between franchising authorities in neighbouring countries, and whilst there are some excellent examples of this working well, there are also examples of missed opportunities. A condition for the development of these types of services is the availability of subsidies; especially in the new Member States this is a bottleneck and it must be stated that the future of several international regional lines in Eastern Europe is

insecure. In addition to financing regional trains, PSO contracts can also be used to safeguard international long-distance services. Many long-distance trains that are not branded EC or IC are not profitable and can survive only through financial support from authorities.

Barriers
In the subsidised (PSO contract) market, the involvement of various authorities complicates the organisation of international services. Nevertheless there are several good examples of international regional lines that are run under a PSO regime.

Many technical barriers for international services still exist, requiring solutions which come at additional costs. As international passenger transport covers only a very small part of the total rail service that is offered, technical standardisation is only feasible to a limited extent.

The incomplete implementation of existing EU legislation continues to be a barrier to the development of cross-border passenger services. In some countries fears remain of discrimination in the allocation of paths. Additional barriers include delays and problems in accessing facilities such as cleaning and maintenance depots. Also, the lack of strong independent regulators, to whom an appeal can be made in case of dispute, is considered to be a barrier. High track access charges can also be a barrier, particularly on new high-speed lines. An additional barrier is the failure to charge air transport for its externalities or even to harmonise tax arrangements such as value added tax between the two modes.

Border delays still make cross-border rail travel unattractive in some countries. Poor organisation and fears of unreliability on the part of the railway companies are contributing factors to this barrier.

8.3 Rail Freight Transport between the EU and Third Countries

Demand for Rail Freight between the EU and Third Countries
With respect to freight transport, this study has focused on the market between the EU and third countries. Geographically four submarkets are defined, as presented in Table 8.2. In Eastern Europe rail freight transport is more important than rail passenger transport; this is especially the case in the Baltic Rim. The incumbent operators in this region tend to regard freight traffic as their main business and passenger services as a more marginal activity.

Table 8.2 Development of rail freight demand 2001–2007, per submarket

Submarkets in EU27 – non-EU	Rail volume in 1,000 tonnes			Change in freight tonnes lifted from 2001-2007, in %
	Rail 2001	Rail 2005	Rail 2007	
EU27 – Switzerland/Norway	21,976	25,506	25,855	18%
EU27 - Eastern Europe (1,520mm gauge, Baltic Rim)	82,803	85,647	77,280	-7%
EU27 - Eastern Europe (1,520mm gauge, Ukraine, Belarus, Moldova)	31,550	28,390	33,874	7%
EU27 - Eastern Europe (1,435mm gauge, Balkan and Turkey)	1,495	10,001	11,193	649%
Total EU27 - non-EU	137,824	149,544	148,202	8%

Source: NEA analysis

Future Orientation

Forecasts made through the use of the TRANS-TOOLS model suggest a large growth (20-40 percent) across the borders with Eastern Europe up to 2020. Whilst the recent economic crisis has led to a considerable drop in volumes, it can be expected that once the crisis is over, volumes will recover towards previous levels and that long-term forecasts will not need to be revised.

The current rail transport volume with China is modest and is almost completely directed to Baltic and Finnish ports. The development of rail traffic between China and Western Europe suffers from the track gauge differences between China (1,435mm gauge); Kazakhstan/Russia/Baltics/Finland (1,520mm gauge) and Western Europe (1,435mm gauge). The volumes from Kazakhstan are higher; the volumes can be routed without gauge changes to Baltic and Finnish ports.

Freight transport is a commercial activity and private operators, as well as joint ventures of private and public operators will be the main actors in the future. Although the speed of opening of the market and railway reform varies from country to country in Eastern Europe, the trend is towards stronger private sector involvement. This will benefit the position of railways in the long run.

Barriers

Barriers for interoperability can be diminished once international arrangements such as COTIF have been applied by more countries. However, the track gauge difference between Eastern Europe and Central and Western Europe will remain a barrier to the growth of the rail market share. The creation of a 1,520mm gauge route into Central Europe could be helpful for specific traffics and market segments such as container transport.

Border crossings are another problematic issue with respect to interoperability between the EU railways and the railways in neighbouring countries. The establishment of jointly operated border crossing facilities, where the various operations are carried out simultaneously, can help to reduce the time required to complete all procedures and formalities. This will result in a reduction of border waiting times.

ANNEXES

Annex 1 References

1) COWI, NEA and IWW, "Feasibility study on Rail Baltica Railways", January 2007, Final Report for the European Commission, Directorate-General Regional Policy.
2) SIA "NK Konsultaciju birojs", "Rail Baltica Corridor Study. Assessment of the Rail Baltica Railways Corridor Alternatives", January 2008, Final Report.
3) The iTREN-2030 Reference Scenario until. 2030 Deliverable D4, August 17th 2009) Project No: TREN/07/FP6SSP/S07.68203/044260 Instrument: SSA – Specific Support Action Thematic Priority 8.1: Policy-Oriented Research: Scientific Support to Policies – SSP
4) Technical Secretariat Pan-European Transport Corridor X (2009). Activity Report on Cross-border Issues and Results of the Cross-border Surveys; M: Main axis, B, C: Branches of Corridor X
5) COTIF Appendix A to the Convention concerning International Carriage by Rail (COTIF) of 9 May 1980, OTIF, Berne, 1980. Text available on http://www.unece.org/
6) General Master Plan for transport in Serbia, Final report – Executive Summary, by Italferr, NEA, IIPP, W+B (2009)
7) http://ec.europa.euJtransport/studies/index en.htm
8) http:// ec.europa.euJtransport/rail/ studies/index en.htrn
9) Impact Assessment Study On Amendments To The Rail Access Legislation In The Framework Of The Recast Of The 1st Railway Package, Annex H – Liability Rule, PWC, NEA (2009).
10) Lisbon Strategy for Growth and Jobs National Reform Programme 2008-2010 (Interministerial Committee for EU Affairs, 2008)
11) TEN-T EA data-sheet, 2009.
12) Study on Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion Funds for the Programming Period 2007-2013, Ecorys (2006).
13) Serbian Statistical Office Publication on transport, 2009
14) SBB AG 2005-1006-2007-2008 Annual Reports
15) Eurostat, website /epp.eurostat.ec.europa.eu /portal/ page/portal/eurostat/home
16) Advisory Council for Southeast Europe
17) Thomas Cook European Rail Timetable, different years
18) Jan Ulrik Holsten/Thorsten Pulver Überholspur oder Abstellgleis Studie zum europäischen Schienenpersonenverkehr 2009 Internationales Verkehrswesen (61) 9/2009
19) Railway Gazette International (different issues) as well as www.railwaygazette.com/
20) Technical Secretariat of the Steering Committee for Pan-European Corridor X (2009).
21) TRANS-TOOLS instead of mentioning all reports we refer to the website http://energy.jrc.ec.europa.eu/TRANS-TOOLS
22) UIC Statistics, 2007
23) Slovenian Railways in figures, 2007
24) Annual Report Comboios de Portugal, 2008

25) Annual Report AS Gorail, 2008 (www.gorail.ee)
26) Activity Report on Cross-border Issues and Results of the Cross-border Surveys.http://www.internationaltransportforum.org/Proceedings/Border2009/09Miltiadou.pdf
27) A Broad-Gauge Connection to the Vienna/Bratislava Twin City Region, Dr. Philipp Nagl, Prof. Dr. Sebastian Kummer, Mag. Gudrun Stranner Wirtschaftsuniversität Wien, Institute for Transport and Logistics Management Railway Market-CEE Review No. 2 2008
28) "European High-speed Rail – An Easy Way to Connect" European Commission, 2009
29) United Nations/UNESCAP http://www.unescap.org
30) CREAM project http://www.cream-project.eu/
31) RETRACK project http://www.retrack.eu
32) Eurobarometer surveys: http://ec.europa.eu/public_opinion/index_en.htm
33) Union Internationales des Chemins de Fer: Infrastructure Charges for High Performance Passenger Services in Europe. UIC, Paris 2008
34) Preston, J: Competition for Long-distance Passenger Rail Services: The Emerging Evidence.18th international symposium on transport economics, International Transport Forum, Madrid, 2009

Annex 2 List of Border crossings

The following table provides an overview of international rail passenger connections between the EU27 countries and with third countries. It shows all bilateral country pairs connected by at least one rail border crossing for passenger operations.

Table A2.0.1 International rail passenger border crossings between EU27 and with third countries

#	EU27 Border crossing	EU27 Border crossing with third countries
1	EI-UK	FR-CH
2	UK-FR	DE-CH
3	FR-BE	AT-CH
4	FR-LU	IT-CH
5	FR-DE	SE-NO
6	FR-IT	FI-RU
7	FR-ES	PL-RU
8	NL-DE	PL-BY
9	NL-BE	PL-UA
10	DE-BE	SK-UA
11	LU-BE	HU-UA
12	LU-DE	HU-RS
13	IT-AT	HU-HR
14	IT-SL	RO-UA
15	ES-PT	RO-MD
16	SE-DK	BG-RS
17	DK-DE	RO-RS
18	DE-AT	BG-TU
19	DE-CZ	HE-TU
20	DE-PL	HE-MK
21	AT-CZ	LT-RU
22	AT-SL	LT-BY
23	AT-HU	LV-RU
24	AT-SK	EE-RU
25	PL-LT	SL-HR
26	PL-SK	
27	PL-CZ	
28	CZ-SK	
29	SK-HU	
30	HU-RO	
31	HU-SL	
32	RO-BG	
33	BG-HE	
34	LT-LV	
35	LV-EE	

Annex 3 Application of Methodology on Border Crossings

Table A3.0.1 Number of international rail passenger trips per border crossing within the EU27, in 1,000 trips per year

EU27 Border crossing	TRANS-TOOLS 2007 cross-border	Trips Model results TRANS-TOOLS 2007 O-D info TT (a)	Eurostat 2007 O-D information EU (b)	Frequencies Initial approximation Cross-border FF (c)	Reliability check based on column (a) (b) or (c) adaptation action	Outcome of the analysis
EI-UK	641	822	1,698	1,752	TT underestimates, FQ and EU are similar	1,879
UK-FR	5,727	8,177	16,025	3,504	EU includes shuttle=7 million, FF increase occup. rate to 8 million (shuttle/Eurostat=50%/50%)	8,177[43]
FR-BE	3,391	11,627	7,369	12,863	TT includes transit, not EU, FF about right	11,627
FR-LU	860	877	3,299	5,373	EU too low, TT too low, transit added	3,317
FR-DE	4,661	4,755	1,556	4,190	FR-DE Eurostat too low, misses Verkehrsverbund/regional lines, we use TT O/D	4,755
FR-IT	1,551	2,295	3,081	2,467	TT too low, EU plus transit added, FF too low	3,824
FR-ES	1,480	2,208	880	2,482	O-D from EU + transit TT	1,844
NL-DE	10,899	11,324	2,994	4,424	TT too high, Eurostat too low, we use the frequencies here 4424 as TT border and subtract difference TT O-D	4,424
NL-BE	5,874	7,722	3,714	4,161	TT too high, transit added	5,562
DE-BE	2,313	3,214	488	2,132	EU too low, transit and other services added	3,033
LU-BE	902	964	2,137	3,650	TT too low, EU plus transit	2,199

[43] It should be noted that the shuttle services between the UK and France are not included, as these provide services for car and are not included in this study. The volume of passenger traffic on the shuttle is about 7 million passengers in 2008 (see case study).

EU27 Border crossing	TRANS-TOOLS 2007 cross-border	Trips Model results TRANS-TOOLS 2007 O-D info TT (a)	Eurostat 2007 O-D information EU (b)	Frequencies Initial approximation Cross-border FF (c)	Reliability check based on column (a) (b) or (c) adaptation action	Outcome of the analysis
LU-DE	200	202	512	964	EU includes transit, FF too high	513
IT-AT	2,931	2,949	1,114	1,504	EU too low, TT too high, transit added	2,949
IT-SL	1,229	1,435	94	73	TT too high, EU taken, FF too low	94
ES-PT	1,071	1,148	355	438	EU too low, TT too high, transit added	432
SE-DK	19,370	19,662	19,370	2,876	EU=TT, FF too low	19,662
DK-DE	1,240	1,915	852	1,256	EU too low, TT added for transit, FF too low	1,527
DE-AT	7,461	8,312	3,716	8,132	EU too low, AT not included, FF about right	8,312
DE-CZ	547	590	836	1,270	EU too low, TT added for transit, FF too high	879
DE-PL	1,993	2,134	1,173	1,424	EU too low, FF used as PSO have to be added	1,424
AT-CZ	223	1,850	776	1,548	TT cross-border/transits seem very high, we use Eurostat O/D, but for cross-border we add TT	2,403
AT-SL	765	947	172	1,168	TT overestimates, EU is taken here	354
AT-HU	266	827	1,112	1,723	EU taken, TT underestimates, initial FF too high	1,673
AT-SK	385	398	2,736	584	EU taken, TT underestimates, initial FF too low	2,749
PL-LT	404	793	23	7	EU taken, TT too high, FF too low	120
PL-SK	407	1,076	116	263	EU for O-D, transit TT added, FF too low	283
PL-CZ	2,004	2,116	307	664	EU for O-D, transit TT added, FF too low	418
CZ-SK	2,590	2,715	2,482	1,358	TT included for transit, FF too low	2,607
SK-HU	843	1,549	228	1,000	EU for O-D, transit TT added, FF too high	404
HU-RO	714	1,162	445	1,080	EU for O-D, transit TT added, FF too high	894
HU-SL	1,284	1,493	158	131	EU for O-D, transit TT added, FF bit too low	262

EU27 Border crossing	TRANS-TOOLS 2007 cross-border	Trips Model results TRANS-TOOLS 2007 O-D info TT (a)	Eurostat 2007 O-D information EU (b)	Frequencies Initial approximation Cross-border FF (c)	Reliability check based on column (a) (b) or (c) adaptation action	Outcome of the analysis
RO-BG	510	1,122	49	219	EU for O-D, transit TT added, FF too high	202
BG-HE	28	52	115	292	EU for O-D, transit TT added, FF too high	139
LT-LV	261	540	7	73	EU for O-D, transit TT added, FF too high	14
LV-EE	255	356	0	22	FF taken here, checked with data retrieved from country	22
Total	85,281	109,328	79,989	75,067		99,059

Source: NEA analysis

A similar table is shown for the non-EU border crossings below.

Table A3.0.2 Number of international rail passenger trips per year between EU27 and neighbouring countries, in 1,000 trips

Non-EU Border crossing	TRANS-TOOLS 2007 cross-border	Trips Model results TRANS-TOOLS 2007 TT (a)	Eurostat 2007 EU (b)	Frequencies Initial Approximation FF (c)	Reliability check based on column (a) (b) or (c) adaptation action	Outcome of the analysis
FR-CH	1,306	1,490	5,304	4,497	use Eurostat and add transits	5,488
DE-CH	4,493	6,396	5,868	3,789	use Eurostat and add transits	7,771
IT-CH	3,594	5,316	3,838	4,409	use Eurostat and add transits	5,560
AT-CH	194	1,492	0	730	TT too high use frequency, 2/3 is O-D and 1/3 is transits	730
SE-NO	48	91	794	431	use Eurostat and add transits	837
FI-RU	200	200	798	219	use Eurostat and add transits	798

Non-EU Border crossing	TRANS-TOOLS 2007 cross-border	Trips Model results TRANS-TOOLS 2007 TT (a)	Eurostat 2007 EU (b)	Frequencies Initial Approximation FF (c)	Reliability check based on column (a) (b) or (c) adaptation action	Outcome of the analysis
PL-RU	0	1	372	37	use Eurostat and add transits	373
PL-BY	845	29	1,235	212	use Eurostat and add transits	1,235
PL-UA	148	148	590	146	use Eurostat and add transits	590
SK-UA	66	69	32	131	use Eurostat and add transits	35
HU-UA	212	212	0	44	use Eurostat and add transits	22
HU-RS	11	41	186	168	use Eurostat and add transits	216
HU-HR	52	176	119	256	use Eurostat and add transits	243
RO-UA	4	95	12	37	use Eurostat and add transits	103
RO-MD	0	0	136	51	use Eurostat and add transits	136
BG-RS	2	102	52	73	use Eurostat	52
RO-RS	1	2	34	51	use Eurostat and add transits	34
SL-HR	154	223	379	37	use Eurostat and add transits	448
BG-TU	9	20	28	44	use Eurostat and add transits	38
HE-TU	21	21	32	73	use Eurostat and add transits	32
HE-FY	0	16	12	146	use Eurostat and add transits	28
LT-RU	36	18	556	219	use Eurostat and add transits	538

Non-EU Border crossing	TRANS-TOOLS 2007 cross-border	Trips Model results TRANS-TOOLS 2007 TT (a)	Eurostat 2007 EU (b)	Frequencies Initial Approximation FF (c)	Reliability check based on column (a) (b) or (c) adaptation action	Outcome of the analysis
LT-BY	59	1	206	146	use Eurostat and add transits	148
LV-RU	0	20	622	73	use Eurostat and add transits	642
EE-RU	0	1	300	577	use data from collections	301
Total	11,454	16,180	22,320	16,593		26,478

Source: NEA analysis

One reason why the official statistics underestimate the number of international rail trips is because regional trains are often not considered. In the example of Netherlands-Germany, around 25% (around 1 million) of international rail passengers travel on regional trains, e.g. on the links between Venlo and Kaldenkirchen and between Enschede and Gronau. We asked the Dutch railways to provide data for these links. The figures we received amounted to only 10% of the actual figures, the reason being that tickets sold by the German Verkehrsverbund and by German regional operators were not included in the Dutch NS statistics. In the 2 tables below we have reported the outcome of the analysis, in the first table for the EU borders, in the second table for the cross-border traffic with third countries.

When comparing the data in Tables A3.1 and A3.2, one should take into consideration the fact that TRANS-TOOLS and Eurostat data are based on Origin - Destination measures, while the first approximation by frequencies is based on cross-border data and includes transit flows as well as O-D flows.

Annex 4 Questionnaire

A concise questionnaire was used to gather data on passenger flows.[44] From the questionnaire the following information was gathered:

- Frequencies of long-distance and local rail passenger trains to neighbouring countries (grouped by country destination).
- International (i.e. border crossing) rail passenger transport (distinguished by country of destination) and national (domestic) rail passenger transport (both in number of passengers).
- Mode share of international passenger transport: road, rail, air (by number of passengers).
- Mode share of domestic (national) passenger transport: road, rail, air (by number of passengers).
- High-speed rail (if applicable): the number of lines, length in km, frequency of trains, passenger demand (number of trips, annual number of passengers).
- High-speed lines planned or under construction: location of lines, length, expected date of operation.
- Night trains for the international market: frequency and lines (to/from).
- Car trains (trains carrying passengers and their cars) for the international market: frequency and lines (to/from).
- List of passenger rail operators (including the number of staff, financial performance, routes operated, frequency; any information on their marketing and customer service).
- Services by low-cost airlines to and from [specific country] (to and from which countries, frequency; name of airline).
- Domestic and international freight transport in tonne-km for road/rail/inland waterway.
- Any documents or reports on the status of market reform in [specific country].

[44] It should be noted that different methods and sources were applied and used for data collection. This concise questionnaire was mainly used for data collection in Central and Eastern European countries. The following countries provided feedback: Bulgaria, Czech Republic, Estonia, Finland, Latvia, Lithuania, Poland, Romania, Slovakia and Switzerland.

Annex 5 Tables Analysis of International Rail Passenger Flows

Table A5.0.1 International rail connections within the EU27 for 2009, number of train pairs/day and cross-border traffic in 2009

EU Border crossing	Number of connections/ links	HST/ICE	IC/EC	other LD	regional	Total trains
UK-EI	1	0	8	0	0	8
UK-FR	1	24	0	0	0	24
FR-BE	4	42	32	0	16	90
FR-LU	2	6	27	0	8	41
FR-DE	5	10	2	6	87	105
FR-IT	4	5	4	0	54	63
FR-ES	5	7	2	0	45	54
NL-DE	6	7	12	0	78	97
NL-BE	3	6	16	0	35	57
BE-DE	1	9	0	0	11	20
BE-LU	3	0	19	9	15	43
LU-DE	1	0	5	0	16	21
IT-AT	3	0	10	0	3	13
PT-ES	3	0	2	2	0	4
DK-SE	1	5	0	14	52	71
DK-DE	3	0	7	0	16	23
DE-AT	8	9	30	10	72	121
DE-CZ	7	0	7	6	44	57
DE-PL	7	0	7	7	55	69
AT-CZ	4	0	12	7	22	41
AT-SK	2	0	3	1	40	44
AT-HU	4	0	7	10	66	83
AT-SL	2	0	12	4	0	16
IT-SL	1	0	1	0	0	1
PL-LT	1	0	0	0	1	1
PL-SK	2	0	0	3	6	9
PL-CZ	3	0	4	5	1	10
CZ-SK	4	0	14	4	6	24
HU-SK	4	0	7	6	7	20
HU-RO	5	0	11	3	8	22
HU-SL	1	0	1	0	8	9
RO-BU	1	0	0	3	0	3
BG-HE	2	0	0	4	0	4
LT-LV	1	0	0	1	0	1
LV-EE	1	0	0	0	3	3
Total	106	130	262	105	775	1272

Table A5.0.2 International rail frequencies between the EU27 and third countries for 2009, number of train pairs per day for cross-border traffic in 2009

EU – non-EU relations 2009	Number of border crossings /links	HST/ICE	IC/EC	other LD	regional	Total trains
FR-CH	7	22	32	5	48	107
DE-CH	5	32	4	0	84	120
IT-CH	5	11	3	4	46	64
AT-CH	2	0	10	0	0	10
SE-NO	4	0	3	5	4	12
FI-RU	1	0	3	0	0	3
PL-RU	1	0	0	1	0	1
PL-BY	2	0	0	6	4	10
PL-UA	2	0	0	4	0	4
SK-UA	1	0	0	3	3	6
HU-UA	1	0	0	1	1	2
HU-RS	2	0	1	2	3	6
HU-HR	3	0	1	4	5	10
RO-UA	1	0	0	1	0	1
RO-MD	1	0	0	1	2	3
BG-RS	1	0	0	2	0	2
RO-RS	2	0	0	1	2	3
SL-CR	4	0	4	7	4	15
BG-TU	1	0	0	1	0	1
HE-TU	1	0	0	1	1	2
HE-MK	1	0	0	2	0	2
LT-RU	1	0	0	4	0	4
LT-BY	2	0	0	6	0	6
LV-RU	2	0	0	4	0	4
EE-RU	1	0	0	2	0	2
Total	54	65	61	67	207	400

Table A5.0.3 Number of international rail passenger trips in 2007 per border crossing within the EU27, in 1,000 trips per year and share of border crossing in total

EU Border crossing	Passenger rail trips 2007	Share of border crossing in total border crossing travel
UK-EI	1,879	1.9%
UK-FR	8,177[45]	8.3%
FR-BE	11,627	11.7%
FR-LU	3,317	3.3%
FR-DE	4,755	4.8%
FR-IT	3,824	3.9%
FR-ES	1,844	1.9%
NL-DE	4,424	4.5%
NL-BE	5,562	5.6%
BE-DE	3,033	3.1%
BE-LU	2,199	2.2%
LU-DE	513	0.5%
IT-AT	2,949	3.0%
IT-SL	94	0.1%
PT-ES	432	0.4%
DK-SE	19,662	19.8%
DK-DE	1,527	1.5%
DE-AT	8,312	8.4%
DE-CZ	879	0.9%
DE-PL	1,424	1.4%
AT-CZ	2,403	2.4%
AT-SL	354	0.4%
AT-HU	1,673	1.7%
AT-SK	2,749	2.8%
PL-LT	120	0.1%
PL-SK	283	0.3%
PL-CZ	418	0.4%
CZ-SK	2,607	2.6%
HU-SK	404	0.4%
HU-RO	894	0.9%
HU-SL	262	0.3%
RO-BU	202	0.2%
BG-HE	139	0.1%
LT-LV	14	0.0%
LV-EE	22	0.0%
Total	99,059	100.0%

[45] It should be noted that the shuttle services between UK and France are not included in this study, as these provide services for car. The volume of passenger traffic on the shuttle is about 7 million passengers in 2008 (see case study).

Table A5.0.4 Number of international rail passenger trips per year between EU27 and neighbouring countries, in 1,000 trips

Non-EU Border crossing	Passenger rail trips 2007	Share of border crossing in total border crossing travel
FR-CH	5,488	20.7%
DE-CH	7,771	29.3%
IT-CH	5,560	21.0%
AT-CH	730	2.8%
SE-NO	837	3.2%
FI-RU	798	3.0%
PL-RU	373	1.4%
PL-BY	1,235	4.7%
PL-UA	590	2.2%
SK-UA	35	0.1%
HU-UA	22	0.0%
HU-RS	216	0.8%
HU-HR	243	0.9%
RO-UA	12	0.0%
RO-MD	136	0.5%
BG-RS	52	0.6%
RO-RS	34	0.1%
SL-HR	448	1.7%
BG-TU	38	0.1%
HE-TU	32	0.1%
HE-MK	28	0.1%
LT-RU	538	2.0%
LT-BY	148	0.6%
LV-RU	642	2.4%
EE-RU	301	1.1%
Total	26,478	100.0%

Table A5.0.5 Train occupancy on EU27 cross-border relations

EU27 Border crossing	Number of passengers at border crossings 2007 (in 1,000)	Number of train pairs per day (from Thomas Cook frequencies)	Occupancy (pass/train)
UK-EI	1,879	8	322
UK-FR	8,177	24	467
FR-BE	11,627	90	177
FR-LU	3,317	41	111
FR-DE	4,755	105	62
FR-IT	3,824	63	83
FR-ES	1,844	54	47
NL-DE	4424	97	62
NL-BE	5,562	57	134
BE-DE	3,033	20	208
BE-LU	2,199	43	70
LU-DE	513	21	33
IT-AT	2,949	13	311
IT-SL	94	1	135
PT-ES	432	4	148
DK-SE	19,662	71	379
DK-DE	1,527	23	91
DE-AT	8,312	121	94
DE-CZ	879	57	21
DE-PL	1424	69	28
AT-CZ	2,403	41	80
AT-SL	354	16	30
AT-HU	1,673	83	28
AT-SK	2,749	44	86
PL-LT	120	1	165
PL-SK	283	6	65
PL-CZ	418	13	44
CZ-SK	2,607	24	149
HU-SK	404	20	28
HU-RO	894	22	56
HU-SL	262	9	40
RO-BU	202	3	92
BG-HE	139	4	47
LT-LV	14	1	19
LV-EE	22	3	11
Total	99,059	1272	107

Table A5.0.6 Train occupancy on non-EU cross-border relations

Non-EU Border crossing	Number of passengers at border crossings 2007 (in 1,000)	Number of train pairs per day (from Thomas Cook frequencies)	Occupancy (pass/train)
FR-CH	5,488	107	70
DE-CH	7,771	120	89
IT-CH	5,560	64	119
AT-CH	730	10	100
SE-NO	837	12	96
FI-RU	798	3	364
PL-RU	373	1	512
PL-BY	1,235	10	169
PL-UA	590	4	202
SK-UA	35	6	8
HU-UA	22	2	15
HU-RS	216	6	49
HU-HR	243	10	33
RO-UA	12	1	10
RO-MD	136	3	62
BG-RS	52	2	36
RO-RS	34	3	16
SL-HR	448	15	41
BG-TU	38	1	53
HE-TU	32	2	22
HE-FY	28	2	19
LT-RU	538	4	184
LT-BY	148	6	34
LV-RU	642	4	220
EE-RU	301	2	206
Total	26,478	400	91

Table A5.0.7 International rail connections within EU27 for 2001, number of trains/day and cross-border traffic in 2001

EU Border crossing	Number of connections /links	HST/ICE	IC/EC	other LD	regional	Total trains 2001	Total trains 2009/ 2001
UK-EI	1	0	8	0	0	8	1.00
UK-FR	1	24	0	0	0	24	1.00
FR-BE	4	32	38	0	5	75	1.20
FR-LU	2	0	5	15	6	26	1.58
FR-DE	5	0	10	8	64	82	1.28
FR-IT	4	3	11	0	55	69	0.91
FR-ES	5	5	7	0	49	61	0.89
NL-DE	6	7	9	0	35	51	1.90
NL-BE	3	5	16	0	35	56	1.02
BE-DE	1	7	0	7	0	14	1.43
BE-LU	3	0	24	8	15	47	0.91
LU-DE	1	0	3	0	15	18	1.17
IT-AT	3	0	10	4	10	24	0.54
PT-ES	3	0	2	3	0	5	0.80
DK-SE	1	3	2	16	52	73	0.97
DK-DE	3	0	9	0	7	16	1.44
DE-AT	8	2	37	9	61	109	1.11
DE-CZ	6	0	10	3	26	39	1.46
DE-PL	7	0	8	6	35	49	1.41
AT-CZ	4	0	4	2	19	25	1.64
AT-SK	2	0	0	3	3	6	7.33
AT-HU	4	0	4	6	31	41	2.02
AT-SL	2	0	3	4	5	12	1.33
IT-SL	1	0	1	1	0	2	0.50
PL-LT	1	0	0	0	1	1	1.00
PL-SK	3	0	0	7	2	9	1.00
PL-CZ	4	0	3	9	6	18	0.56
CZ-SK	4	0	9	9	7	25	0.96
HU-SK	5	0	4	17	10	31	0.65
HU-RO	4	0	2	11	6	19	1.16
HU-SL	1	0	1	0	8	9	1.00
RO-BU	1	0	0	4	0	4	0.75
BG-HE	2	0	0	2	0	2	2.00
LT-LV	1	0	0	1	0	1	1.00
LV-EE	1	0	0	0	2	2	1.50
Total	107	88	240	155	570	1053	1.21

Table A5.0.8 International rail frequencies between EU27 – third countries for 2001, number of trains per day for cross-border traffic in 2001

Non-EU Border crossing	Number of connections /links	HST/ICE	IC/EC	other LD	regional	Total Trains 2001	Total trains 2009/2001
FR-CH	7	18	2	40	34	94	1.17
DE-CH	5	13	17	3	116	149	0.91
AT-CH	2	0	7	4	4	15	0.67
IT-CH	5	7	17	6	67	97	0.66
SE-NO	4	0	0	11	4	15	0.80
FI-RU	1	0	3	0	0	3	1.00
PL-RU	1	0	0	1	0	1	1.00
PL-BY	2	0	0	8	3	11	1.18
PL-UA	3	0	0	7	0	7	0.57
SK-UA	1	0	0	1	1	2	3.00
HU-UA	1	0	0	1	1	2	1.00
HU-RS	2	0	1	2	2	5	1.20
HU-HR	3	0	2	4	2	8	1.25
RO-UA	1	0	0	1	0	1	1.00
RO-MD	1	0	0	1	0	1	3.00
BG-RS	1	0	0	2	0	2	1.00
RO-RS	1	0	0	1	0	1	3.00
BG-TU	1	0	0	2	0	2	0.50
HE-TU	1	0	0	1	0	1	2.00
HE-MK	1	0	0	1	0	1	2.00
LT-RU	1	0	0	5	0	5	0.80
LT-BY	3	0	0	9	0	9	0.67
LV-RU	3	0	0	6	0	6	0.67
EE-RU	1	0	0	2	0	2	1.00
SL-CR	2	0	1	5	7	13	1.15
Total	54	38	50	124	241	453	0.93

Table A5.0.9 International rail connections within EU27 for 2007, number of passengers rail, road (bus and car) and air, including modal split

	rail	road	air	%rail	%road	%air
UK-EI	1,879	7,084	0	21%	79%	0%
UK-FR	8,177	25,716	31,937	12%	39%	49%
FR-BE	11,627	63,064	13,467	13%	72%	15%
FR-LU	3,317	23,135	305	12%	86%	1%
FR-DE	4,755	95,827	20,617	4%	79%	17%
FR-IT	3,824	47,464	16,160	6%	70%	24%
FR-ES	1,844	21,837	20,200	4%	50%	46%
NL-DE	4,424	72,685	7,183	5%	86%	9%
NL-BE	5,562	54,347	6,617	8%	82%	10%
BE-DE	3,033	24,089	4,258	10%	77%	14%
BE-LU	2,199	10,183	55	18%	82%	0%
LU-DE	513	5,586	71	8%	91%	1%
IT-AT	2,949	28,739	3,572	8%	82%	10%
IT-SL	94	19,895	7,110	1%	73%	26%
PT-ES	432	24,746	6,360	1%	78%	20%
DK-SE	19,662	25,262	7,623	37%	48%	15%
DK-DE	1,527	27,593	12,646	4%	66%	30%
DE-AT	8,312	92,657	13,238	7%	81%	12%
DE-CZ	879	58,218	2,698	1%	94%	4%
DE-PL	1,424	50,541	6,118	2%	87%	11%
AT-CZ	2,403	21,308	1,327	10%	85%	5%
AT-SL	354	15,043	1,450	2%	89%	9%
AT-HU	1,673	15,785	6,505	7%	66%	27%
AT-SK	2,749	6,482	377	29%	67%	4%
PL-LT	120	3,412	4,208	2%	44%	54%
PL-SK	283	45,506	430	1%	98%	1%
PL-CZ	418	10,869	893	3%	89%	7%
CZ-SK	2,607	6,014	172	30%	68%	2%
HU-SK	404	1,998	175	16%	78%	7%
HU-RO	894	3,826	4,298	10%	42%	48%
HU-SL	262	5,357	3,128	3%	61%	36%
RO-BU	202	6,554	3,846	2%	62%	36%
BG-HE	139	3,569	826	3%	79%	18%
LT-LV	14	18,160	3,701	0%	83%	17%
LV-EE	22	16,707	3,221	0%	84%	16%
Total	99,059	959,258	214,793	8%	75%	17%

Table A5.0.10 International rail connections between EU27 and third countries for 2007, number of passengers rail, road (bus and car) and air, including modal split

	rail	road	air	%rail	%road	%air
FR-CH	5,488	8,377	2,694	33%	51%	16%
DE-CH	7,771	41,638	6,098	14%	75%	11%
IT-CH	5,560	27,034	6,346	14%	69%	16%
AT-CH	730	7,295	632	8%	84%	7%
SE-NO	837	1,542	1,924	19%	36%	45%
Total	20,386	85,886	17,694	16%	69%	14%

Table A5.0.11 International rail, road, and air passengers within EU27 for 2020, number of passenger's rail, road (bus and car) and air, including modal split

EU27	rail 2020 in 1,000 passengers	road 2020 in 1,000 passengers	air 2020 in 1,000 passengers	%rail	%road	%air
UK-EI	2,324	8,090	0	22%	78%	0%
UK-FR	9,693	28,008	36,384	13%	38%	49%
FR-BE	13,768	69,591	16,164	14%	70%	16%
FR-LU	3,673	24,725	372	13%	86%	1%
FR-DE	5,716	103,538	24,287	4%	78%	18%
FR-IT	5,150	52,460	19,517	7%	68%	25%
FR-ES	2,514	24,286	23,317	5%	48%	47%
NL-DE	4,674	77,768	8,887	5%	85%	10%
NL-BE	6,454	59,773	7,929	9%	81%	11%
BE-DE	3,587	25,334	5,045	11%	75%	15%
BE-LU	2,406	10,880	68	18%	81%	1%
LU-DE	581	5,899	89	9%	90%	1%
IT-AT	3,609	31,322	4,433	9%	80%	11%
IT-SL	129	20,194	9,143	1%	68%	31%
PT-ES	591	29,151	7,513	2%	78%	20%
DK-SE	22,883	27,012	8,978	39%	46%	15%
DK-DE	1,746	28,760	14,850	4%	63%	33%
DE-AT	9,126	100,023	15,740	7%	80%	13%
DE-CZ	936	61,023	3,380	1%	93%	5%
DE-PL	1,555	52,908	7,695	3%	85%	12%
AT-CZ	2,531	25,354	1,860	9%	85%	6%
AT-SL	400	16,359	1,945	2%	87%	10%
AT-HU	1,717	16,305	7,647	7%	64%	30%
AT-SK	3,836	6,995	467	34%	62%	4%
PL-LT	167	4,041	5,087	2%	43%	55%
PL-SK	305	56,514	809	1%	98%	1%
PL-CZ	437	14,392	1,527	3%	88%	9%
CZ-SK	2,725	8,116	309	24%	73%	3%
HU-SK	501	2,564	380	15%	74%	11%
HU-RO	1,000	3,506	5,014	11%	37%	53%
HU-SL	279	5,865	3,875	3%	59%	39%
RO-BU	217	6,520	4,470	2%	58%	40%
BG-HE	145	3,504	983	3%	76%	21%
LT-LV	17	23,866	4,422	0%	84%	16%
LV-EE	36	21,978	3,691	0%	86%	14%
Total	115,452	1,056,625	256,272	8%	74%	18%

Table A5.0.12 International rail, road, and air passengers between EU27 Switzerland and Norway for 2020, number of passengers for rail, road (bus and car) and air, including modal split

EU27 – non-EU	rail 2020 in 1,000 passengers	road 2020 in 1,000 passengers	air 2020 in 1,000 passengers	%rail	%road	%air
FR-CH	6,381	9,120	3,214	34%	49%	17%
DE-CH	9,048	43,545	7,255	15%	73%	12%
IT-CH	7,130	28,257	7,484	17%	66%	17%
AT-CH	765	9,417	843	7%	85%	8%
SE-NO	1,761	1,653	2,298	31%	29%	40%
Total	25,085	91,991	21,094	18%	67%	15%

Table A5.0.13 International rail, road, and air passengers within EU27 for 2020, number of passengers rail, road (bus and car) and air, growth factor 2020/2007

	rail	road	air
EI-UK	1.24	1.14	0
UK-FR	1.19	1.09	1.14
FR-BE	1.18	1.10	1.20
FR-LU	1.11	1.07	1.22
FR-DE	1.20	1.08	1.18
FR-IT	1.35	1.11	1.21
FR-ES	1.36	1.11	1.15
NL-DE	1.06	1.07	1.24
NL-BE	1.16	1.10	1.20
DE-BE	1.18	1.05	1.18
LU-BE	1.09	1.07	1.22
LU-DE	1.13	1.06	1.26
IT-AT	1.22	1.09	1.24
IT-SL	1.16	1.02	1.29
ES-PT	1.37	1.18	1.18
SE-DK	1.16	1.07	1.18
DK-DE	1.14	1.04	1.17
DE-AT	1.10	1.08	1.19
DE-CZ	1.06	1.05	1.25
DE-PL	1.09	1.05	1.26
AT-CZ	1.05	1.19	1.40
AT-SL	1.13	1.09	1.34
AT-HU	1.03	1.03	1.18
AT-SK	1.40	1.08	1.24
PL-LT	1.39	1.18	1.21
PL-SK	1.08	1.24	1.88
PL-CZ	1.05	1.32	1.71
CZ-SK	1.05	1.35	1.80
SK-HU	1.24	1.28	2.17
HU-RO	1.12	0.92	1.17

	rail	road	air
HU-SL	1.06	1.09	1.24
RO-BG	1.08	0.99	1.16
BG-HE	1.05	0.98	1.19
LT-LV	1.23	1.31	1.19
LV-ES	1.24	1.32	1.15
Total	1.17	1.10	1.19

Table A5.0.14 International rail, road, and air passengers between EU27 and third countries, number of passengers for rail, road (bus and car) and air, growth factor 2020/2007

	rail	road	air
FR-CH	1.16	1.09	1.00
DE-CH	1.16	1.05	1.19
IT-CH	1.28	1.05	1.18
AT-CH	1.05	1.29	1.33
SE-NO	2.10	1.07	1.19

Annex 6 Case Studies

1) Case Study of Underutilised Links between Old and New EU Members; the Example of Italy–Slovenia

This case study is an example of an underutilised link between old and new EU Member States, specifically between Italy and Slovenia. Despite large urban agglomerations there is little regional rail service between the two countries and only one intercity train per day.

Rail transport: Slovene Railways (SZ) is a 100% state-owned public company. The state secures funds from the national budget on an annual basis for the development and maintenance of infrastructure, and to cover the gap between the costs and revenues of passenger and multi-modal transport.

In Italy, Rete Ferroviaria Italiana (RFI) is a rail infrastructure company which is part of the Ferrovie dello Stato (FS) Group. As the body responsible for the tracks, stations, signalling and overhead electrical equipment, RFI provides access to the rail network for Italian railway undertakings. Operational lines are over 16,300 km long.

Trenitalia SpA, 100% owned by the FS Group, manages passenger operations and logistics. About 500 million passengers are transported annually[46].

The FVG rail network consists of around 500 kilometres of tracks, including two double track "backbones"; Venice-Mestre to Trieste and Trieste via Udine to Tarvisio. The latter of these was recently modernised between Udine and Tarvisio to provide a capacity of 220 trains per day with a potential maximum speed of 200 kilometres per hour[47].

In Slovenia, more than 16 million passengers travelled by train during 2007, total usage being more than 812 million passenger-kilometres. More than 15,2 million of those passengers were making journeys within Slovenia, while almost 891,000 made international journeys[48]. The majority of international rail passengers were travelling to or from Slovenia Croatia, Austria, Germany, Serbia or Italy.

In 2007, 17,446 passengers moved to Italy from Slovenia (and back) and 20,386 passengers moved from Italy to Slovenia (and back)[49].

[46] Source: FS website
[47] Source: FVG region website
[48] Source: World Bank
[49] Source: Statistical office of the Republic of Slovenia, 2007

Figure A6.0.1 Rail Link Ljubljana-Venice

Currently, one rail service per day operates between Italy and Slovenia: the Euronight (EN) 240/241 Budapest Keleti to Venezia S.L.

The Eurocity 50/51 "CASANOVA" rail service ceased operation in April 2008, meaning that there are now no daytime rail connections between Italy and Slovenia, despite the relatively short-distances between the major centres. Today, Slovenian trains terminate at Nova Gorica and passengers must cross the border to Gorizia Centrale by bus or by taxi. This change of stations takes about 40 minutes.

However as part of Priority project 6 (Corridor 5), the Lyon-Turin-Milan-Trieste-Ljubljana-Budapest rail link, some € 872.2 million has been assigned for cross-border sections of the Turin-Lyon rail line, the Brenner Base Tunnel and the **Trieste-Divača line**. These sections will strengthen the ties between the Mediterranean areas, the Balkan regions and the northern regions of Europe[50]. Planning the modernisation of the current Venice-Trieste-Divača railway line is now going ahead, with works expected to commence during 2010.

The aim of the project is to increase the capacity of the existing railway corridor by creating a direct Trieste-Divača connection which will complement the existing line.

Relevant information on the project is as follows:

- Contribution from Italy: € 22,000,000.
- Contribution from Slovenia: € 28,700,000.
- Total project cost authorised by the EU Decision: € 101,400,000.
- EU contribution: € 50,700,000 (50% of works).
- Implementation schedule: December 2008 (Start date) to December 2013 (End date).
- Implementing bodies: Rete Ferroviaria Italiana s.p.a., Slovene Agency for the Management of Public Railway Infrastructure Investment[51].

[50] Source: "LISBON STRATEGY FOR GROWTH AND JOBS NATIONAL REFORM PROGRAMME 2008-2010" (Interministerial Committee for EU Affairs, 2008).
[51] TEN-T EA data-sheet, 2009.

Slovenian National Funding in the Transport Sector per Mode of Transport

Table A6.1 summarises Slovenian national funding in the transport sector per mode of transport, from 2001 to 2005[52].

Table A6.0.1 National funding (budget allocation) of transport in Slovenia per mode of transport, 2001- 2005 in million EUR

Year	Road	Rail	Air	IWW
2001	220,4	100,5	9,5	1,9
2002	243,8	96,4	8,6	1,4
2003	261,6	101	9,8	1,7
2004	289,6	134,6	8,9	2
2005	301,3	127,9	9	2
Total 2001-2005	1316,7	560,4	45,8	9
Share	68%	29%	2%	0%

Source: Official Journal of the Republic of Slovenia

Conclusions

In recent years, there has been investment in road connections between Italy and Slovenia, but railway links have not been enhanced. There are no daytime train services between the two countries; Slovenian trains terminate in Nova Gorica and a transfer taking 40 minutes by bus or by taxi is needed in order to transfer to Gorizia Centrale station in Italy.

The budget allocation per mode demonstrates the high level of spending on motorway development, and the more limited spending on rail, over the last few years. The planned new Trieste-Divača high-speed line provides an opportunity to improve rail connections, and therefore facilitate passenger cross-border movements by rail. Case study 6 presents more information on the Trieste-Ljubljana route.

2) Case study: High-speed Charter Trains between the Netherlands and the Costa Brava (Spain)

The Costa Brava is an important holiday destination for the Netherlands. The modes that are used are private car, bus and charter flight. A large Dutch tour operator was interested in exploring the possibility of a high-speed day train charter service. Once the Perpignan-Barcelona high-speed link is complete, practically all the rail journey between the Netherlands and the Costa Brava can be made on new high-speed lines (from the Netherlands, Brussels, around Paris, around Lyon, Perpignan, to the Costa Brava). The tour operator proposed to charter half a train on a weekly basis. During the planning process (around 2005) the tour operator was confronted with several organisational barriers and charges that would have to be paid by such a train. The conclusion was that tickets could not be offered at a price that would be competitive, which was felt to need to be about 150% of the price of the bus and around the same price (at that time) of charter flights.

[52] Study on Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion funds for the Programming Period 2007-2013, Ecorys (2006).

It would be interesting to determine whether the outcome of such a study would be different under the present regime of market opening of international passenger services. There are already (weekly) daytime high-speed trains services from the Netherlands to Provence in the summer and to French skiing areas in the winter. In these cases it is a rail operator that organises the service. The entry barrier for a tour operator, not being a rail operator itself, to organise such a high-speed charter service through four Member States could still be high. Besides the Dutch tour operator, there are others considering entry into the cross-border rail tourist market.

3) Case Study: Passenger Long-Distance Train between Sofia and Belgrade

This case study provides an example of a long-distance service between an EU Member State (Bulgaria) and a non-EU country (Serbia).

The daily night train from Sofia to Belgrade is operated jointly by BDZ (Bulgarian Railways) and Serbian Railways. The train is composed of 1 sleeping car, 1 couchette car and 2 day coaches. The quality of the rolling stock varies. Sometimes it is good, but sometimes it is less so. The day coaches are Serbian Railway coaches, while the others are shared between BDZ and Serbian Railways (BDZ for half the year, Serbian Railways for the other half). Serbian Railways provide the day coaches, because the train is also used as a domestic passenger train on Serbian territory.

Passenger occupancy over the year averages 4 to 8 passengers in the sleeping car, 4 to 6 passengers in the couchette car and 10 to 30 in the day coaches. During the August and September holiday season occupancy increases (up to 50%). Most travel is for personal purposes (holiday, family visits), and there is very little business travel on the train. These occupancy rates have been confirmed in the analysis of cross-border traffic.

The distance is 418 km and, according to the timetable, the journey time is 7 hours and 45 minutes for both day and night trains in both directions (after taking into account the 1 hour time difference between Sofia and Belgrade). Therefore, the average speed according to the time table is 56 km per hour. However the train rarely arrives on time. Delays vary between 45 minutes and 2 hours 30 minutes. Taking into account an average delay, an average speed of 35/40 km per hour is more likely. Interestingly border procedures do not normally cause this delay.

According to the timetable, the stopping time at the border station of Dimitrovgrad (on Serbian territory) is about 20 to 40 minutes. The border crossing actually normally takes 30 to 40 minutes; due to locomotive changes and technical control (brake tests). Passport and customs control is executed during the trip, by separate Bulgarian and Serbian teams; in other words, the passengers are disturbed several times per night for passport controls.

The trip involves 2 locomotive changes. The first section from Sofia to Dimitrovgrad at the border is electrified, and BDZ provides the locomotive. Diesel traction is needed from Dimitrovgrad to Nis; then from Nis to Belgrade

the line is again electrified. Traction in Serbia is provided by Serbian Railways. Much of the track is in poor condition, and hence there are many permanent and temporary speed restrictions.

Tickets are purchased in Sofia at the international ticket sales office. Tickets can only be purchased at the station for travel on that day. The price is € 60 for a return trip in the sleeping car. The train faces fierce competition from both cars and buses.

The passenger security on the train is generally sufficient due to the number of staff on the train, namely: 2 locomotive drivers, 1 steward in the sleeping car, 1 in the couchette car, and 1 conductor attending to the day coaches.

Revenues are estimated to be a maximum of € 1,000 per return trip; (excluding income from domestic journeys within Serbia). These revenues are shared between BDZ and Serbian Railways. Estimating the costs and revenues for this trip, based on WB data, the revenues generated by this train cannot cover more than 7-8% of the total costs.

4) Case Study: Germany to Basel; a Regional Border Crossing with a Non-EU Country

This case study gives insight into the regional rail passenger transport in the border triangle of Northwest Switzerland, South East France and the South Western part of Germany, maintained by the Swiss Railways SBB AG, their German subsidiary SBB GmbH, DB Bahn and SNCF. In the centre of the metropolitan cross-border region is the Regio S-Bahn Basel rapid transit railway.

The following table gives an overview of the operators in the tri-national region.

Table A6.0.2 Operators of the regional and tri-national rail passenger transport

Region	Operator (country code in brackets)
North-West Switzerland, Wiesental, Alsace	SBB (CH and D)
Upper Rhine (Offenburg, Freiburg, Basel)	DB Bahn (D)
Alsace	SNCF (F)

The (new) SBB GmbH is based in Konstanz (Germany) and represents a joint venture between Euro Thurbo GmbH in Konstanz and the (old) SBB GmbH in Lörrach, a German subsidiary of the Swiss SBB AG. Through the joint venture of the two enterprises in November 2005 SBB GmbH now provides passenger rail services in the border region around Lake Constance and the Basel-Lörrach area. The SBB GmbH runs two lines of the Regio S-Bahn, lines 5 and 6.

Regio S-Bahn Basel has been slowly developed since 1997 after a preparatory period of almost 30 years. The following are some to the obstacles which had to be overcome:

- The lines on the German side had to undergo a special cost-benefit analysis.
- The environmental impacts were studied in three different national assessments.
- The project had to overcome technical barriers, such as different national systems of electrification, signalling and safety.

Table A6.0.3 Services provided by Regio S-Bahn Basel between Switzerland-Germany-France

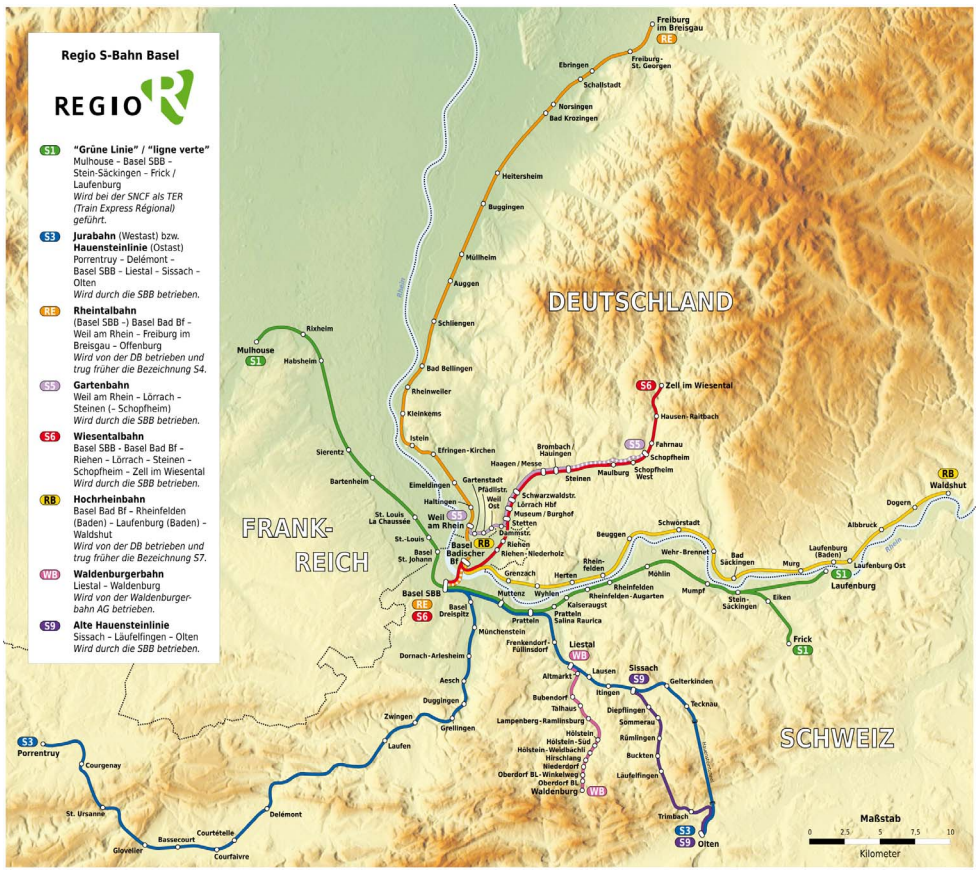
Line	Link	Operator	Frequency	Length	Number of trains 2008	Additional information
S1 (also known as: Grüne Linie or Ligne Verte)	Frick / Laufenburg-Basel SBB-Mulhouse	SNCF operates this train as TER (Train Express Régional)	80 S-Bahn trains (at 30-minute intervals: Basel SBB-Stein/S.) 40 trains operate directly from/to Mulhouse and St. Louis	79.6 km	88 NPZ (Colibri) 5 units, seating capacity: 356 (System SBB+SNCF) constantly replaced by FLIRT (12 trains)	additional night connections every Fri/Sat and Sat/Sun, and on 1.8. and on New Year's eve
S3 (Western branch also known as: Jurabahn; Eastern branch known as: Hauensteinlinie)	Olten-Basel-Laufen-Delémont-Porrentruy	SBB AG	80 SS-Bahn trains (at 30-minute intervals: Olten-Laufen) 38 S-Bahn trains (at 60-minute intervals: Laufen-Porrentruy)	104.79 km	20 FLIRT, seating capacity: 180, standing capacity: 220 3 NPZ (Colibri) 5 units, seating capacity: 356	additional night connections every Fri/Sat and Sat/Sun, and on 1.8. and on New Year's eve
S5 (also known as: Gartenbahn)	Weil am Rhein-Lörrach-Steinen	SBB Deutschland GmbH	60-minute intervals/ 30-minute intervals 54 S-Bahn trains	13 km	2 FLIRT, seating capacity: 180, standing capacity: 220	
S6 (also known as: Wiesentalbahn)	Basel SBB-Lörrach-Zell im Wiesental	SBB Deutschland GmbH	60-minute intervals/30-minute intervals 70 S-Bahn trains	34 km	8 FLIRT, seating capacity: 180, standing capacity: 220	
S9	Olten-Läufelfingen-Sissach	SBB AG	60-minute intervals 37 S-Bahn trains	18.19 km	1 NPZ (Colibri) 2 units, seating capacity: 128	

Source: Regio S-Bahn Basel

Apart from the two S-Bahn services, SBB GmbH also operates the "seehas" regional train in Switzerland between Konstanz and Engen, 45 km north-west of Konstanz. Additional train services are the Rheintalbahn between Basel (CH) and Weil am Rhein, Freiburg and Offenburg on the German side, provided by Basel SBB. Furthermore, Deutsche Bahn runs the "Hochrheinbahn" regional train between Basel and the German towns of Rheinfelden, Laufenburg and

Waldshut. Finally, there is a regional service (13.1 km) between Liestal and Waldenburg in Switzerland provided by the Waldenburgerbahn AG. The following map gives an overview of the available S-Bahn and regional rail services in the border triangle of Germany, France and Switzerland.

Figure A6.0.2 Basel Regio S-Bahn network



Source: Basel Regio S-Bahn

5) Case Study of Rail Baltica: Rail Transport with the Baltic Countries

This case study refers to passenger and freight rail movements on the "Rail Baltica" route (between Warsaw and Tallinn) as an example of rail links with Baltic countries.

The Rail Baltica corridor forms part of European Transport Corridor I. It connects Warsaw in Poland, via Lithuania and Latvia, to Tallinn in Estonia. The main rationale behind Rail Baltica is to develop high-quality passenger and freight links between the Baltic States and Poland (for which it is the only rail connection) as well as between the Baltic States and other EU countries through a Warsaw hub. The project contributes to the major EU objective of enhancingsustainability of transport, and ensures the transfer of some passenger and freight flows from road and air to rail. The corridor could provide a high–capacity and high quality rail link to the port of Tallinn, which is strategically important for passenger and freight transport from the Nordic

countries to the Baltic and on to other Central and Eastern European countries and vice versa. The Warsaw–Kaunas–Riga–Tallinn rail axis is one of the TEN–T priority projects completion of which is scheduled for 2016.

The total length of Corridor I from Warsaw to Tallinn is 1,193 km using existing lines. About 40% of the corridor is double track. The current maximum speed is 120 km/h. Nevertheless, due to interoperability problems and low maintenance, trains operate at lower speeds than this. Passenger line speed is 100–120 km/h, while freight line speed is 80-90 km/h. The Baltic countries make little use of north–south international rail freight links because of the poor quality of the existing network, low service levels and line speed. Currently, therefore, road transport caters for the major transport and freight flows along this axis.

The difference in track gauge is a crucial interoperability problem along the Rail Baltica corridor. Railways within the corridor include both 1,520mm and 1,435mm gauge systems (1,520mm in the Baltic States and 1,435mm in Poland). These meet at Sestokai in Southern Lithuania. Currently goods are transhipped between the two different gauge systems at Sestokai station using parallel tracks. A feasibility study prepared for DG Regio[53] investigated different options for re-constructing the whole Rail Baltica network to a single gauge. These options could utilise either the 1,435mm or the 1,520mm gauge as the preferred gauge, a decision which has not yet been taken. Meanwhile, therefore, the installation of an efficient gauge change mechanism remains an pressing interim requirement.

Another consideration for further development of the Rail Baltica corridor is the choice of alignment and, consequently, decisions must be made about the construction of new lines or the modernisation of existing ones. Feasibility studies by the consultancies COWI and SIA[54] have both shown that renovating the existing tracks is economically beneficial, and would help to reduce bottlenecks. These reports have also demonstrated the need for constructing new lines. It is possible, therefore, that a combined approach using both new and upgraded lines would be the most effective.

Although relatively small in size, density and economy compared to other EU countries and neighbours, the Baltic States' networks carry significant flows of international and transit freight traffic. For passenger transport, bus is rail's biggest competitor for both national and short-distance international travel. In particular, the rail share of the passenger market in Latvia and Estonia is remarkably low.

The completion of work on the Rail Baltica corridor (along which operations are expected to start in 2016) will increase passenger train speed to 160 km/h (with the possibility of increasing to 200 km/h) and freight train speed to 120 km/h. Journey times on this corridor will be reduced to such an extent that it will become possible to travel between Berlin and Riga in under 10 hours.

[53] COWI, "Feasibility study on Rail Baltica Railways", January 2007, Final report for the European Commission, Directorate-General Regional Policy.
[54] SIA "NK Konsultaciju birojs", "Rail Baltica Corridor Study. Assessment of the Rail Baltica railways corridor alternatives" January 2008, Final report.

6) Case Study: Development of Intercity Services Between EU15 countries and EU12 countries

The largest changes in supply between 2001 and 2009 took place between the old and the new Member States. These changes relate not just to higher service frequencies but also to improved travel times as a result of infrastructure investments and the removal or simplification of border crossing delays. However more investment is still necessary and it is planned to lift the quantity and quality of the EU15 - EU12 rail connections to the same levels as the connections between EU15 countries. In this case study the development of several cross-border routes between large conglomerations on both sides of the border between EU15 and EU12 Members will be described. These show a mixed picture.

Vienna (AT)-Budapest (H)

Vienna-Budapest has always been an important international route with a history of luxury trains running from Western Europe to the Orient. Today the main purpose of this route is to carry traffic between the two capitals of Vienna to Budapest, though most trains still run from through Vienna to and from other cities. The improved travel times (for the fastest train between Budapest Keleti and Wien West) and the number of daily train pairs is presented in Table A6.4.

Table A6.0.4 Development of supply on the Vienna-Budapest line (272km)

Year	Train pairs/day	Travel time	Speed (km/h)
1987	5	3h35	76
1992	11	3h18	82
2001	10	2h48	97
2009	11 (+ 10 Vienna-Gyor)	2h58	92 (90 on Vienna-Gyor section)

The number of trains increased immediately after the fall of the iron curtain in 1989 but speed improvements were only realised following infrastructure investments. In 2001, there was much variation in travel time, with most trains taking around 3h00. In 2009, a 2h58 travel time is achieved by EC branded trains running at 2-hour regular intervals. In 2001, one particular morning train that took the shorter route from Wien-Sud acheived a 2h32 travel time, but the longer route to Wien-West is used as the main Vienna station for the Budapest-Vienna line because most trains form part of longer services linking Budapest and Germany. Some reduction of the travel times between Budapest and Wien-West can be expected as a result of ongoing investment.

Recently an additional regular 2-hourly interval service between Wien Sud and Gyor has been introduced. The journey time is 1h31 for a distance of 135 km. This service has 3 intermediate stops and, with an average speed of 90 km/h, is relatively fast.

Vienna(AT)- Bratislava (SK)

Vienna and Bratislava are just 66 km apart but in 1987 there were only 4 trains per day. Following the fall of the iron curtain, the line through Marchegg was renovated, leading to a temporary increase in travel times. For example in 1992 there were only 3 long-distance trains per day with lengthy journey times between Vienna and Bratislava). In more recent years regular interval services

have been provided on both the direct route via Marchegg and the reopened route through Bruck/Leitha. In addition to these local trains, there is one long-distance train each day from Vienna with Kiev as its final destination, and 2 trains each day with origins west of Vienna.

Table A6.0.5 Development of supply on the Vienna-Bratislava line (66 km via Marchegg/74 km via Bruck/Leitha)

Year	Train pairs	Travel time to Bratislava Hlavna	Speed (km/h)
1987	4/day via Marchegg	1h07	59
1992	3/day via Marchegg	2h13	30
2001	12/day (two routes together)	1h20	50
2009	1/hour via Marchegg and 1/hour via Bruck/Leitha to Bratislava-Petzralska	57min (via Marchegg)	69

(Source: NEA)

Dresden (D)–Prague (CZ)

This line is now operated by through EC services along the Hamburg-Dresden-Prague-Brno-(Bratislava/Vienna/Budapest) route. Although the service pattern of through trains has not changed much over the years travel times have been reduced considerably. As most trains continue from Prague to Brno they only call in Prague at the Holesovice station which is not in the centre of the city. Nowadays, there is also a 2-hourly local train between Dresden and the Czech border town of Decin.

Table A6.0.6 Development of supply on the Dresden-Prague line (188 km)

Year	Train pairs/day	Travel time	Speed (km/h)
1987	9	3h23	56
1992	8	2h40	70
2001	8	2h33	74
2009	8/day + 8 local/day Decin-Dresden	2h06	90

(Source: NEA)

Berlin (D)-Stettin (PL)

Although the cities of Berlin and Stettin are only 138 km apart there have always been only a limited number of trains. From the border crossing, the trains are diesel operated. In addition to the single daily through service, there are also slow regional stopping services. Notably, the one through daily train now runs from Schiphol (NL) whereas in 1987 it formed part of the East Berlin-Gdansk service.

Table A6.0.7 Development of supply on the Berlin-Stettin route (138 km)

Year	Train pairs	Travel time	Speed (km/h)
1987	1/day	2h59	46
1992	4/day	3h42	37
2001	1/day from B-Lichtenberg +8/day with transfer in Angermunde	1h43	80
2009	1/day from B-Hauptbahnhof + a 2-hourly connection with transfer in Angermunde	2h06	66

(Source: NEA)

Trieste (I)–Ljubljana (SL)

Traffic by rail between these cities which are 144 km apart has always been light. The only passenger service crossing the Italian-Slovenian border nowadays is one daily train to and from Venice which does not serve Trieste. However, it has recently been announced that investment will be made to upgrade the line, which is important for freight flows[55].

Table A6.0.8 Development of supply on the Trieste-Ljubljana route (144 km)

Year	Train pairs/day	Travel time	Speed (km/h)
1987	5	3h22	43
1992	5	3h10	44
2001	2 (1day, 1 night)	3h05	44
2009	0		

[55] Case study 1 presents the Italian-Slovenian case, as an example of an under utilised link between old and new EU Member States.

7) Case Study of Cross-Channel Traffic: Competition between an International High-speed Link and Shuttle Service with Air, Bus and Ferry

The Channel Tunnel connects Folkestone (UK) to Calais (France) by rail. It is 50,5 km long and is used by high-speed Eurostar passenger trains, shuttle trains carrying road vehicles and international freight trains. Eurostar trains are operated by SNCF (France), by SNCB (Belgium) and by Eurostar (UK) Ltd. The shuttle trains are operated by Eurotunnel, the tunnel operating company. Since 2007, there has been open access and a simplified pricing system for freight.

Since it was opened in 1994, the tunnel has faced a number of problems with illegal immigration, and with occasional fires.

From 1993 to 2002, passenger travel from UK to continental Europe increased by 61%, and passenger travel from UK to near Europe increased by 41%. Passengers using the tunnel reached a maximum in 1998. In that year, 18,4 million passengers used the tunnel, 12,1 million using the shuttle and 6,3 million using Eurostar. At that time, the tunnel had 18% of the market to continental Europe, and 33% of the market to near Europe. Tunnel passenger traffic and market share declined after 1998 due to the loss of duty free privileges and the growth of low cost airlines.

In 2008, 16,1 million passengers used the tunnel, 7,0 million using the shuttle and 9,1 million using Eurostar. Given the known numbers for cars (1,907,484) and coaches (55,751) using the shuttle in 2008, it appears that shuttle passengers are split approximately between 4,5 million by car and 2,5 million by coach. These figures are confirmed by the cross-border analysis. These 2008 figures indicate a share for the tunnel of the order of 10% of all passengers between UK and Europe, including a share for Eurostar of the order of 6%. During 2008, 1,254,282 trucks (14,2 million tonnes) and 2,718 freight trains (1,24 million tonnes) also used the tunnel.

8) Case Study: International Car Sleepers with Destinations in France

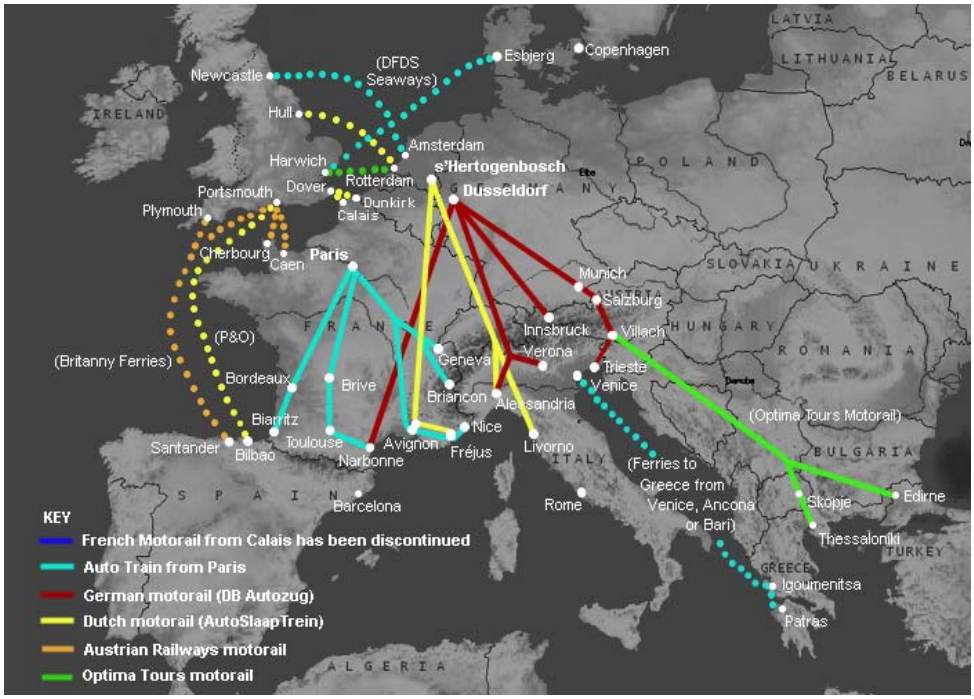
This case study first provides an overview of car sleepers in Europe in general. More detail is then provided for services with destinations in France. Finally, the car sleeper service operated by Dutch Motorail between 's Hertogenbosch (the Netherlands) and Avignon (France) is examined further.

Motorail (car sleeper) trains cover several domestic and international destinations in Western and Eastern Europe. Motorail trains carry cars, motorbikes, small trailers and roof boxes and sometimes over-height 4x4 vehicles and people carriers.

Italian railways operate car sleeper trains to various destinations within the country weekly all year around and daily in the summer. Example routes include Bologna-Palermo and Bologna–Cataniac. International sercices to Italy are provided by Dutch Motorail (between June and September from 's Hertogenbosch to Livorno and Bologna on a weekly basis) and German Motorail (one train per week between April and October from Dusseldorf to

Alessandria and Verona). German Motorail also provides an international service from Dusseldorf to Salzburg, Innsbruck and Villach in Austria (one or two trains per week between April and October) as well as a domestic service between Dusseldorf and Munich. During the summer months SNCF operates a car sleeper service between Paris and Geneva (Switzerland) up to three times per week. Further car sleeper trains are provided by German and Austrian operators to several destinations in Central, East and South East Europe such as Bulgaria, Macedonia, Greece, and Turkey. The major international and national routes are shown on the map below.

Figure A6.0.3 Major international and national lines for car sleepers



Source: ITS

In France, the SNCF's car/train service comprises several overnight car-carrying trains within France, with some services to neighbouring European Member States as well. In the past, all these car/trains also carried sleeping cars. Many no longer allow passengers to travel on the same train as their cars. Typically, passengers drop off their car any time during the day and then use a separate train to reach their destination, where they can pick up the car any time the following day.

The service is available between 18 railway stations. Gare de Bercy in Paris is the main car/train terminal and there are terminals in the of Avignon (separate station), Auray, Biarritz, Bordeaux, Briançon, Brive, Fréjus-St-Raphaël (separate station) Lille-Seclin, Lyon-Perrache, Marseille-Saint-Charles, Mulhouse, Metz, Nice, Narbonne (separate station), Nantes, Strasbourg, Tarbes, Toulon and Toulouse. The automobiles are carried on open railcars, and for that reason the SNCF offers passengers a free car wash in the destination city.

There are now just two important sleeper services that still carry both cars and passengers overnight. One train runs overnight from Calais to Avignon, Fréjus (for St Tropez) and Nice (convenient for the Italian Riviera). The other runs overnight from Calais to Brive, Toulouse and Narbonne (convenient for the Spanish Costa Brava). These services from the north to popular holiday destinations operate during the summer months (May to September) only.

Car/train services offer a very convenient way to transport families with their cars and luggage over long distances between the North and the South of France. Italy or Spain is then within easier range by road, as Narbonne and Nice are relatively short drives away from the Spanish or Italian borders. Ticket prices include the exclusive private use of a whole six-berth or four-berth couchette compartment and continental breakfast at the destination. One and two berth sleepers were withdrawn from French Motorail trains in 2006.

The service is used by families, couples and touring motorcyclists, to name just three typical groups. There is known to be a significant element of repeat-business loyal customers who return year after year. The service offers several advantages to these groups compared with either driving the whole distance or using air travel:

- There are sleeping compartments exclusively for passengers travelling with car or motorcycle;
- There are evening departures, so passengers can relax, sleep and enjoy their journey, rather than endure it;
- Passengers can take as much luggage as they can fit into their vehicle without having to worry about excess baggage fees;
- French toll road fees are avoided and savings are made on mileage, petrol and vehicle wear and tear.

SNCF markets the services through agencies based in the relevant European Member States. For example, for the UK "French Motorail" is a subsidiary of Rail Europe, which is itself, a UK-managed subsidiary of SNCF (French Railways). Rail Europe contracts with SNCF (French Railways) to run the trains and provide the wagons and coaches, but provides its own English-speaking staff for the terminals and on board the trains.

'S Hertogenbosch (the Netherlands)–Avignon (France)

Auto SlaapTrein between 's Hertogenbosch and Avignon (1,191 km) is operated by Euro Express Trein Charter, a private company which took over the Dutch Railway's motor rail service when they were privatised in 1996. The train operates once a week from June to late September, southbound on Friday nights, north-bound on Saturday nights. Thus, between June and September 28 trains circulate in this route in both directions. The tariffs of the train are flexible and vary according to the date of travel, type of car and passenger accommodation.

Table A6.0.9 Timetable for the 's Hertogenbosch-Avignon car sleeper

Routes	Departure	Arrival
's Hertogenbosch-Avignon	Friday, 18.00 Load cars 14.00- 16.30	Saturday, 07.35
Avignon-'s Hertogenbosch	Saturday, 19.16 Load cars 16.00 – 17.45	Sunday, 08.25

9) Case Study of Night trains: CityNightLine

This case study illustrates the niche market for night trains. CityNightLine (CNL) is a European overnight sleeper train company wholly-owned by German Railways DB AutoZug GmbH. This company controls the business of DB Autozug (which provides motorail services) and is commercially responsible for EuroNight and D-Nacht services. CityNightLine AG is its Swiss sister company, registered in Zurich. The DB AutoZug GmbH business has been a train operating company in its own right since 2002.

CityNightLine AG originated as a joint project undertaken by Deutsche Bahn (DB) (German Federal Railways), Austrian Federal Railways (Österreichische Bundesbahnen, ÖBB) and Swiss Federal Railways (SBB-CFF-FFS). CityNightLine's first train service was operated in May 1995. SBB-CFF-FFS and ÖBB have since ended their collaboration with CNL, which is currently a daughter company of DB incorporated under Swiss law.

The current owner of CityNightLine sleeper trains, DB AutoZug GmbH, is now a wholly-owned subsidiary of DB Fernverkehr AG. The latter has had control of DB Autozug since the start of 1997 and the CityNightLine business since the end of 1998. Commercial responsibility for EuroNight and D-Nacht services likewise passed to DB AutoZug GmbH in 2003.

DB European Railservice (DB ERS) encompasses the core competencies of passenger care, hospitality and on-board operational services for overnight travel as well as being responsible for the initial and advanced training of service staff and for drafting and putting into effect a concept for service and catering on board trains. DB European Rail service is a wholly-owned subsidiary of DB AutoZug GmbH. Its various business areas employed 1,030 staff as per July 2007.

CityNightLine services operate overnight on an extensive range of routes, including:

- Paris-Berlin
- Paris-Munich
- Amsterdam and Cologne-Prague
- Amsterdam and Cologne-Copenhagen
- Amsterdam and Cologne-Milan
- Amsterdam, Cologne, Frankfurt-Vienna
- Amsterdam-Munich and Zurich
- Berlin-Zurich, Hamburg-Munich and Zurich

Services are of a consistently high standard. Customers have a choice of accommodation at various price levels. Facilities include private compartments in sleeping cars with various levels of washing and showering facilities. These compartments are of various sizes and can accommodate between one and three persons; couchettes or simple bunks in shared compartments of four or six berths; or ordinary seats in six seat compartments or open plan cars with reclining seats. Double-deck sleeping cars, built especially for the company, are used by CityNightLine on some routes. Some trains also include a restaurant car for the whole journey or a part thereof and passengers can order breakfast to be served in their compartments.

Most CityNightLine sleeper trains have a special bicycle compartment with space for several bikes. These spaces must be reserved in advance, and a fee must be paid per bike per journey. Disabled people are also catered for; wheelchair-accessible couchette car cabins have accessibly designed layouts and there are wheelchair-accessible sanitary facilities. Additional services for passengers on some routes include car-sharing facilities at the route ends and bicycle loan facilities in destination cities.

In the previous section we have described RU's that have international cross-border services as part of their total operations (including domestic). In this section we describe joint ventures or specific RU's that concentrate on cross-border activities. This is done via a case study description as there are many ways of setting up international services which cannot be captured or analysed in a fixed format which will do justice to the detail and complexity of cooperation. Such cooperation can take many forms, as will be demonstrated in the following case studies:

a) Case study of mixed regional/long-distance operators: services between Copenhagen and Malmö.
b) Case study of Arriva: a private operator under a PSO contract.
c) Case study of joint operators: Cisalpino - rail passenger services between Italy and Switzerland.
d) Case study of joint operators: the Railteam alliance of operators.
e) Case study of joint operators: Eurostar.

10) Case Study of Mixed Regional/Long-Distance Operators: Services between Copenhagen and Malmö

This case study of rail services between Sweden and Denmark provides an example of regional and long-distance services provided by different operators. The Oresund Railway (Swedish: Öresundbanan, Danish: Øresundbanen) is a railway between Copenhagen in Denmark and Malmö in Sweden across the Oresund Bridge. The railway infrastructure on the Swedish side is managed by Banverket and that on the Danish side by Banedanmark.

DSB had previously been responsible for operations in Denmark and the Swedish State Railways, SJ, for those in Sweden.

Since the Oresund Bridge opened in 2000, Öresund trains have provided services between Elsinore and the Sound and into the Scania, Halland, Kronoberg, Kalmar and Blekinge provinces.

From Elsinore in the west to Gothenburg and Kalmar in the east there are 79 train sets running on an extensive rail network through the Øresund Region. This has placed considerable demands for train equipment to be adaptable to a range of differences requirements. It has also placed demands on the local knowledge of the personnel.

The operation of such a complex area network involves many different systems and authorities; different owners of the trains, various transport companies, various municipalities, counties and administrations. All parties are interdependent and must work well together if the trains are to run safely and on schedule.

Oresund trains are now operated by DSBFirst between Copenhagen and Malmö, with connections to Gothenburg, Kalmar and Karlskrona. DSBFirst is a partnership between the Danish state railway DSB and UK-based transport operator FirstGroup and took over the operation of train services between the Øresund region of Denmark and Southern Sweden in January 2009.

On the Danish side many trains continue northwards on Kystbanen to Elsinore. DSB operates Oresund trains to Ystad with a ferry connection to Bornholm. SJ operates X2000 high-speed trains on a Stockholm-Malmö-Copenhagen service and Oresund trains between Gothenburg and Copenhagen. Freight trains are operated by Railion using EG locomotives.

The services are operated under separate but jointly procured contracts in each country. The Swedish operating franchisee, which is owned 70% by DSB and 30% by FirstGroup, provides services from Malmö to Karlskrona, Göteborg and Kalmar. The main contracting party is the regional transport agency Skånetrafiken, with separate contracts with a number of counties. The Kystbanen franchise for services in Denmark was awarded by the country's National Rail Authority. The operator is owned 75% by DSB and 25% by FirstGroup, and replaces DSB as the former incumbent. DSBFirst operates up to 18 trains an hour between Helsingør and København, and six trains an hour over the Øresund Bridge. There is a plan to increase cross-border services to 12 trains an hour. Both franchises run to 2015, with an optional two year extension. The operations are considerable, with a total combined annual turnover estimated at DKr 7 billion.

11) Case Study of Arriva: A Private Operator under PSO Contract

This case study provides an example of regional services operated by a private operator under PSO contract. The example refers to the service provided by Arriva on the link between Groningen (Netherlands) and Leer (Germany).

The service across the border crossing between Nieuweschans (NL) and Leer (DE) is operated by Arriva Netherlands as part of a concession acquired through tendering including a network of 6 lines in the North of the Netherlands. There is a PSO contract involving both a Dutch Authority (Groningen Province) and a German one (Landesverkehrsgesellschaft Niedersachsen). Nowadays a two-hourly diesel train service between Nieuweschans and Leer is provided; at the Dutch side these trains run to and from the city of Groningen integrated into the more frequent Nieuweschans-Groningen service. Only train sets adjusted

for the German signalling system and staff that fulfil requirements set out by the German authorities are used on the through trains. Occupancy at the border point is modest. Arriva is responsible for the revenues (on a net costs contract); the cross-border service receives a yearly subsidy as specified in the concession contract paid by the authorities on each side of the border.

In the 1960s there were 2 through trains a day between Groningen and Bremen, running as semi-fast trains on the stretches between Groningen and Nieuweschans and between Leer, Oldenburg and Bremen. A third daily train ran between Nieuweschans and Oldenburg. This cross-border service was gradually downgraded to three local trains a day in the eighties and nineties. The infrastructure was in poor shape, passenger numbers were low and closing the line was under consideration. A study commissioned by the Province of Groningen and the Land Niedersachsen showed that further into the future within a united Europe the cross-border connection had some potential and the authorities decided not to close the line and instead to improve the infrastructure (with the help of European subsidy) and to increase the frequency to the present two-hourly service.

12) Case Study of Joint Operators: Cisalpino - Rail Passenger Transport between Italy and Switzerland

The purpose of this case study of Cisalpino is to illustrate the operational performance of a service which combines intercity, regional and high-speed rail transport between an EU and a non-EU country.

Introduction

Cisalpino AG is a jointly-owned subsidiary of Trenitalia SpA and SBB AG founded in 1993. Both companies hold an equal share in Cisalpino AG. In September 2009 however, SBB and Trenitalia decided to terminate their cooperation with the introduction of the new 2009/10 timetable. All services will be transferred back to SBB and Trenitalia.

Cisalpino operates international services between Italy and Switzerland. The company's main office is in Berne. Other offices are located in Zurich, Visp and Milan. The personnel for the train crews are supplied by the SBB, Trenitalia, Elvetino, Cremonini and various cleaning companies. Since December 2005, all international trans-alpine day services between Italy and Switzerland have been operated by Cisalpino, now serving no less than 76 destinations, carrying 12 million passengers and totalling 7.2 million kilometres per annum[56]. The Cisalpino rail network offers passengers the quickest way through the Alps, with some 50 daily services connecting the main cities in North Italy and Switzerland.

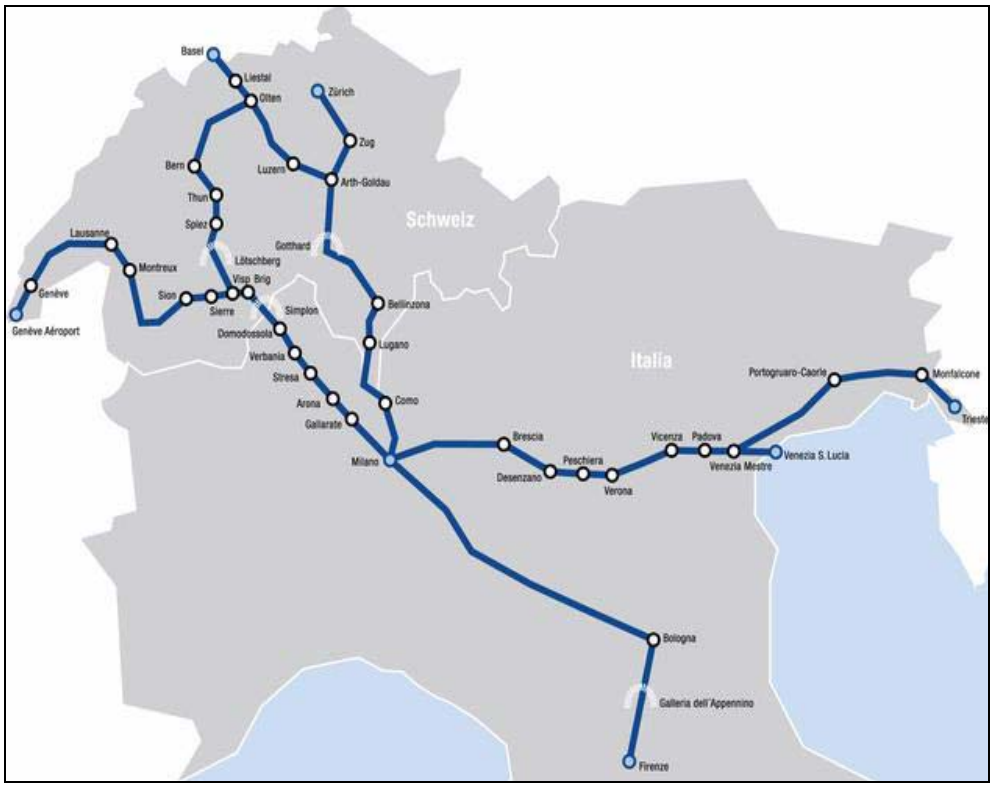
Currently, the company employs 42 people (32 in Switzerland and 10 in Italy) and operates a fleet composed of:

- ETR 610 (Cisalpino II); with its super sleek design and state-of-the-art technology, the ETR 610 reaches a speed of 250 km/h.

[56] Information referred to 2007.

- ETR 470 (Cisalpino I) equipped with a tilting system allowing it to maintain speed on bends.
- EC-trains (Conventional rolling stock) hired from parent companies SBB and Trenitalia for some Cisalpino routes.

Figure A6.0.4 Routes operated by Cisalpino in 2009



Financial Performance of the Company[57]

Operational performance of the company from 2005, when it became the sole operator of long-distance day services between Switzerland and Italy, shows an improving trend until 2007, when it reached its maximum, followed by a slight decline in 2008. In more detail, in 2005 the Cisalpino fleet covered around 4,9 million train-kilometres in 2005, generating a total of some 900 million passenger-kilometres. Compared with 2004, revenues in 2005 increased by 60% to around CHF 160 million (€ 102 million). Part of this growth can be attributed to the transfer of three Geneva–Milan and three Basel–Milan services from SBB's long-distance services unit to Cisalpino.

2007 was a successful business year for the company. The number of passengers increased to 12,4 million and passenger-kilometres totalled 1,52 billion which amounted to a 7% increase in transport performance (2006: 1,42 billion passenger-kilometres). Revenues increased by 7% to CHF 229.5 million (€ 151 million) compared to 2006 and the EBIT was CHF 25 million (€ 16 million) 20% higher than the previous year.

[57] All information in this paragraph come from SBB AG 2005-1006-2007-2008 Annual Reports.

In 2008, the number of passenger-kilometres fell marginally to CHF 1, 48 billion. At CHF 227.6 million (€ 150 million) operating income was also below the previous year's figure.

Operational Issues[58]

Despite the the company's encouraging financial results, it has faced major operational issues during the past four years.

In 2005 Cisalpino ordered 14 new high-speed tilting trains (ETR 610) in preparation for the substantial expansion of services scheduled to take place following the opening of the Lötschberg base tunnel. In the same year the company invested a total of some CHF 165 million (€ 106 million) in rolling stock and infrastructure. New trains were planned to be ready by 2009.

At the time of the timetable change in December 2008, the company needed to lease an increased amount of rolling stock from SBB and Trenitalia. There were two reasons for this; firstly the delayed delivery of the new ETR 610 trains and secondly disruptions to the service resulting from maintenance problems on the ETR 470 fleet. The maintenance work on the passenger comfort features in the ETR 470 was handed over to SBB in Basel.

Cisalpino trains recorded a huge number of delays, cancellations and technical problems. At the beginning of 2009 the FTO (Swiss Federal Office of Transport) was forced to investigate the possibility of reducing the service if quality did not improve. Due to numerous measures such as technical improvements and training of the engine drivers on the ERT 470 fleet, the FTO concluded that the Company was on its way to solving the problems.

However, in September 2009, the company announced that Cisalpino will cease to manage international passenger traffic between Italy and Switzerland with the introduction of the new timetable scheduled for 13 December 2009, because Cisalpino's parent companies, SBB AG and Trenitalia SpA, had made the decision to handle railway traffic independently.

13) Case Study of Joint Operators: the Railteam Alliance of Operators

Seven European high-speed rail operators have formed an alliance to provide seamless high-speed rail travel across Europe. This alliance will make international travel connections easier.

The following train operators are part of Railteam:

- Deutche Bahn
- SNCF
- Eurostar UK
- NS Hispeed
- ÖBB
- SBB-CFF-FFS
- NMBS/SNCB

Associate members are:

- Thalys (France/ Belgium/ Germany)
- Lyria (France/ Switzerland)

[58] All information in this paragraph come from SBB AG 2005-1006-2007-2008 Annual Reports and from Trenitalia.

- Alleo (France/ Germany)

Railteam believes that it can build on the high levels of comfort, punctuality and reliability offered by high-speed services such as ICE, TGV, Eurostar, Thalys and TGV Lyria. The operators claim that extensive research has shown that business travellers are willing to travel up to four hours by rail because of the increased productivity compared to air travel, whilst leisure travellers are prepared to enjoy longer journeys of up to around six hours.

Other operators are permitted to join Railteam subject to quality standards such as air conditioning, seat widths, on board and multilingual staff. Trains must be capable of reaching a minimum speed of 230 km/hour.

Much is made of the coordination of departure and arrival times between partners and of remedies for missed connections. In addition, single transaction ticketing and reservations are offered.

The high-speed train operators claim that Railteam is their answer to the airline alliances such as Sky Team, Oneworld and Star Alliance. Railteam, like the airline alliances, uses hubs, joint frequent business traveller programmes and reciprocal lounge access between member operators. The five Railteam hubs are:

- Brussels
- Lille
- Cologne
- Frankfurt
- Stuttgart.

By 2010, the Railteam members expect 25 million international travellers per annum to be using their European high-speed rail network.

14) Case Study of Joint Operators: Eurostar

Eurostar provides high-speed rail passenger services from London to Paris and Brussels via the Channel Tunnel. Until recently services were operated by SNCF (France), by SNCB (Belgium) and by Eurostar (UK) Ltd., but it is now a jointly owned subsidiary. Eurostar services are operated under a unified management known as the Eurostar Group. The different constituent members undertake local operations. It is claimed that this will permit a faster reaction to change, as the management will no longer need to obtain the agreement of three separate operating companies to any changes proposed. Eurostar uses high-speed lines in France, Belgium and the UK.

Since services through the Channel Tunnel began in 1994, the Belgian high-speed line has been opened in 1997 and the UK high-speed line opened in two stages: the first stage in 2003 and the second stage in November 2007 when the London terminus moved from Waterloo International to St Pancras.

By 2004, Eurostar had captured a 68% share of the London to Paris market.

The UK is not part of the Schengen agreement; hence Eurostar passengers are submitted to border and luggage controls. There are 17 weekday services from London to Paris (20 on Fridays) and 11 weekday services from London to Brussels. In addition, there are various daily and seasonal services from London to Paris Disneyland, to Avignon, and to the Alps for skiers.

Currently, there are intermediate stations at Ebbsfleet, Ashford, Calais and Lille. There do not appear to be any plans at present for Eurostar services to call at the soon to be opened Stratford International station. Also there appears to be no plan to extend services to UK regions at least until high-speed lines towards the north (HS2) is built.

There is a longer term plan to build a high-speed line (LGV Picardie) from Calais, via Amiens, to Paris, This a considerably shorter route than LGV Nord via Lille, and could save 20 minutes on the journey from Paris to London. There are also very recently announced plans to connect LGV to La Defence in Western Paris.

Extension of Eurostar services beyond Paris and Brussels would require the installation of special security measures since the UK is outside the Schengen agreement. Furthermore, if services are to be extended outside France and Belgium, the rolling stock may have to be heavily modified to operate at different voltages. Currently, Eurostar has rather chosen to develop connections with other services such as Thalys. With the opening of the European rail market in 2010, Air France/KLM has indicated that it will apply to operate services between Paris and London, and between Paris and Amsterdam. Deutsche Bahn (DB) also has aspirations to operate its ICE trains between Germany and London.

15) Case Study of Technical Barriers: Ukraine–Poland

This case study elaborates on the technical barriers facting rail freight transport in Eastern Europe due to the difference in track gauge between Poland and Ukraine.

The Poland-Ukraine border is 542 km long. It has 12 border crossing points, of which three are used only by road transport. By way of comparison, the Poland–Germany border (500 km) had 38 border crossings before Poland entered the Schengen agreement, from which 19 were reserved only for road transport.

The gauge of the Ukrainian railroad is 1,520mm (the same as in the Russian Federation and Finland) which differs from the 1,435mm gauge of the majority of EU Member States, including Poland. The gauge change at the Ukrainian–Polish border is a major obstacle to interoperability, as it is time-consuming and slows down the freight and passenger transport flow. For example, at present the distance of 690 km between Warsaw (Poland) and Kiev (Ukraine) is covered by passenger trains within 17–18 hours, of which at least 3 hours are used for the gauge change at the border (and excluding the time for border and customs controls).

The Polish and Ukrainian authorities, the European Community (who are interested in options for extending Pan European Corridor III) and Russia and China (through their interests in promoting direct rail transport access to the European Community) are all interested in the removal of technical and administrative bottlenecks at this border. Several options exist that will be described below.

The first option is the construction of a new rail link to the 1,435mm track gauge between Lviv (Ukraine) and Peremishl (Poland). This project is consistent with the aim of possible extension of International Transport Corridor III and is supported by several West European countries. The overall length of the proposed linkis 84 km; the estimated project cost is some € 500 million. Focused on the development of passenger transport more than on freight, this project will allow an increase in speed up to 160 km/h.

A second option is supported by Russian Federation and Poland. A wide gauge (1,520mm) rail line of more than 430 km in length from the Ukrainian border to Slavkuv in Poland already exists but is not operated. Therefore, an alternative or a complementary project involve be the modernisation of this line and construction of missing sections further towards Germany. This option is considered to be oriented more to freight transport and would assist in the connection of Western Europe to Russia and Asia by rail transport.

The third alternative is an installation of an automatic switch system between track gauges one at the border. Different technical solutions have been studied, offering very significant reductions in the border crossing times for passenger trains.

Annex 7 Technical Specifications according to Border Crossing

Table A7.0.1 Technical specification per border crossing within the EU27

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
UK-EI	Belfast	Dublin	D, broad-gauge
UK-FR	London	Paris/Brussels (BE)	[E/E/E*] The Channel Tunnel is electrified at 25 kV 50 Hz; all trains (other than Eurotunnel works trains) using it must be equipped with TVM430 cab signalling and must meet stringent fire resistance standards.
FR-BE	Lille	Gent	[E*] The neutral section between the SNCB 3kV and the SNCF 25kV 50Hz is a few kilometres south of Mouscron. Passenger services between Lille and Brugge and between Lille and Antwerpen via Gent are worked by SNCB dual-system EMUs.
FR-BE	Lille	Mons- (Liege)	[E*] A neutral section just west of Froyennes separates SNCB and SNCF electrification and only dual-system electric motive power can use the line. SNCB dual-system EMUs run hourly between Lille and Liège.
FR-BE	(London)-Lille/Paris	Brussels (-NL/D)	[E] Electrification at 25 kV 50Hz is to SNCF standards as far as the end of the high-speed line at Lembeek (15 km from Bruxelles) with neutral sections there and at the intermediate access points near Antoing and near Ath. Only trains equipped with TVM430 cab signalling can use this line.
FR-BE	minor crossings		[E*] 3kV dc extends to Jeumont, where there are transfer tracks in the station and freight sidings.
FR-LU	Longwy	Luxembourg	[E] CFL operates the passenger train service to Longwy.
FR-LU	(Basel/Paris)-Metz	Luxembourg-(Brussels)	[E] International trains to and from Luxembourg are formed of SNCF electric locos hauling either CFL or SNCF stock. Local trains between Metz, Thionville and Luxembourg are worked by both SNCF and CFL
FR-DE	Thionville	Trier	[E*]. Passenger services terminate short of the border, SNCF at Apach (F) and DB at Perl (D).

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
FR-DE	(Paris)-Strasbourg	Saarbrucken (-Frankfurt)	[E*] DB ICE trains worked by dual-system units. SNCF diesel multiple-units are used on local trains.
FR-DE	Strasbourg	Saarbrucken	[E] Stadtbahn Saar GmbH operates a light rapid transit system between Sarreguemines and Saarbrücken, using DB and SNCF tracks south from Brebach. The through workings between Strasbourg and Saarbrücken are operated by SNCF diesel multiple-units. The line between Sarreguemines and Saarbrücken is electrified at the German standard 15kV 16.7Hz.
FR-DE	Wissembourg	Neustadt	[D] DB works to Wissembourg.
FR-DE	(Paris)-Strasbourg	Kehl-(Karlsruhe-etc)	[E*] DB works long-distance passenger trains and some local services to Strasbourg using dual-frequency locomotives. Local trains between Strasbourg and Offenburg comprise diesel rail cars.
FR-IT	(Paris)-Chambery	Modane -(Milano)	[E*] FS works to Modane, with locomotives operating at reduced power under SNCF 1,500V catenary. Multi-system TGVs operate between Paris and Milano.
FR-IT	Breil	Torino	[D] FS operates the whole line
FR-IT	Breil	Ventimiglia	[D] FS works to Breil-sur-Roya.
FR-IT	(Paris)-Cannes-Nice	Ventimiglia (Genova)	[E*] SNCF works to Ventimiglia (I). The line from Marseille is electrified at 25kV 50Hz, but Ventimiglia station itself is 1,500V dc. This system can be used by both the SNCF dual-system locomotives that operate in the area and by FS 3kV dc stock.
FR-ES	(Paris)-Narbonne	Barcelona	Although lines of both gauges (1,435mm and 1,668mm) cross the borders at Cerbère/Port-Bou and Hendaye/Irun, passenger carrying trains normally run only from France to Irun and Port-Bou, while those from Spain normally run only to Hendaye and Cerbère, i.e. trains run empty in the reverse directions. There are some through trains on each route which undergo change of carriage bogies (or have their wheel spacing adjusted) at the frontier. RENFE 3,000V dc trains operate at reduced power under 1,500V dc catenary in the border areas.

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
FR-ES	La Tour de Carol	Barcelona	Although lines of both gauges (1,435mm and 1,668mm) cross the borders at Cerbère/Port-Bou and Hendaye/Irun, passenger carrying trains normally run only from France to Irun and Port-Bou, while those from Spain normally run only to Hendaye and Cerbère, i.e. trains run empty in the reverse directions. There are some through trains on each route which undergo change of carriage bogies (or have their wheel spacing adjusted) at the frontier. RENFE 3,000V dc trains operate at reduced power under 1,500V dc catenary in the border areas.
FR-ES	(Paris)-Hendaye	Irun- (Madrid)	Although lines of both gauges (1,435mm and 1,668mm) cross the borders at Cerbère/Port-Bou and Hendaye/Irun, passenger carrying trains normally run only from France to Irun and Port-Bou, while those from Spain normally run only to Hendaye and Cerbère, i.e. trains run empty in the reverse directions. There are some through trains on each route which undergo change of carriage bogies (or have their wheel spacing adjusted) at the frontier. RENFE 3,000V dc trains operate at reduced power under 1,500V dc catenary in the border areas.
FR-ES	Henday	Irun	[E] Metre-gauge railway operated by Eusko Trenbideak/Ferrocarriles Vascos.
NL-DE	(Groningen)-Nieuweschans	Leer	[D]
NL-DE	(Schiphol)-Hengelo	Bad Bentheim- (Berlin)	[E*] various tracks have switchable catenary.
NL-DE	Enschede	Gronau-(Munster/Dortm)	D, no through service in NL beyond Enschede
NL-DE	(Schiphol)_Arnhem	Emmerich-(Koln-Frankfurt)	[E*] various tracks have switchable catenary. ICE services, worked by dual-system units,
NL-DE	Venlo	Kaldenkirchen- (M Gladbach)	[E*] Voltage switching is provided in Venlo station area.
NL-DE	Heerlen	Aachen	[D]
NL-BE	Maastricht	Liege-(Brussels)	[E*] The voltage change point is at Maastricht Randwijck. SNCB standard electric multiple-units work to Maastricht, operating at reduced

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
			power under the NS 1,500V dc catenary. Locomotive-hauled passenger trains are usually worked by SNCB dual-voltage electric locomotives.
NL-BE	(Amsterdam)-Roosendaal	Antwerp-(Brussels-Paris)	[E*] The voltage change point is just south of Roosendaal. SNCB standard electric multiple-units work to Roosendaal, operating at reduced power under the NS 1,500V dc catenary. The passenger service between Brussels and Amsterdam is operated either by push-pull trains, comprising NS carriages and SNCB dual-voltage electric locomotives, or *THALYS* trains on services through from Paris.
NL-BE	(Amsterdam)Breda	Antwerp-(Brussels-Paris)	E ERMTS, fully interoperable between B and NL
BE-DE	(Paris/Brussels)-Verviers	Aachen- (Cologne)	[E*] Two routes exist between Chênée (4 km east of Liège-Guillemins) and the Hammer viaduct (south of Hergenrath)-the classic main line via Verviers and the new 42 km high-speed line electrified at 25 kV 50 Hz. The line between Liège-Guillemins and Aachen Hbf via Verviers is electrified at the SNCB standard of 3 kV dc, Aachen Hbf having four switchable tracks. SNCB units operate local services between Liège and Aachen but many cross-border passenger services are provided by multi-system high-speed trains (*Thalys* or ICE3).
BE-LU	Liege	Luxembourg	[E] Trains are hauled by dual-system electric locomotives: the transition between 3 kV dc and 25 kV 50 Hz is just south of Rivage in Belgium.
BE-LU	(Brussels)-Arlon	Luxembourg- (FR-CH)	[E] SNCB 3 kV dc electrification extends to Luxembourg station and Luxembourg triage, where there are switchable tracks. SNCB 3 kV electric multiple units work through to Luxembourg. CFL local trains between Luxembourg and Kleinbettingen are worked by CFL dual-system electric locomotives.
BE-LU	Athus	Rodange-(Luxembourg)	[E] The area is electrified at 25 kV 50 Hz.
LU-DE	Luxembourg	Trier	[E*] InterCity trains are worked to and from Luxembourg by DB dual-frequency electric locomotives.

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
IT-AT	(Verona)-Bolzano	Brenner-(Innsbruck-Munich-DE)	[E*] carries ÖBB Corridor Trains between Brenner and Lienz via Weitlanbrunn. ÖBB works to Brenner/Brennero.
IT-AT	Fortezza	Lienz	[E*] carries ÖBB Corridor Trains between Lienz and Brenner.
IT-AT	(Venezia)-Udine	Villach-(Vienna)	E*] At Tarvisio Boscoverde there is a dead section in the catenary; a diesel shunter propels electric locomotives back to their end of the station.
PT-ES	Porto	Vigo	[D]
PT-ES	(Lisbon)-Coimbra	Salamanca-(Irun)	[ED]
PT-ES	(Lisbon)-Abrantes	Caceres-(Madrid)	[D]
DK-SE	Copenhagen	Malmo-(Goteborg/Stockholm)	[E*] The Øresund fixed link, via a tunnel and a bridge. Electrification and signalling standards are to Danish standards, with the change to Swedish systems at Lernacken, Sweden. Dual-frequency electric units and locomotives.
DK-DE	(Copenhagen)-Redby	Puttgarden-(Hamburg)	ferry
DK-DE	(Frederica)-Padburg	Flensburg-(Hamburg)	[E*] The change of electrification system is in Padborg. DSB operates some diesel services as far as Flensburg.
DK-DE	Tender	Niebull	[D] The infrastructure between Niebüll and the border with Denmark is owned by Norddeutsche Eisenbahngesellschaft Niebüll mbH.
SF_SE	Tornio/Torneå	Haparanda	[D] Freight only. A single Swedish 1,435mm gauge track extends to Tornio and a Finnish 1,524mm gauge track to Haparanda. The two lines are interlaced across the border bridge.
DE-AT	(Munich)-Lindau	Bregenz -(Zurich/Innsbruck-Vienna)	[E] ÖBB and SBB work to Lindau using electric locomotives. SBB locomotives, specially-fitted with an ÖBB pantograph as well as the smaller Swiss one, are used on passenger trains between Zürich and Lindau.
DE-AT	Kempten	Reutte in Tirol	[D] DB operates the service between Pfronten-Steinach and Reutte in Tirol using diesel units.
DE-AT	Garmisch Partenkirchen	Reutte in Tirol	[E] DB operates the service between Garmisch-Partenkirchen and Reutte in Tirol using electric units.
DE-AT	(München)-Garmisch-P	Innsbruck	[E] DB works to Innsbruck and ÖBB to Garmisch-Partenkirchen.
DE-AT	(München)-Rosenheim	Kufstein-(Brenner)	[E] Corridor Trains are worked by ÖBB. ÖBB works some trains to München using its own electric locomotives. DB works many local

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
			trains to Salzburg,.
DE-AT	(München)-Rosenheim	Salzburg- (Vienna)	[E] Corridor Trains are worked by ÖBB, which also works some trains to München using its own electric locomotives. DB works many local and other trains to Salzburg,
DE-AT	Simbach	Braunau-(Linz)	[D] ÖBB works to Simbach with diesel railbuses.
DE-AT	Passau	Linz-(Vienna)	[E] DB electric locomotives work to Wien, including passenger trains to Wien Westbf.
DE-CZ	Bay Eisenstein	Zelesna-(Pilzen)	[D] Bayerisch Eisenstein station is on the border. There have been no through services since this crossing reopened in 1991, with ČD and DB trains connecting at different ends of the same platform.
DE-CZ	(Regensburg)-Furth im Wald	Pilzen-(Prag)	[D] ČD works to Furth im Wald.
DE-CZ	(Nurnberg)-Marktredwitz	Cheb	[D] DB works to Cheb. German operator Vogtlandbahn works through trains between Cheb and Marktredwitz.
DE-CZ	(Zwickau)-Plauen	Cheb	[D] this line actually crosses into the Czech Republic twice, with a station at Plesná in the Czech Republic before crossing back into Germany for. German operator Vogtlandbahn works through trains between Plauen, Cheb and Marktredwitz.
DE-CZ	Johanngeorgenstadt	Karlsbad	[D] ČD works to Johanngeorgenstadt.
DE-CZ	(Berlin)-Bad Schandau	Usti ned Laben- (Prag)	[E*] There is a fixed voltage change near the border and through trains are mostly worked by dual-system electric locomotives.
DE-CZ	Zittau	Liberic	[D] carrying ČD Corridor Trains between Liberec and Zittau, this line actually passes through a short stretch of Poland (without stations) before reaching Germany.
DE-PL	(Dresden)-Gorlitz	Wroclaw	[D] Through trains to and from Wrocław are worked by PKP to Görlitz; supplemented by DB diesel multiple units working a very limited service to Zgorzelec.
DE-PL	(Berlin)-Cottbus	Tuplice-(Wroclaw)	[D]
DE-PL	(Berlin)-Frankfurt/Oder	Poznan-(Warszawa) and Krakow	[E*] the cross-border *EuroCity* services are hauled to Rzepin (P) by DB dual electronic locomitves. Other passenger trains are hauled by PKP diesel locomotives between Frankfurt (Oder) and Rzepin.
DE-PL	(Berlin)-Strausberg	Kostrzyn	[D] DB works to Kostrzyń.

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
DE-PL	(Berlin)-Angermunde	Stettin	[D]
DE-PL	(Schwerin)-Pasewalk	Stettin	[D]
DE-PL	Stralsund	Swinoujscie	[D] this route is operated by Usedomer Bäderbahn.
AT-CZ	Linz	Ceske Budejovice-(Prag)	[E*] the voltage change is at the border. Passenger and freight trains exchange ČD and ÖBB electric locomotives at either Summerau or at Horní Dvořistě.
AT-CZ	(Vienna)-Gmund	Ceske Velenice	[ED] ČD diesel trains work to Gmünd.
AT-CZ	(Vienna)-Retz	Znojmo	[E] Electrification at the Austrian standard of 15 kV 16.7 Hz has been completed from Retz as far as Šatov, and this section of the route is being worked by ÖBB electric push-pull trains.
AT-CZ	(Vienna)-Hohenau	Breclaw- (Prag-Berlin/Ostrava)	[E*] Dual-frequency ÖBB locomotives work to Břeclav.
AT-SK	(Vienna)-Marchegg	Bratislava	[D] ÖBB diesel locomotives.
AT-SK	(Vienna)-Bruck a d Leitha	Bratislava	[E*] ÖBB works to Bratislava-Petržalka. A bay platform and the south end of the adjacent through platform are electrified at 15kV 16.7Hz for ÖBB local trains, the remainder of the station being electrified at 25kV 50Hz.
AT-HU	Vienna	Gyor- (Budapest)	[E*] ÖBB works to Hegyeshalom, where there are switchable tracks. Trains use dual-frequency electric locomotives.
AT-HU	(Vienna)-Eberfurt	Sopron	[E*] carries dual-frequency ÖBB Corridor Trains via Sopron to Deutschkreutz. Sopron to Ebenfurth is electrified at the Hungarian standard 25kV 50Hz, and Ebenfurth station area has switchable tracks: the ÖBB Corridor Trains change frequency whilst reversing here.
AT-HU	(Vienna)-Wiener Neustadt	Sopron-(Budapest)	[D] carries ÖBB Corridor Trains between Wiener Neustadt and Sopron,
AT-HU	Graz	Szombathely	[D]
AT-SL	(Vienna)-Graz	Maribor	[E*] SŽ works to Spielfeld Straß. Though there are switchable tracks here, they do not seem to be used as such, with the locomotives of incoming hauled trains being shunted back to their own end of the station.
AT-SL	(Munich/Zurich)-Villach	Jenesice- (Ljubljana)	[E*] The change in electrification is at the midpoint of Jesenice station. The locomotives of incoming hauled trains are shunted back to their own end of the station. ÖBB works to Jesenice,

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
			with DB electric locomotives on some trains.
IT-SL	(Venezia)-Villa Opicina	Sezana-(Lubl-Budapest-HU)	[E] SŽ works to Villa Opicina.
PL-LT	(Warsawa)-Bialystok	Kaunas-Vilnius	[D] PKP works to Šeštokai on 1,435mm gauge tracks, which are interlaced with broad-gauge (1,520mm) from Mockava. There is a "SUW2000" gauge changing system at Mockava but this was used only by the overnight passenger train pair which was withdrawn.
PL-SK	Lupkow	Medzilaborce	[D] ŽSR works to Łupków.
PL-SK	(Krakow)-Nowy Sacz	Plavec-(Kosice-RO/HU)	[E] PKP works to Plaveč
PL-SK	(Katowice)-Bleisko Biala	Zilina	[E] ŽSR works most services to Zwardoň but there is a daily PKP EMU from Kraków to Žilina and return, balanced by a ŽSR electric locomotive working a daily service to Katowice.
PL-CZ	(Katowice)-Bleisko Biala	Cesky Tesin	[E] PKP works to Český Těšín.
PL-CZ	Krakow/Katowice	Ostrava	[E] PKP works express services to Bohumin but ČD works 2 regional services to and from Katowice.
PL-CZ	Wroclaw	Lichlow-(Prag)	[E] Following completion of electrification, PKP works through Praha-Wroclaw services to Letohrad. ČD works two local services a day to Miedzylesie with diesel rail buses.
CZ-SK	(Prag)-Cesky Tesin	Zilina	ČD and ŽSR were, until the split of Czechoslovakia, one railway and they still work to largely common operational and technical standards.
CZ-SK	(Prag)-Horni Lidec	Zilina	ČD and ŽSR were, until the split of Czechoslovakia, one railway and they still work to largely common operational and technical standards.
CZ-SK	Vlarsky prusmyk	Trancianska Tepla	ČD and ŽSR were, until the split of Czechoslovakia, one railway and they still work to largely common operational and technical standards.
CZ-SK	(Prag)-Breclav	Bratislava	ČD and ŽSR were, until the split of Czechoslovakia, one railway and they still work to largely common operational and technical standards.
SL-HU	Bratislava	Gyor	[E] MÁV generally works to Bratislava, though on some longer-distance workings locomotives are changed at Rajka.
SL-HU	(Bratilava)-Sturovo	Budapest	[E] MÁV works trains to Štúrovo, and some through to Bratislava.
SL-HU	Filákova	Salgotarjan-(Budapest)	[D] ŽSSK generally works to Somosköújfalu, though some trains

Countries	Origin	Destination	[DE] or [ED] = change from diesel to electric.
			are operated by MÁV locomotives as far as Zvolen.
SL-HU	Kosice	Miskolc	[E*] ŽSSK generally works to Hidasnémeti using dual-system locomotives, the electrification changeover being at the border.
HU-RO	Mateszalka	Carei	[D] MÁV works to Carei.
HU-RO	Debrecen	Valea lui Mihai	[D] CFR works to Nyírábrány.
HU-RO	(Budapest)-Biharkereszies	Oradea-(Cluj Napoca)	[D] CFR works to Biharkeresztes.
HU-RO	Bekescsaba	Salonta	[D] MÁV works to Salonta.
HU-RO	(Budapest)-Bekescsaba	Arad- (Bucaresti/Tigru Mures)	[E] MÁV works to Curtici.
HU-SL	(Budapest)-Zalaegerszeg	Hodos-(Maribor/Ljubliana)	[D] MÁV works to Hodoš. As well as local services, which generally require a change of trains at Hodoš, one through Buda-pest-Ljubljana IC train pair runs via this route.
RO-BU	Bucaresti	Russe-(Sofia/Istanbul)	[D] BDŽ works to Bucharest.
BG-HE	Sofia	Thessaloniki	[D] OSE works to Kulata.
BG-HE	Svilengrad	Alrxandrupoli	[D] OSE works to Svilengrad.
LT-LV	Vilnius	Daugavpils- (RU)	[D] All rail routes are 1,520mm gauge.
LV-EE	Riga	Valga	[D] All rail routes are 1,520mm gauge.

Table A7.0.2 Technical specification per border crossing between EU27 and third countries

Countries	Origin EU	Destination non-EU	
FR-CH	(Paris/Bruss)-Strasbourg	Basel -(Zurich)	[E*] Bay platforms at the west end of Basel SBB are used by SNCF trains terminating or starting at Basel. These bays are electrified at 25 kV; the west end of the adjacent through platform is switchable, with a light display indicating "15" or "25" as appropriate. Dual-frequency multiple-units work local trains running through between Mulhouse and Pratteln and beyond. Long-distance through trains between France and Switzerland are shunted between the two parts of the station by SBB dual-frequency shunting locomotives.
FR-CH	Besancon	La Chaux-de-Fonds	[DE] SNCF works to Le Locle.
FR_CH	(Paris)-Dyon	Neuchatel- (Bern)	[E*] The only cross-border passenger trains are multi-system TGVs
FR-CH	(Paris)-Dyon	Lausanne	[E*] All daytime cross-border passenger trains are multi-system TGVs running between Paris and Lausanne.
FR-CH	(Paris/Lyon)-Bellegarde	Geneve	[E*] SNCF works to Genève and the line is electrified at 1,500 V dc and signalled to SNCF standards from the border to both the passenger station. CFF operates a local service between Genève and La Plaine, using specially-built 1,500 V dc rolling stock
FR-CH	Annemasse	Geneve	[E] operated using dual-frequency rolling stock, though the branch itself is electrified at 25kV 50Hz.
FR-CH	Chamonix	Martigny	[E*] This is a metre-gauge line, electrified at 750V dc third rail on the SNCF line from St Gervais-les-Bains to Le Chatelard Frontiere and at 750V dc, mixed overhead and third-rail, on the Martigny-Chatelard line from Le Chatelard Frontier to Martigny. Both MC and SNCF have recently acquired new trains capable of running through between the two systems.
DE-CH	(Frankfurt)-Freiburg	Basel	Despite a common electrification system, different designs of overhead line and pantographs and different safety systems prevent through working by electric trains without special arrangements
DE-CH	(Schaffhausen)-Rheinfelden	Basel	[DE]
DE-CH	(Base)-Rheinfelden	Schaffhausen	[D]

Countries	Origin EU	Destination non-EU	
DE-CH	(Stuttgart/Lindau)-Singen	Schaffhausen-(Zurich)	[E]
DE-CH	Konstanz	Kreuzlingen-(Zurich)	[E]
AT-CH	(Munich-DE)-Bregenz	St Gallen- (Zurich)	Despite a common electrification system, different designs of overhead line and pantographs and different safety systems prevent through working by electric trains without special arrangements
AT-CH	(Innsbruck)-Feldkirch	Buchs-(Zurich)	Despite a common electrification system, different designs of overhead line and pantographs and different safety systems prevent through working by electric trains without special arrangements
IT-CH	Tirano	Posschiavo-(St Moritz)	[E] This is the Rhätische Bahn metre gauge line, worked exclusively by that company.
IT-CH	(Milano)-Chiasso	Lugano- (Gotthard)	[E*] FIn Chiasso (CH) incoming locomotives are shunted off their trains, and there is no switching.
IT-CH	Luino	Bellinzona	[E*] FFS works to Luino (CH) providing the only service at several stations in Italy. There are no through passenger trains at Luino.
IT-CH	Domodossola	Locarno	[E] This metre-gauge railway operates with through electric multiple units from end to end.
IT-CH	(Milano)-Domodossola	Brig-(Bern/Geneve)	[E*] SBB and BLS work to Domodossola, where electric locomotives are shunted back to their own end of the station.
SE-NO	Kiruna	Narvik	[E]
SE-NO	(Ostersund)-Storlien	Trondheim	[E]
SE-NO	(Stockholm)-Karlsstad	Oslo	[E]
SE-NO	Goteborg	Oslo	[E]
FI-RU	Helsinki	Vyburg-(St Persburg/Moskau)	[E*] RŽD dual-system electric locos (3kV dc/25kV 50Hz) work into Finland.
PL-RU	(Berlin DE)-Elbnag	Kalinigrad	Only transit trains to Kaliningrad
PL-BY	Bialystok	Hrodna	[E] This route has both 1,435mm (electrified) and 1,520mm (not electrified) gauge tracks in use between Grodno and Sokółka. Passenger services are operated by PKP with five daily standard gauge train pairs to Grodno (BY)using 1,435mm gauge electric multiple units o,f which one pair is through from/to Białystok. For freight, cross-border traffic is either re-gauged at Kuźnica Białostocka or transferred at Sokółka.

Countries	Origin EU	Destination non-EU	
PL-BY	(Warsawa)-Terespol	Brest-(Moskwa-RU)	[E] PKP operates to Brest. This route is 1,435mm gauge as far as Brest.
PL-UA	Warsawa	Kiew	[D] PKP operates on 1,435mm gauge tracks to Yahodyn.
PL-UA	Warsawa/Krakow	Lviv-(Kiev/Odessa	[E] PKP operates a daily night train between Kraków and Lvov, using the 1,435mm gauge line to/from the SUW2000 gauge changing facilities at Mostiska 2. The 1,520mm daytime passenger trains are believed to still use the gauge changing facilities at Przemyśl.
SL-UA	Kosice	Chop- (Moskwa)	[E] This route and the station area at Čop are dual gauge 1,435/1,520mm. Passenger services are 1,435mm gauge, operated by ŽSR; on through services, gauge-changing is performed to the east of Čop station, carriages being shunted out of and into the station for this purpose.
HU-UA	(Budapest)-Zahony	Chop- (Moskwa)	[D] This route is dual gauge 1,435/1,520mm. Passenger services are 1,435mm gauge, operated by MÁV diesel locomotives. The 1,520mm gauge tracks are out of use
HU-RS	Szeged	Subotica	[D]
HU-RS	(Budapest)-Kiskunhalas	Kelebia-(Beograd)	[E] loc changes at Kelebia (SB).
HU-HR	(Budapest)-Pecs	Osijek	[DE] HŽ works to Murakeresztúr (HU)
HU-HR	(Budapest)-Gyekenyes	Zagreb	[E] HŽ works to Gyékényes (HU)
HU-HR	Murakeresztur	Varazdin	[D] MÁV generally works to Beli Manastir (CR)
RO-UA	(Bucaresti)-	Suceava	[D]
RO-MO	(Bucaresti)-Iasi	Ungheni	[D] CFR operates 1,435mm gauge trains to Ungheni.
BG-RS	Sofia	Nis-(Beograd)	[ED] BDŽ operates electirc trains to/from Kalotina (border station); On Serbian side diesel locos are needed.
RO-RS	Timisoara	Beograd	[D] loco changes at Vršac (SB).
RO-RS	Jimbolia	Kikinda	[D] loco changes at Jimbolia (RO).
BG-TU	Plovdiv	Edirne-(Istanbul0	[DE] BDŽ works to Kapıkule.
HE-TU	Thessaloniki	Edirne-(Istanbul0	[D]
HE-FY	Thessaloniki	Skopje	[E] Loco changes at Gevgelija (FY).
LT-RU	(RU)-Vilnius	Kalinigrad	All rail routes between this pair of countries are 1,520mm gauge.
LT-BY	Vilnius	Lviv	All rail routes between this pair of countries are 1,520mm gauge.
LT-BY	Vilnius	Minsk	All rail routes between this pair of countries are 1,520mm gauge.
LT-RU	Riga	Moskwa	All rail routes between this pair of countries are 1,520mm gauge.
LT-RU	Riga/LT	St-Petersburg	All rail routes between this pair of countries are 1,520mm gauge.

Countries	Origin EU	Destination non-EU	
EE-RU	Tallinn		All rail routes between this pair of countries are 1,520mm gauge.
SL-HR	Divaca	Pula	[D]
SL-HR	Ljubljana	Ryeka	[D] The Croatian and Slovenian railways were once part of the JŽ Yugoslav railways and have largely common operating systems. The two different electrification systems originate from Slovenia and part of Croatia having been Italian territory until 1945. Accordingly, FS 3 kV dc electrification had reached Postojna and Rijeka by 1939. This system was used for further schemes in the area, despite 25kV being adopted as the Yugoslav standard.
SL-HR	(AT/Ljubljana)_Most	Zagreb	[E*] In Dobova (SL) electrification changes. There is a fixed voltage change, and incoming electric locomotives are shunted back to their own system by the relieving locomotive.
SL-HR	Ormoz	Cakovec	[D] The Croatian and Slovenian railways were once part of the JŽ Yugoslav railways and have largely common operating systems. The two different electrification systems originate from Slovenia and part of Croatia having been Italian territory until 1945. Accordingly, FS 3 kV dc electrification had reached Postojna and Rijeka by 1939. This system was used for further schemes in the area, despite 25kV being adopted as the Yugoslav standard.

Annex 8 Information on International Rail Passenger Operators

UK

Currently, open access for commercial operators in Britain is subject to the Regulator being satisfied that such services primarily generate new rail revenue rather than abstracting revenue from franchised operators.

Other barriers to development are the level of charges and safety requirements for use of the Channel Tunnel (currently only the Eurostar trains satisfy the latter) and border controls (which currently preclude use of international trains by domestic passengers within Britain).

Danish State Railways (DSB)

Barriers to Rail Business Development

- Implementation of EU and international legislation: DK has implemented the requirements of the second railway package so that foreign and domestic railway undertakings have open access to the DK network. Denmark is in the Advanced group in the Rail Liberalisation Index (2007).
- International competition: The website of rail infrastructure operator Banedanmark clearly describes the process involved to obtain a licence. Some information is only available in Danish.
- Administrative barriers: Rail supervisory authority Trafikstyrelsen is responsible for issuing licenses, safety certificates and homologation of rolling stock. Network Statement licences from other EU states are recognised in DK only for transit transport and cross-border freight transport. Train path allocation is customer friendly and efficient. Enquiries areanswered quickly and railway undertakings can enquire about free capacity on the internet.
- Technical aspects: Complete vertical separation of infrastructure and operation.

SJ (Sweden)

Barriers to Rail Business Development

- Implementation of EU and international legislation: Sweden is relatively advanced in rail reform. All relevant aspects of Directives of the second railway package were already guaranteed by law before 2007.
- International competition: With the exception of the UK, which is a special case, the market shares of external RUs are the highest in Europe. Sweden is attractive market for commercial railway undertakings. Long-distance passenger transports under a public service contract are put out to public tender with exclusive rights by the national transport authority Rikstrafiken. State railway authority JVS has joint responsibility for railway safety and regulation. Its competencies exceed the requirements of the EU Directive. Licences, safety certificates and homologation certificates are all issued by the JVS and offered free of charge. Reasonable deadlines for processing are given. All are downloadable in Swedish and English, as is

the network statement. SJ is looking to establish strategic partnerships with other partners; e.g. the partnership with the airline SAS enables passengers to combine air and rail travel.

- Administrative: There has been full vertical separation of infrastructure in Sweden since 2001.

Eurostar

Barriers to Rail Business Development:

- Implementation of EU and international legislation: The Infrastructure company Railtrack which was insolvent is now Network Rail, under control of the British Government. Domestic and foreign railway undertakings have open access to international and purely commercial transport. The Office of Rail Regulation (ORR) acts as the rail regulatory authority as defined in Article 30 of Directive 2001/14/EC and is vested with competencies that exceed the requirements of the Directive. Great Britain ranks first in the Rail Liberalisation Index 2007.
- Public service contracts for passenger transport are awarded in tender procedures, but there is currently no cross-border PSC.
- Eurostar is the sole cross-border operator (except for Belfast-Dublin, the EI-UK route).
- Administration: ORR is responsible for issuing licences.
- Technical barrier: The Channel Tunnel is an obvious constraint on capacity and also has strict safety conditions which currently only the Eurostar fleet satisfies.
- There are high track access charges both for the Channel Tunnel and the high-speed line to London.

SNCF (France)

Barriers to Rail Business Development:

- Implementation of EU and international legislation: France has implemented the first and second European railway packages into national law. Directive 2001/12/EC, which prescribes that the infrastructure manager must be independent of transport in respect of essential functions, was implemented by means of the formation of an independent infrastructure manager, i.e. Reseau Ferre de France (RFF). RFF assigns central infrastructure management tasks to the incumbent RU, SNCF, which means that the latter company also acts as infrastructure manager on behalf of RFF.
- Development of PSO: SNCF is the sole provider of passenger rail services providing all services including long-distance and high-speed services. PSOs are grouped into services of national and international interest (both Long-distance and high-speed) and those of regional interest. For the former SNCF act on the basis of a periodic decree which regulates the reciprocal commitment between SNCF and the state (Ministry of Transport). The nature of the PSO is based on a net cost contract model in which the operator remains responsible for bearing the risk for traffic revenues.
- International competition: the fact that the RFF entrusts SNCF with key infrastructure tasks entails significant potential for discrimination.

- Railway undertakings have complained that it is easier to extend routes to other western EU Member States than to France. Obtaining information is not easy for an RU. The Network Statement is available on internet in three languages but obtaining information about licenses, safety certificates, market regulation and homologation is time consuming and complicated. Responsible authorities do not answer promptly. Although licenses issued by other EU Member States are recognised promptly, new insurance certificates must be issued. The cover sum for these can be prohibitively high even for a short line. Railway undertakings applying for a licence must have paid up capital of € 1,5 million. Access to sidings and refuelling facilities is described as discriminatory in part by some railway undertakings. SNCF immediately takes over any train paths cancelled by external railway undertakings.

Ofotbanen AS (Sweden and Norway)

Barriers to Rail Business Development

- Implementation of EU and international legislation: Rail reform in Norway could be described as delayed. All passenger transport within Norway has been awarded to the incumbent NSB or to its subsidiaries. Access for international groupings is open as defined in Directive 91/440/EEC. Apart from this, external railway undertakings can provide rail passenger transport in Norway only if they provide their own infrastructure or on lines that NSB no longer operates for economic reasons.
- Administrative barriers: Administrative barriers are low. Obtaining public information about network very easy.
- All laws, decisions, etc. available on internet and in English. A 3-month application threshold is always complied with. Licences issued in other EU Member States are recognised. Licences are valid for indefinite periods of time, dependent on the risk rating of any particular RU applicant. No charges are levied for issuing licences, safety certificates or homologation. Rail routes in Norway must run on the operator's own infrastructure. Some track is owned by Swedish RUs.
- Development of PSOs: In Norway the Ministry of Transport and Communications negotiates with the NSB AS on the annual compensation for PSOs. In this context, the Ministry also performs the necessary evaluations and monitors the RU(s). The only operator currently receiving compensation for PSOs is NSB who do not run international services.

Iarnród Éireann (Ireland)

Barriers to Rail Business Development

- Implementation of EU and international legislation: Ireland was given exemption status in respect of implementation of the first railway package, amongst other reasons because of its island location. As a result, Ireland was granted a deferral for full implementation. No special provisions were agreed for Ireland regarding implementation of the second railway package. Ireland has implemented Directives 2001/12/EC and 2001/13/EC of the first railway package and all Directives of the second railway package. As Directive 2001/14/EC has not yet been implemented, Ireland still does not have a regulatory authority. Nor are there any legal

specifications governing train path access and access to service facilities. Implementation of EU Directives into national law in Ireland is usually restricted to certain basic requirements and is not effected with the same degree of detail as in other EU Member States. These legal specifications have had no practical effect on the Irish rail market.

- Lack of international competition: Rail traffic in Eire is an IE monopoly; in Northern Ireland it is a monopoly of Northern Ireland Railways. Cross-border services are operated by a partnership between the two.
- No external railway undertakings have as yet applied for a licence, a safety certificate or a train path.
- Administrative barriers: No network statement has been published to date. The Authority responsible for safety, National Safety Authority (NSA) is independent of the incumbent. Eire ranks bottom in the Rail Liberalisation Index (LIB Index) which presents information on the relative degree of market opening in EU transport markets, and is classed as in the "Delayed" category. Infrastructure isseparated from transport on an accounting basis only.
- Inter and intramodal competition, Competitiveness of services: Service would be competitive with another RU offering, or alternative coach services. There are no other competing rail operators.

Trenitalia (Italy)

Barriers to Rail Business Development

During the stakeholder consultation carried out during the development of the "Impact assessment study on amendments to the rail access legislation in the framework of the recast of the 1st railway package" the company reported the following obstacles to the development of international rail business:

- Implementation of EU and international legislation
- Lack of international cooperation
- Administrative barriers:
  - Long and non-transparent procedures for railway licenses, as well as for safety certificates and homologation of rolling stock.
- Technical barriers:
  - Lack of technical harmonisation.
  - Lack of investment in railway infrastructure and equipment.
- Revenues and profits of passenger transport operator:
  - Weak financial situation of railway undertakings.
  - Infrastructure fees compulsory in the rail sector, which is not the case for other modes and in particular for the road sector. This affects competition and the global market share of rail transport compared to other modes of transport.

CP-Comboios de Portugal E.P.E (Portugal)

Barriers to Rail Business Development

During the stakeholder consultation carried out during the development of the "Impact assessment study on amendments to the rail access legislation in the framework of the recast of the 1st railway package" the company reported the following obstacles to the development of the international business:

- Implementation of EU and international legislation:

  - Legal uncertainties due to the lack of EU legislation to determine the relationship between Infrastructure Managers and Railway Undertakings in order to allocate responsibilities in case of damages.
- Lack of international cooperation:
  - The lack of international cooperation and coordination among Infrastructure Managers and Member States (e.g. on maintenance work, infrastructure investments): lack of infrastructure investments.
- Administrative barriers:
  - Long and non-transparent procedures for railway licenses, as well as for safety certificates and homologation of rolling stock.
- Technical barriers:
  - Low infrastructure quality (Infrastructure quality affects the competition with other modes of transport, for example, quality of services which are providing by the RU).
  - Lack of investment in railway infrastructure and equipment
- Revenues and profits of passenger transport operator:
  - Weak financial situation of railway undertakings.
  - Infrastructure fees compulsory in the rail sector, which is not the case for other modes and in particular for the road sector. This affects competition and the global market share of rail transport compared to other modes of transport.

RENFE (Spain)

Barriers to Rail Business Development

During the stakeholder consultation carried out during the development of the "Impact assessment study on amendments to the rail access legislation in the framework of the recast of the 1st railway package" the company reported the following obstacles to the development of the international business:

- Technical barriers:
  - Low infrastructure quality (Infrastructure quality affects the competition with other modes of transport, for example, quality of services which are providing by the RU).
  - Lack of investment in railway infrastructure and equipment.
- Revenues and profits of passenger transport operator:
  - Weak financial situation of railway undertakings.

Ceske Drahy a.s. (CD) (CZ)

Barriers to Rail Business Development

During the stakeholder consultation carried out during the development of the "Impact assessment study on amendments to the rail access legislation in the framework of the recast of the 1st railway package" the company reported the following obstacles to the development of the international business:

- Implementation of EU and international legislation:
  - Discrimination in access to rail related services (e.g. in terminals, rolling stock maintenance, etc.).
- Lack of international cooperation:
  - The lack of international cooperation and coordination among Infrastructure Managers and Member States (e.g. on maintenance work, infrastructure investments): lack of infrastructure investments.

- Administrative barriers:
  - Unclear information about access conditions to infrastructure and service facilities.
- Technical barriers:
  - Low infrastructure quality (Infrastructure quality affects the competition with other modes of transport, for example, quality of services which are providing by the RU).
  - Lack of investment in railway infrastructure and equipment.
  - Lack of technical harmonisation.
- Revenues and profits of passenger transport operator:
  - Weak financial situation of railway undertakings.

MAV (Hungary)

Barriers to Rail Business Development

During the stakeholder consultation carried out during the development of the "Impact assessment study on amendments to the rail access legislation in the framework of the recast of the 1st railway package" the company reported the following obstacles to the development of the international business:

- Implementation of EU and international legislation:
  - Discrimination in access to rail related services (e.g. in terminals, shunting yards, rolling stock maintenance, etc.).
- Lack of international cooperation:
  - Lack of international cooperation and coordination among Infrastructure Managers and Member States (e.g. on maintenance work, infrastructure investments): Member States must take their responsibilities with regard to the financing of infrastructure (maintenance work, infrastructure investment, etc).
- Technical barriers:
  - Low infrastructure quality.
  - Lack of investment in railway infrastructure and equipment.
- Revenues and profits of passenger transport operator:
  - Weak financial situation of railway undertakings.

BDZ (Bulgaria)

Barriers to Rail Business Development

During the stakeholder consultation carried out during the development of the "Impact assessment study on amendments to the rail access legislation in the framework of the recast of the 1st railway package" the company reported the following obstacles to the development of the international business:

- Lack of international cooperation:
  - Lack of international cooperation and coordination among Infrastructure Managers and Member States (e.g. on maintenance work, infrastructure investments): Member States must take their responsibilities with regard to the financing of infrastructure (maintenance work, infrastructure investment, etc).
- Technical barriers
  - Low infrastructure quality.
  - Lack of investment in railway infrastructure and equipment.
- Revenues and profits of passenger transport operator:

- Weak financial situation of railway undertakings.
- It should be noted that infrastructure fees are compulsory in the rail sector, which is not the case for other modes and in particular for the road sector. This affects competition and the global market share of rail transport compared to other modes of transport. Rail market growth is an intermodal competition issue. As long as this issue is not properly tackled it will constitute a major obstacle to the development of rail transport.

Latvian Railways (LDz)

Barriers to Rail Business Development

During the stakeholder consultation carried out during the development of the "Impact assessment study on amendments to the rail access legislation in the framework of the recast of the 1st railway package" the company reported the following obstacles to the development of the international business:

- Implementation of EU and international legislation:
  - Legal uncertainties due to the lack of EU legislation to rule the relationship between Infrastructure Managers and Railway Undertakings in terms of allocating responsibilities in case of damages.
- Administrative barriers:
  - Underdeveloped markets for rail related services (e.g. driver training, maintenance, etc.).
  - Unclear information about access conditions to infrastructure and service facilities.
- Technical barriers:
  - Lack of technical harmonisation.
  - Lack of investment in railway infrastructure and equipment.

Annex 9 Financing Passenger Cross-Border Operations in EU27 according to Border Crossing

Table A9.0.1 Overview of financing international rail operations (EU27 – EU27) per border crossing

EU 27 border crossing in 2009	Origin	Destination	Type of service
UK-EI	Belfast	Dublin	3
UK-FR	London	Paris/Brussels (BE)	1, 2
FR-BE	Lille	Gent	4
	Lille	Mons- (Liege)	4
	(London)-Lille/Paris	Brussels (-NL/D)	2
FR-LU	Longwy	Luxembourg	4
	(Basel/Paris)-Metz	Luxembourg-(Brussels)	3
FR-DE	Thionville	Trier	5
	(Paris)-Strasbourg	Saarbrucken (-Frankfurt)	3
	Strasbourg	Saarbrucken	5
	Wissenbourg	Neustadt	5
	(Paris)-Strasbourg	Kehl-(Karlsruhe-etc)	3
FR-IT	(Paris)-Chambery	Modane -(Milano)	3
	Breil	Ventimiglia	5
	Breil	Torino	5
	(Paris)-Cannes-Nice	Ventimiglia (Genova)	3, 5
FR-ES	(Paris)-Narbonne	Barcelona	3
	La Tour de Carol	Barcelona	5
	Henday	Irun	5
NL-DE	(Groningen)-Nieuweschans	Leer	5
	(Schiphol)-Hengelo	Bad Bentheim- (Berlin)	3
	Enschede	Gronau-(Munster/Dortm)	5
	(Schiphol)-Arnhem	Emmerich-(Koln-Frankfurt)	3
	Venlo	Kaldenkirchen- (M Gladbach)	5
	Heerlen	Aachen	5
NL-BE	Maastricht	Liege-(Brussels)	4, 6
	(Amsterdam)-Roosendaal	Antwerp-(Brussels-Paris)	2, 3, 4
	(Amsterdam)Breda	Antwerp-(Brussels-Paris)	2
BE-DE	(Paris/Brussels)-Verviers	Aachen- (Cologne)	2,3
BE-LU	Liege	Luxembourg	3
	Athus	Rodange-(Luxembourg)	4
	(Brussels)-Arlon	Luxembourg- (FR-CH)	3
LU-DE	Luxembourg	Trier	3, 4
IT-AT	(Verona)-Bolzano	Brenner-(Innsbruck-Munich-DE)	3
	Fortezza	Lienz	5
	(Venezia)-Udine	Villach-(Vienna)	3
PT-ES	Porto	Vigo	4
	(Lisbon)-Coimbra	Salamanca-(Irun)	3
	(Lisbon)-Abrantes	Caceres-(Madrid)	3

EU 27 border crossing in 2009	Origin	Destination	Type of service
DK-SE	Copenhagen	Malmo-(Goteborg/Stockholm)	3,5
DK-DE	(Copenhagen)-Redby	Puttgarden-(Hamburg)	3
	(Frederica)-Padburg	Flensburg-(Hamburg)	3
	Tender	Niebull	5
DE-AT	(Munich)-Lindau	Bregenz -(Zurich/Innsbruck-Vienna)	3, 5
	Kempten	Reutte in Tirol	5
	Garmisch Partenkirchen	Reutte in Tirol	5
	(München)-Garmisch-P	Innsbruck	5
	(München)-Rosenheim	Kufstein-(Brenner)	3
	(München)-Rosenheim	Salzburg- (Vienna)	3, 5
	Simbach	Braunau-(Linz)	5
	Passau	Linz-(Vienna)	3, 5
DE-CZ	Bay Eisenstein	Zelesna-(Pilzen)	5
	(Regensburg)-Furth im Wald	Pilzen-(Prag)	3, 5
	(Nurnberg)-Marktredwitz	Cheb	5
	(Zwickau)-Plauen	Cheb	5
	Johanngeorgenstadt	Karlsbad	4
	(Berlin)-Bad Schandau	Usti ned Laben- (Prag)	3, 5
	Zittau	Liberic	5
DE-PL	(Dresden)-Gorlitz	Wroclaw	3, 5
	(Berlin)-Cottbus	Tuplice-(Wroclaw)	5
	(Berlin)-Frankfurt/Oder	Poznan-(Warszawa) and Krakow	3, 5
	(Berlin)-Strausberg	Kostrzyn	5
	(Berlin)-Angermunde	Stettin	3, 5
	(Schwerin)-Pasewalk	Stettin	5
	Stralsund	Swinoujscie	5
AT-CZ	Linz	Ceske Budejovice-(Prag)	3, 4
	(Vienna)-Gmund	Ceske Velenice	3,4
	(Vienna)-Retz	Znojmo	5
	(Vienna)-Hohenau	Breclaw- (Prag-Berlin/Ostrava)	3, 5
AT-SK	(Vienna)-Marchegg	Bratislava	5
	(Vienna)-Bruck a d Leitha	Bratislava	3, 5
AT-HU	Vienna	Gyor- (Budapest)	3, 4
	(Vienna)-Eberfurt	Sopron	5
	(Vienna)-Wiener Neustadt	Sopron-(Budapest)	5
	Graz	Szombathely	3, 5
AT-SL	(Vienna)-Graz	Maribor	3
	(Munich/Zurich)-Villach	Jenesice- (Ljubljana)	3
IT-SL	(Venezia)-Villa Opicina	Sezana-(Lubl-Budapest-HU)	3
PL-LT	(Warsawa)-Bialystok	Kaunas-Vilnius	3
PL-SK	Lupkow	Medzilaborce	5
	(Krakow)-Nowy Sacz	Plavec-(Kosice-RO/HU)	3, 4
PL-CZ	(Katowice)-Bleisko Biala	Zilina	3, 5
	Krakow/Katowice	Ostrava	3
	Wroclaw	Lichlow-(Prag)	3

EU 27 border crossing in 2009	Origin	Destination	Type of service
CZ-SK	(Prag)-Cesky Tesin	Zilina	4
	(Prag)-Horni Lidec	Zilina	4
	Vlarsky prusmyk	Trancianska Tepla	4
	(Prag)-Breclav	Bratislava	3
SL-HU	Bratislava	Gyor	3
	(Bratilava)-Sturovo	Budapest	3, 4
	Filákova	Salgotarjan-(Budapest)	4
	Kosice	Miskolc	3
HU-RO	Mateszalka	Carei	4
	Debrecen	Valea lui Mihai	4
	(Budapest)-Biharkereszies	Oradea-(Cluj Napoca)	5
	Bekescsaba	Salonta	4
	(Budapest)-Bekescsaba	Arad- (Bucaresti/Tigru Mures)	3
HU-SL	(Budapest)-Zalaegerszeg	Hodos-(Maribor/Ljubliana)	3, 4
RO-BU	Bucaresti	Russe-(Sofia/Istanbul)	3
BU-HE	Sofia	Thessaloniki	3
	Svilengrad	Alrxandrupoli	3
LV-LT	Vilnius	Daugavpils- (RU)	3
LV-EE	Riga	Valga	4

Source: NEA

As described in detail in paragraph 4.2.1:
1 = commercial, 2 = joint venture of incumbent operators, 3 = jointly operated, 4 = national PSO, 5 = regional PSO, 6 = additional co-financed

Annex 10 Financing Passenger Cross-Border Operations in EU27 – non-EU according to Category

Table A10.0.1 Overview of financing international rail operations (EU27 – nonEU27) per border crossing

EU27 – non-EU border crossing in 2009	Origin	Destination	Type of service
FR-CH	(Paris/Bruss)-Strasbourg	Basel -(Zurich)	3, 5
	Besancon	La Chaux-de-Fonds	5
	(Paris)-Dyon	Neuchatel- (Bern)	3
	(Paris)-Dyon	Lausanne	3
	(Paris/Lyon)-Bellegarde	Geneve	3, 5
	Annemasse	Geneve	5
	Chamonix	Martigny	5
DE-CH	(Frankfurt)-Freiburg	Basel	3, 5
	(Schaffhausen)-Rheinfelden	Basel	5
	(Base)-Rheinfelden	Schaffhausen	5
	(Stuttgart/Lindau)-Singen	Schaffhausen-(Zurich)	3, 5
	Konstanz	Kreuzlingen-(Zurich)	5
AT-CH	(Munich-DE)-Bregenz	St Gallen- (Zurich)	3
	(Innsbruck)-Feldkirch	Buchs-(Zurich)	3
IT-CH	Tirano	Posschiavo-(St Moritz)	5
	(Milano)-Chiasso	Lugano- (Gotthard)	2, 5
	Luino	Bellinzona	5
	Domodossola	Locarno	5
	(Milano)-Domodossola	Brig-(Bern/Geneve)	2, 5
SE-NO	Kiruna	Narvik	3
	(Ostersund)-Storlien	Trondheim	5
	(Stockholm)-Karlsstad	Oslo	3, 5
	Goteborg	Oslo	3
FI-RU	Helsinki	Vyburg-(St Persburg/Moskau)	3
PL-RU	(Berlin DE)-Elbnag	Kalinigrad	3
PL-BY	Bialystok	Hrodna	5
	(Warsawa)-Terespol	Brest-(Moskwa-RU)	3
PL-UA	Warsawa	Kiew	3
	Warsawa/Krakow	Lviv-(Kiev/Odessa	3
SK-UA	Kosice	Chop- (Moskwa)	3, 4
HU-UA	(Budapest)-Zahony	Chop- (Moskwa)	3, 4
HU-RS	Szeged	Subotica	3
	(Budapest)-Kiskunhalas	Kelebia-(Beograd)	3
HU-HR	(Budapest)-Pecs	Osijek	3, 4
	(Budapest)-Gyekenyes	Zagreb	3

EU27 – non-EU border crossing in 2009	Origin	Destination	Type of service
	Murakeresztur	Varazdin	4
RO-UA	(Bucaresti)-Suceava	Chemivisi- (Moskwa-RU)	3
RO-MO	(Bucaresti)-Iasi	Ungheni	3, 4
BG-SB	Sofia	Nis-(Beograd)	3
	Timisoara	Beograd	3
	Jimbolia	Kikinda	3, 4
BG-TU	Plovdiv	Edirne-(Istanbul)	3
HE-TU	Thessaloniki	Edirne-(Istanbul)	3
HE-FY	Thessaloniki	Skopje	3
LT-RU	(RU)-Vilnius	Kalinigrad	3
LT-BY	Vilnius	Lviv	
	Vilnius	Minsk	3
LT-RU	Riga	Moskwa	3
	Riga/LT	St-Petersburg	3
EE-RU	Tallinn	St-Petersburg/Moskwa	1
SL-HR	Divaca	Pula	4
	Ljubljana	Ryeka	4
	(AT/Ljubljana)_Most	Zagreb	3
	Ormoz	Cakovec	4

Source: NEA

As described in detail in paragraph 4.2.1:
1 = commercial, 2 = joint venture of incumbent operators, 3 = jointly operated, 4 = national PSO,5 = regional PSO, 6 = additional co-financed

Annex 11 Information on Freight Rail Reform in Third Countries

The rail reform process in the neighbouring countries is described according to the 4 areas chosen in this report for freight.

1. EU27 - CH/NO
2. EU27 - Eastern Europe (1,520mm gauge, Baltic Rim)
3. EU27 - Eastern Europe (1,520mm gauge, Ukraine, Belarus, Moldova)
4. EU27 - Eastern Europe (1,435mm gauge, Balkan and Turkey)

EU27 – CH/NO

Switzerland

The railway sector occupies a special place in Switzerland. The country is situated in the centre of Europe and hence there are many transit transport flows. The Trans Alpine passage imposes some constraints and determines the overall national transport policy. Article 84 of the Swiss Constitution specifies that transalpine freight shall be transported by rail and, aims, amongst other things, at protecting the alpine region from the negative effects of transit traffic by road and requires that heavy goods transport be transferred from road to rail. For these reasons rail transport has always played an important role in Switzerland and its development has received priority in the national transport policy. All the measures undertaken within the country increase the rail share of freight transport and support the transfer of freight transport flows from road to rail.

The rail reform process of the railway sector in Switzerland was carried out in two phases. Firstly, within the "Railway reform 1" in 1998 (which came into force in 1999) the legislation was revised in depth. The aim of this reform was to bring the situation in line with the first wave of European Directives and make it consistent within the bilateral land transport agreement signed between Switzerland and the European Union in 1999. "Railway reform 1" covers the points required by EU Directive 91/440, which aimed to introduce competition on the railway network (especially for freight traffic) and to ensure that railways are separated from the State Administration. At the same time, other EU directives from the First Railway Package as well as the Directive on Interoperability were not covered by the reform and to date the adoption of the directives concerning the second part of the EU's First Railway Package is still pending.

Within the reform and under the bilateral agreement, the focus in Switzerland has been placed on mandated non-discriminatory access. The introduction of separate accounting systems has made it possible to isolate the financing of regional transport and infrastructure (subsidised), freight (partially subsidised) and long-distance transport (not subsidised). As a result of the Rail Reform 1, Swiss Federal Railways (CFF) was converted into a State-owned enterprise in order to ensure the accounting and operational separation of the network and train operations. The infrastructure was separated from transport on an accounting basis only.

During the second phase of the railway reform Switzerland negotiated the adoption of the first two "railway packages" within the land transport agreement with the EU. For economic reasons it was decided to maintain vertical integration while creating an independent service for allocating train paths. The aim of the reform was to implement a new regulation regarding the financing of infrastructure through service agreements, to guarantee non-discriminatory access, to reinforce interoperability with the European railways network and to guarantee an equal treatment (in legal terms) between transport companies. This reform allowed foreign companies to enter the freight market freely and created conditions for compatibility between the Swiss Institutional Framework and the Community Framework.

As a result of these steps, Switzerland ranked 7th for the Rail Liberalisation Index 2007 (for freight and passenger transport) with 757 points (of the 27 European countries for which the index was calculated). This means the rail reform process is on schedule. If rail reform is considered exclusively in terms of freight, Switzerland is in 5th position in the overall classification (with 848 points out of 908).

The COM Index shows the competitive dynamics in rail transport markets: it calculates the aggregate of the development level of rail's share of the modal split, the number of external railway undertakings in proportion to the length of the network, and the market share held by external railway undertakings. On this index Switzerland is in 8th place with 459 points (compared with the highest of 793 in the UK). Amongst other things this index shows that external railway undertakings have increased their share in the rail freight market: in Switzerland between 2004 and 2007 this growth was around 4 % and the share of external railway undertakings on the rail freight market was between 20% and 29%.

The alpine transit routes provide good examples of the liberalised rail market in Switzerland is: in 2006 five railway companies from three countries were already providing traction services on these routes through Switzerland (north–south freight corridor Netherland–Germany–Switzerland–Italy). No single railway company was dominant. Hence competition is showing positive results.

Norway

The First Infrastructure Package and Interoperability Legislation have changed the rail market in Norway. Because of the economic and geographical situation the changes brought about by the reform were different than in other EU countries. Traditionally, all trains were operated by NSB (the main rail operator in Norway) but the deregulation in the past 10 years has led to the introduction of a number of new freight operators, including CargoNet, Hector Rail, Tågåkeriet and Ofotbanen.

Currently the organisation of the railway market in Norway is as follows: Jernbaneverket is a state-owned agency which builds and maintains all railway tracks, while other companies operate them. These companies include Norges Statsbaner, NSB Anbud, CargoNet, Flytoget, Hector Rail, Tågåkeriet and Ofotbanen.

In general, in the Rail liberalisation index 2007 (rail freight and passenger transport) Norway occupies the 13th position (from 27 countries) and its reform process has "on schedule" status. As for the rail freight liberalisation index, Norway is amongst the leading countries at 7th position in the overall classification.

EU27 – Eastern Europe (Baltic Rim)

Russian Federation

On 18 May 2001 the Government of the Russian Federation ratified the programme of structural reform on the railway transport. This reform was organised in three steps.

Step 1: Preparatory (2001–2002). The objective of the first step was mainly to prepare the institutional framework of the reform and execute the first steps toward the reform of rail transport in RF. Some of the main tasks were:

- To create an effective regulatory mechanism which will stimulate competition in the rail freight and passenger transport.
- To separate the functions of the government regulation and management of the railway and to create the "Russian Railroads" joint stock company.
- To create conditions for non-discriminatory access to the rail infrastructure.
- To create conditions for the development of competition in railway transport and assist the development of the freight companies with their own rolling-stock.
- To create independent subsidiaries within OAO Russian railroads for the execution of the specific transport activities (long-distance passenger transport, maintenance of the rolling stock, freight transport, etc).

The biggest achievement of the first step of the reform was the creation of the joint stock company OAO Russian Railroads.

Step 2: Organisational and legal separation of activities (2003–2005). The main tasks in this step were to continue the creation and development of the independent sub-units of OAO RZD and to open them progressively to competition, to increase competition in the rail freight transport, to finalise the optimal organisation of the OAO RZD, to reduce cross-subsidization in the passenger transport and to set up an overall sector management structure.

As the result of this step, during 2004–2005 OAO RZD created 27 associated companies specialised in, for example, maintenance, container transport and regional passenger transport. In order to reinforce competition, several Federal Laws were accepted providing operators with non-discriminatory access to the railway infrastructure. Private sector operations were introduced in those cargo groups most attractive to operators from the point of view of tariffs. From then on, the share of the private companies providing freight transport in RF has increased continually. At the end of the 2005 around one-third of the national wagon park was owned by private companies and they were carrying almost a quarter of the national rail traffic.

Step 3: Further developments (2006–2010). The separation of infrastructure management from management of the transport activity continues: the subsidiary of OAO RZD responsible for future freight transport operations was created during this step. Shares in some non-key OAO RZD subsidiaries were sold to private operators. One of the tasks was to promote the future development of privately owned rolling stock. The Federal Passenger Company was created in order to support the development of long-distance passenger trains. The Second Cargo Company was also created, finalizing the rough division of the national freight market. Additional objectives of the last reform step are to the increase investment attractiveness of the railroad sector in general, to increase overall competitiveness and profitability of OAO RZD and to improve the quality of the transport service.

By the end of the reform period OAO RZD is expected to be a transparent, reliable and profitable holding. The shares of its subsidiary companies are regularly sold out to private investors in order to provide fairer competition and develop the production capacity of OAO RZD.

Currently there are rather tense discussions about the future directions of structural reform. At the end of October 2009, OAO RZD, together with McKinsey, elaborated a new model for development of freight rail transport up to 2015. The main discussions centre around the access of private operators to locomotive traction.

EU27 – Eastern Europe (Ukraine, Moldova, Belarus)

Ukraine

Ukrzaliznytsa (UZ) is the Ukraine monopoly railway operator. A recently developed reform programme has established the main directions for the development of the Ukrainian railway sector up to 2015. The objective of the reform is to separate economic activity from government. A joint-stock company will be created on the basis of UZ, but UZ will remain a public company which will operate as a national freight and passenger transport and logistics provider. Reform will be organised in three steps During the first step (2009–2010) the governmental public concern "Ukrainian Rail Roads" will be created and legislative support of its functioning and for the reform itself will be put in place. Economic, technological and organisational mechanisms for the development of the sector will be introduced in the the second step (2011-2012). The main idea is to gradually create a vertically separated organisation. Finally, the aims of the third reform step (2013–2015) are to create a Public Joint Stock company, to reduce subsidization of passenger transport, to promote the creation of private companies with their own wagon fleets and to create regional railroad companies.

Republic of Moldova

CFM (Moldovan Railway) is the only railway operator in the Republic of Moldova and is responsible for passenger and cargo transportation as well as railway infrastructure and maintenance. It is the successor to MZhd, a subdivision of the USSR railway. During the period 1999–2005 the internal restructuring of CFM took place: historic debts were paid back, freight and passenger traffic volumes stabilised, and some non-key activities were removed from the CFM

structure. Development of the rail sector is currently determined by the national strategy of land transport development for 2008–2014. The Railroad Code, passed by the Moldovan Parliament in 2003, strengthened the monopolistic structure of the national railway sector and introduced the division between the management and economic functions of the CFM and the regulatory functions of the Transport Ministry in the Moldovan railroad sector.

Belarus

Belarus Railroad has a monopoly on the freight and passenger transport in Belarus. In order to increase the profitability of the organisation it is necessary to separate the main activities into independent companies, as well as to abandon all non-key activities. At the beginning of 2008 Belarus Railroad considered the possibility of creating a Joint Stock company, outsourcing all social operations and allowing private companies into the national rail market. In collaboration with the National Academy of Sciences, Belarus Railroad has elaborated plans for the reorganisation of Belarus Railroad but these plans have not yet been approved.

EU27 - Eastern Europe (Balkan and Turkey)

The current status of the railway reforms in the Western Balkans is presented in the figure below:

Figure A11.0.1 Current status of the railway reforms in the Western Balkans (May 2009)

	Albania	Bosnia-Herzegovina	Croatia	Kosovo (UNSCR 1244)	fYRo Macedonia	Monte-negro	Serbia
Historic debts			Implem.		Ongoing	Implem.	
Network statement	Ongoing	Ongoing	Public	Ongoing	Ongoing	Ongoing	Ongoing
Regulatory Institutions			Ongoing				Ongoing
Separation of operations and IM	Legisl.	Legist.	Ongoing	Legisl.	Implem.	Implem.	Legisl.
Safety – incl. safety certification		Ongoing	Ongoing		Ongoing	Ongoing	
Border crossing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Contract relations, incl. TAC, MAC, PMO			Implem.		Legisl.		

Source: E. Catania, Integrating railways markets – The European Facilitator, presentation made on the meeting with CEOs of West Balkan Railways, Brussels, 6 May 2009.

The greatest alignment of legislation with EU Directives (separation of infrastructure management and transport operation) has so far been achieved in Croatia, Former Yugoslav Republic of Macedonia and Montenegro. Kosovo and Bosnia and Herzegovina have proposed this but not yet implemented it. Open access to infrastructure is foreseen in many Western Balkan countries, but has not yet been introduced. Discussions about the introduction of reciprocal access are being held in Albania, Serbia and Croatia. Access charges are foreseen in the legislation of each Western Balkan country.

At present, even though the process of railway restructuring has been under way for several years in all these countries, the railway market of each individual country remains closed, even on a reciprocal basis. Existing national laws are very often not implemented properly.

Serbia

Reform of the railway sector has been supported strongly by the Government of Serbia which has created a Unit for Public Enterprise Restructuring under the Ministry of Finance to lead and finalise the reform process. Reform was considered necessary in order to harmonise the national situation with the EU's Acquis Communautaire and the support the EU accession process.

In March 2005 Parliament ratified a new railway law, introducing the Railway Directorate as the regulatory body for the railway sector, though with limited regulatory functions. Serbian Railways (ZS) was established as the legal successor to the former ZTP. ZS functions both as infrastructure manager and operator. Future separation of accounts for freight/passenger operations and infrastructure management was also envisaged. Whilst the railway law of 2005 also introduced the principle of competition into Serbian railways, by allowing access to more operators, there is as yet no competition in reality.

In 2009 the Serbian government initiated another step towards the railway structural reform. The reorganisation of the railway assumes the separation of infrastructure from commercial operations. This next step of reform is planned for implementation in two stages:

- During the first stage, the accounting separation of infrastructure from operation would be made. Infrastructure management will remain the responsibility of the State. In order to improve competition, the building of individual lines could be outsourced in the form of sub-contracts (as a concession or contract on strategic investment between the state and the private sector). A new company, called Commercial Railway Enterprise (CRE) will be created and will be responsible for freight and passenger operations.
- In the second stage of the reform the physical separation of the infrastructure and further institutional separation will take place. All the assets necessary for infrastructure will remain under the State's responsibility (within the REI company) and the assets necessary for the commercial operation of railway services would be transferred to CRE. Further transformation of CRE will be undertaken: the freight and the passenger profit centres would be further separated into intercity and international and local passenger centres.

With regard to the opening of the railway market, the Serbian Ministry of Infrastructure has adhered to the policy of first opening the market to the domestic operators, before subsequently opening up to operators from SEETO neighbours and finally to any third party.

Republic of Macedonia

Macedonian Railway Reform was initiated in 2005 with the assistance of the World Bank. The main objectives were to improve the financial effectiveness and productivity of railway operations through labour rationalisation, to increase accountability, to introduce competition into rail operations, to restructure and to rationalise passenger services. Division of Macedonian railways into separate companies for infrastructure management and transport operation was one of the key reform elements.

On July 1, 2007 the Government of Macedonia ratified and published the necessary legislation and the separation of Macedonian Railways became effective. The new state-owned rail infrastructure company (Public enterprise Macedonian Railways Infrastructure–Skopje) took over the operation and maintenance of all rail tracks and other railway assets and the new transport operator (Macedonian Railway Transport Joint Stock Company–Skopje) assumed responsibility for the operation of passenger and freight trains.

In February 2008 the Council of the EU adopted the Accession Partnership for Macedonia containing eight key priorities as benchmarks for launching accession negotiations.

The status of railway reform in Macedonia is comparatively advanced when compared to other Western Balkan countries: currently almost all requirements of the first EC railway package Directives have been implemented and Infrastructure (IM) and Operations (RU) are performed by separate companies. However, passenger and freight operations accounts have not been separated into independent undertakings and the Government does not intend to privatise them, although the Law on Transformation of the Railways (ratified in 2005) allows for this.

Croatia

In 2003 Croatia adopted a Railway Law which adheres to the majority of EU Directives. Furthermore several other laws were passed in order to provide complete alignment with the first and second EU Railway Packages. According to this Railway Law, Croatia has separated the State Railways into four companies: HZ Infrastructure, HZ Passengers, HZ Cargo and HZ Traction. In September 2006 the holding company was created to which all abovementioned companies now belong.

Croatia is one of the Balkan countries which is now ready to open up its railway market to third party competition. No country in the region is actually doing this however, not even on the basis of reciprocal agreements. Nevertheless, access to local lines is possible and Croatia is moving forward the process of awarding licenses to independent operators.

Albania

Albania is also a potential candidate country for EU accession following the Thessaloniki European Council of June 2003. In 2008 the Council adopted a new European partnership with Albania and the Stabilisation and Association Agreement with the country came into force in April 2009. Therefore, there is a need to align, at least partially, its current legislation with the main EU

Directives (to date Laws are not aligned with EC Directives, not even with EU Directive 91/440). There is plan to amend the Railway Law in 2010, to incorporate all Directives including Dir. 2008/57.

Railways in Albania are administered by the national railway company Hekurudha Shqiptare (HSH) (Albanian Railways). Infrastructure and operations are not separated, either as entities or as accounts. The Albanian Government has approved the separation of infrastructure although it is only at a draft stage. Progress is also being made in the appointment of technical assistance to the railway directorate, which will focus on reform assistance. The restructuring project is almost finished and Albanian Railways will be reorganised into three business units (cargo, passengers and infrastructure) and two service units (rolling stock maintenance and facilities).

Bosnia and Herzegovina

Bosnia and Herzegovina (BiH) are progressing slowly on a proposal to reform railways. In 2008, the EU and BiH signed the Stabilisation and Association Agreement which gives BiH 5 years to implement certain structural changes.

Currently the railways in Bosnia and Herzegovina (BiH), due to the particularity of the State, are regulated within three different laws: the Law on railways in Bih (passed in 2005) the Law for FZBiH for the Federation of BiH (passed in 2001) and, finally the Law for ZRS for Republic of Srpska (passed in 2001 and amended both in 2005 and in 2008). The State entity laws are not aligned with EU Directive 2001/14 and only partly with EU Directive 91/440.

Non-discriminatory access to infrastructure is foreseen at State level, but in practice only operators from the two national entities can run on the respective infrastructures. FZBiH has expressed its readiness to separate its infrastructure and operations accounts, but this has not yet been implemented. No separation has been announced by ZRS.

Kosovo

Since 2005, Kosovo Railways is organised as one Joint Stock Company with two main divisions - infrastructure and commercial (train operations), the accounts of which are not separated. The present organisation of the company serves as a transitional phase for further development into two separate companies, as required by the new railway law and EU legislation.

The new railway law and the law on public companies were both adopted in June 2008. The railway law is fairly well aligned with EU Directives. Through this law, Kosovo Railways are subordinate to policy making by the Ministry of Transport and Telecommunications. The Law on public companies covers the legal and financial aspects of Kosovo Railways as a public company and defines the company as subordinate to the Ministry of Economy and Finance as owner.

Separation of accounts for Infrastructure and Operations Directorates currently exists at the legislative level, but is not yet implemented in practice. The creation of an independent Regulatory Authority, acting as market regulator, licensing body, safety authority and accident investigation body, is foreseen for 2009/2010.

Montenegro

In 2004 the new Railway Law (enforced in 2005 and complemented by the Railway Safety Law in 2007) was adopted in Montenegro. On 15 October 2007 Montenegro signed the Stabilisation and Association Agreement with the EU. By doing so, the country assumed the obligation to harmonise the legislation with the Acquis Communautaire. Currently the alignment of Montenegro Railway legislation with EU Directives is almost complete. Since June 2008 infrastructure management has been separated from operations. Montenegro has also applied European Safety and Security standards. There is a clear separation of costs for infrastructure maintenance and modernisation between the State (which owns the infrastructure) and the user through access charges fee which must not discriminate.

At present the development of the Montenegro Railways is determined by three main documents: the Transport Strategy (2008), the Restructuring Strategy of the Railway of Montenegro (2007) and the Privatisation Plan (Decision of the Government 2009). Among the objectives of the Restructuring Strategy are the reform of the railway market, the improvement in service quality, the privatisation of operational activities, free track access and transparent and equal prices for its use, logistical integration with the Railway of Serbia and the Port of Bar and the strengthening of transit transport, especially for container and inter-modal transport.

The restructuring process of the Railways of Montenegro has been organised in three phases: revision of balance, segmentation and privatisation. There is complete separation of the railway undertaking from infrastructure management.

The restructuring process is currently at the end of the second phase which implies further segmentation of newly created stock companies: Railway Infrastructure and Railway Transport, as well as preparation for privatisation of certain parts of those railway companies. Railway Infrastructure will be organised as a holding company with three daughter companies created through further segmentation: Managing Infrastructure and Traffic Regulation, Infrastructure Maintenance and Stations and Land. The new joint stock Company "Montecargo" (freight operator) was formed in 2009. The Railway Transport company (passenger operator) will be organised as a company with two daughter companies: Passenger Transport and Maintenance of Rolling Stock. In parallel, the ministry is making the legislative changes to railway laws necessary as a precursor to possible privatisation. The Tender Commission for privatisation was formed in March 2009. The Commission and the advisor for privatisation are preparing tender documents for privatisation of some parts of the railway system.

Turkey

The State Railways of the Republic of Turkey (TCDD in Turkish) is the state corporation that operates the public railway system in Turkey. As the sole railway operator in the country to date, TCDD operates all passenger, freight and suburban railways, including both domestic and international services. Since 1927 TCDD has also been responsible for the operation of various major Turkish ports.

In the light of proposed Turkish accession to the EU, the process of restructuring TCDD was launched with support of the EU and World Bank funds. Currently TCDD remains vertically integrated and is responsible for both infrastructure and operations. The new law will separate infrastructure from operations and allow open-access operation for the first time. The reform process should ensure that TCDD will become the infrastructure authority. A new passenger and freight operating transport company (DETAS) will be set up along with three governmental organisations responsible for the regulation of competition, railway safety and railway accidents respectively. DETAS will be established as a subordinate unit of TCDD, and its general manager will be appointed by the transportation minister.

These arrangements will end the monopoly of TCDD and open up railway transport in Turkey to competition. The private sector will be allowed to construct and to operate railways.

It is planned to establish a Railway Transportation General Directorate (DUGEM) which will resolve disputes arising from railway competition and will be responsible for safety certification of railway companies. The Directorate will also be responsible for issuing permits for the commissioning of rail vehicles and will be authorised to register these vehicles.

Annex 12 Information on Main Rail Freight Operators in Neighbouring Countries

The following section provides an overview of key financial and operational information relating of the main freight operators in neighbouring countries, as well as their expansion plans.

Cargo NET AS

CargoNet AS is Scandinavia's largest railway company for the transport of containers, consignments and trailers. It is a jointly-owned subsidiary of the Norwegian NSB AS (55%) and the Swedish rail operator Green Cargo AB (45%).

The company operates around 100 fully loaded trains every day with mixed cargo and consignments. CargoNet AS carries freight for industry and commerce through an efficient network of 24 freight terminals in Norway, Sweden and Denmark, and between Scandinavia and Continental Europe. Reliable access to strategic freight terminals in Europe is provided through cooperation with Hupac in Switzerland and KombiVerkehr in Germany. The freight trains carry trailers, swap bodies and containers from 20 to 45 feet as well as tanks. There are up to seven freight trains in each direction each working day.

CargoNet AS offers a full range of services, such as:

1) Container transport.
2) Articulated trailer transport.
3) General freight transport by rail in Norway, Sweden and Denmark.
4) Systemtog for large industrial customers.
5) Distribution department services in Norway.
6) Complete package (one-stop-shopping) for handling of unit load carriers.
7) When no train space is available, providiion of road transport all the way.
8) Repair work for containers, reloading and securing of cargo.
9) Custom department services in Norway.
10) Import/export clearance and transitioning of general cargo, consignments and complete load carriers as well as of border crossing transport by Rail, Road, Ship, Air.
11) EU customs clearance.
12) Transitioning in the Norwegian Customs Service's electronic system.
13) Storage facilities-(capacities differ from terminal to terminal).
14) Monitoring of temperature controlled units.
15) Power supply, Diesel refuelling.
16) Minor repairs and lacing up canopies.
17) Makeshift codification ("emergency codification").
18) Arranging for reloading and safeguarding load carriers.
19) Approval and codification of units for railway transport.

Financial and Operational Data

CargoNet AS turnover in 2007: 1.703 million NOK
in 2008: 1.596 million NOK
Number of units transported in 2003: 327 000 units
in 2004: 380 000 units
in 2005: 412 360 units
in 2006: 430 000 units
in 2007: 473 000 units

Source: Facts about CargoNet Group http://www.cargonet.no

SBB Cargo

SBB Cargo, a subsidiary of Swiss Federal Railways (SBB), is Switzerland's leading rail freight provider. The company operates a comprehensive network for its customers, with 323 delivery points in Switzerland, and connects to industrial centres in Germany and Northern Italy. SBB Cargo can deliver individual wagons to the customer's siding, provide rapid overnight freight transport, or haul bulk goods on "block trains". SBB Cargo applies an end-to-end freight handling philosophy throughout the European North-South corridor and offers reliable transport services to customers wishing to import or export goods.

SBB Cargo is the first rail company to have established subsidiaries in Germany and Italy. SBB Cargo Deutschland (based in Duisburg) and SBB Cargo Italia (based in Gallarate) operate with their own locomotives and their own staff in their respective countries. ChemOil Logistics, a subsidiary of SBB Cargo, specialises in logistics for petroleum and chemical products.

The main services offered by SBB Cargo are:
1) Domestic wagonload services including export and import.
2) International wagonload services.
3) FIX or FLEXI block train services.
4) Domestic and international intermodal services.
5) Rail-related logistics services.
6) Services for other rail operators.
7) Express/overnight services.

Main connections and hub locations	
Duisburg–Desio	daily
Duisburg–Brescia	daily
Duisburg–Camnago Lentate	daily
Duisburg–Torino	daily
Important onward connection points and stop	
Singen	Rotterdam
Karlsruhe	Lecco
Cologne	Oggiono
Bremerhaven	Molteno

Hub Locations

Italy: Desio, Brescia, Lonato, Camnago-Lentate, Torino
Germany: Weil am Rhein, Worms, Duisburg-Rheinhausen

Financial and Operational Data

Table A12.0.1 SBB Cargo revenues and expenses, in ChF million

Year	2006	2007	2008
Operating revenues	1,229.0	1,268.8	1,259.0
- of which traffic revenues	1,005.9	1,062.6	1,044.2
Operating expenses	1,258.2	1,448.8	1,262.7
Operating result/EBIT	-29.2	-180.0	-3.7
Net income	**-37.3**	**-190.4**	**-29.9**

Source: SBB Cargo in 2008, extract from SBB's Annual Report 2008

Table A12.0.2 SBB Cargo traffic performance per business type, in net tonne-km (million)

Year	2007	2008
SBB Cargo total	**13,368.1**	**12,530.9**
Wagonload freight	5,397.4	5,776.7
Individual wagonloads	3,748.7	3,862.6
Wagonload block trains	1,648.7	1,914.1
Intermodal freight	7,970.7	6,754.2
Unaccompanied intermodal freight	7,295.5	6,107.4
Rollende Landstrasse (piggyback)	675.2	646.8

Source: SBB Cargo in 2008, The extract from SBB's Annual Report 2008

Table A12.0.3 SBB Cargo traffic performance per national company, in net tonne-km (million)

Year	2007	2008
SB Cargo AS (schweiz)	8,008.1	7,768.8
SBB Cargo Deutschland GmbH	3,686.2	3,649.6
SBB Cargo Italia Srl	915.2	914.1
Bought from third parties	758.7	198.3
TOTAL	**13,368.1**	**12,530.9**

Source: SBB Cargo in 2008, The extract from SBB's Annual Report 2008

In 2008 SBB Cargo exceeded the financial target that was set by the restructuring programme by CHF 53 million. The downturn in the economy and the sharp fall in the euro exchange rate had serious impacts on the freight business and hampered the restructuring efforts, so that SBB Cargo ended the financial year 2008 with a loss of CHF 29,9 million, including provisions of CHF 15.2 million for recession related measures. Howver, the result for the year was considerably better than for 2007. The traffic volume in net tonnes/km declined overall in 2008 by 6.3% to 12,53 billion.

OAO RZD-Russian Railways

Russian Railways is a state-owned rail company with full state backing and guarantee. It accounts for over 3.6% of Russia's GDP and handles around 80% of all transportation in Russia. OAO RZD handles about 83% of all freight in Russia (excluding oil by pipeline). Structurally, OAO RZD is a state-owned company with around 60 subsidiaries and more than 50 dependent organisations.

Russian Railways runs national and international freight services for all types of commodities, ranging from coal, iron ore, cement and oil and oil products to automobiles and grain using specialised tank, box, flat, open freight and grain cars. They also operate containers and provide door-to-door delivery across Russia and Eurasia for goods, giving customers real-time information on the progress and location of the shipment using an electronic trading platform.

OAO RZD revenue in 2007 was RR 975,6 billion and net income was RR 84,5 billion. Even though the Russian freight market has been opened to competition and more than 80 private companies are already operating on it, the total share of OAO RZD in the freight transported remains dominant.

Table A12.0.4 Cargo transportation OAO RZD, in billion tonne-km

	2006	2007	2008
Total shipment	2,148.0	2,312.6	2,461.8

Source: Actionary note, OAO RZD, issue 8.

UZ UkrZaliznyza–Ukrainian Railway

The Ukrainian railway state-owned company is the only operator providing freight rail services in the Ukraine. Ukrainian railway currently has an overall management structure responsible for the functioning of six different regional railroads (which together form the Ukrainian network):

- Donetskaya railroad
- Lvovskaya railroad
- Pridneprovskaya railroad
- Odesskaya railroad
- Southern railroad
- South-West railroad

There are also smaller companies that carry out more specialised activities within Ukrainian railway.

The railway reform foresees the creation of the "Ukrainian railroads" company, and in the second stage of reform (due by 2015) joint stock companies will be created.

The following table provides an overview of general rail freight statistics for Ukraine. Taking into consideration the monopoly of Ukrainian railway in the national market, the assumption can be made that these data reflect the operational results of the railway within Ukraine.

Table A12.0.5 Cargo transportation in Ukraine, in million tonnes

	2006	2007	2008
Total shipment	858.4	902.7	891.8
-of which, railway trains	476.8	512.5	498.8

Source: State Statistics Committee of Ukraine

Table A12.0.6 Cargo transportation in Ukraine, freight turnover, in billion tonnes/km

	2006	2007	2008
Total shipment	477.2	496.4	491.7
-of which, railway trains	240.6	262.8	256.9

Source: State Statistics Committee of Ukraine

In 2008 Ukrainian railroads carried 69,8 million tonnes of transit freight. The annual turnover of Ukrainian railroad is € 2,4 billion (28 blrd Hryvna).

The economic crisis has had a very strong impact on the performance of the Ukrainian railway. In January 2009 the rail transport volume and consignment indicators were the worse for eight years, down some 43% since August 2008 which was the previous peak.

The crisis has also had an impact on the direction of freight flows. Before the crisis international rail freight was fairly equally divided between Ukrainian port traffic and traffic with Western Europe, but the latter freight volumes have decreased significantly.

Ukraine actively supports the possibility of rail container and contrailer transport between Europe and Asia. Another future initiative relates to the re-launching of the "Yaroslavl" combined transport train connecting Poland and Ukraine. This train ceased functioning due to low demand, but there is now heavy road freight traffic on this corridor, estimated at over 400 units per day which could offer a potential for rail. This project is supported by the Polish PKP, Linia Hutnicza Szerokotorova and by Deutshe Bahn. DB has also proposed possible extension of this service toward large European centres such as Frankfurt or Hamburg.

There are other intermodal international freight trains to and from Ukraine, such as the "Viking" service on the Ukraine–Belarus–Lithuania route and since 2009 the ZUBR service from Estonia, Latvia and Belarus to Ukraine.

Another priority development for Ukrainian railway is the further development of rail freight to the Ukrainian ports and, in this context, the development of rail-served dry ports.

BCh–Belarus Railway

Belarus railway is a state-owned company operating under the control of the Ministry of Transport and Communications. It consists of 84 institutions, including regional railroads in the Minsk, Baranovich, Gomel, Mogiliev and Vitebsk departments.

The main services provided by Belarus railroad are:

- Domestic and international wagon and container transport.
- Domestic and international passenger transport.
- Information services.
- Cargo weighing.
- Freight forwarding services.
- Warehousing services.
- Express container trains.

1) "Eastern Wind" is an express container train from Berlin to Moscow and on through to Brest.
2) "Kazakhstanskii vector" is a container train from Belarus through Moscow to Kazakhstan (with freight destined for further afield to Uzbekistan, Tajikistan, Turkmenistan and Kyrgyzstan). The train is not strictly timetabled but departs from Belarus when fully loaded.
3) "Mongol vector" is a container train running from Brest to Ulan Bator twice a week. Recently the service has been extended over the entire route between Germany and China.
4) "Viking" is a weekly container running through Belarus and connecting Ukraine and Lithuania.
5) There are container trains on the Brest (Belarus)–Kaluga (Russia) route.
6) The Zenishki and Aksu 1 trains operate between (Kazakhstan), Minsk (Belarus) and Klaipeda (Lithuania).
7) The ZUBR container train operates from Estonia and Latvia to Ukraine via Belarus.

The freight turnover on the Belarus railroad has been increased steadily in recent years. Taking the Belarus railway monopoly in the national market into account, we can assume that situation reflects the position of the railway in general.

Table A12.0.7 Freight turnover, Belarus, in tonnes/km (million)

	2004	2005	2006	2007	2008
Total freight turnover	54,531	58,753	61,703	67,292	71,949
-of which, railroad	40,331	43,559	45,723	47,933	48,994

Source: National Statistics Committee of Belarus

In 2007 Belarus transported 140,8 million tonnes of freight, of which 98,2 million was international cargo (including 49,3 million tonnes of transit cargo). The volumes of freight transport on the Belarus railroad dropped at the beginning of 2009 due to the economic crisis. For the first 9 months of 2009 (January–September 2009) the freight turnover on Belarus railroad was only 85.7% of its 2008 level (98 million tonnes) and reached only 84.8% of the planned volume.

CFM–The Railway of Moldova

The Railway of Moldova is a state-owned company with a monopoly in rail freight and passenger transport in Moldova. It consists of 38 entities responsible for the management and operation of different railroad sections. The railroad has 81 stations, of which 58 are freight stations.

The main services provided by the Railways of Moldova:
1) Domestic and international transport.
2) Transport of oversized cargo.
3) Container transport.
4) Transport of perishable goods.
5) Freight forwarding services.
6) Warehousing.
7) Cargo security.
8) Leasing of wagons.

The table below provides some general rail freight statistics for Moldova. Taking into consideration the CFM monopoly in the national market, it can be assumed that these data reflect the operational results of the railway in general.

Table A12.0.8 Transported goods, Republic of Moldova, in 1,000 tonnes

	2005	2006	2007	2008
Total	36,410.0	38,250.1	40,794.2	39,793.6
-of which railways	11,704.1	11,092.5	11,846.8	11,006.2

Source: National Statistics Committee Moldova

Table A12.0.9 Turnover of goods, Republic of Moldova, in tonnes/km (million)

	2005	2006	2007	2008
Total freight turnover	5,459.6	6,242.2	5,864.6	5,840.6
-of which, railroad	3,052.9	3,673.2	3,120.2	2,872.7

Source: National Statistics Committee Moldova

TCDD–Turkish State Railways

Currently Turkish State Railways, the only operator in the Turkish rail freight and passenger market, is under the coordination and supervision of the Turkish Ministry of Transport. In addition to rail services, since 1927 TCDD has been responsible for operating several major ports which handle 30% of Turkish port activity.

Currently TCDD is vertically ingegrated and hence is responsible for both infrastructure and operations. The restructuring process is under way and business units for infrastructure and for operations will be separated. The opening of the freight market to the third parties is also foreseen as part of the within reform process.

Currently within TCDD several international freight trains operate from Turkey to Syria and Iraq, through Syria to Iran and the Central Asian countries beyond, to Greece and the countries beyond and to various European countries through Bulgaria. Railroad transportation from Turkey to CIS countries or vice versa is possible through links via Romania, Moldavia and the Ukraine.

Container trains run between Turkey (Istanbul), Teheran (Iran), Uzbekistan (Tashkent) and Almaty (Kazakhstan) and between Haydarpasa (Turkey) and Turkmenistan, operating once a week in each case.

As an operator of several Turkish ports, TCDD proposes to provide combined transit transport services by rail and water, using the ports it operates at Haydarpasa, Alsancak, Mersin, Bandirma, Samsun, Derince and Iskenderun.

TCDD also proposes rail and water combined operations to Romania and the countries beyond, using the train ferry operating between the ports of Derince (Turkey) and Constanta (Romania).

The table below provides general rail freight statistics for Turkey up to 2007. In 2007 The TCDD monopoly in the national market allows us to assume that these data reflect the operational results of the railway in general.

Table A12.0.10 Transported goods, Turkey, in 1,000 tonnes

	2004	2005	2006	2007
Total rail transport, of which	17,989	19,195	20,185	21,404
- Low-speed domestic	15,302	15,878	16,591	17,632
- Low-speed international	2,300	2,906	3,003	3,100

Source: Turkish State Railways Annual Statistics, 2003-2007

Table A12.0.11 Turnover of goods, Turkey, in tonne/km (million)

	2004	2005	2006	2007
Total rail transport, of which	9,417	9,152	9,676	9,921
- Low-speed domestic	8,181	7,919	8,146	8,372
- Low-speed international	1,107	1,081	1,318	1,316

Source: Turkish State Railways Annual Statistics, 2003-2007

Zeleznice Srbije-Serbian Railways

Serbian Railways is a state-owned railway company. The Freight Service Department is responsible for all organisational, transport and commercial activity on the Serbian Railways network. In 2008 Serbian Railways handled around 14,1 million tonnes of goods and around 4,338.6 million net tonne-kilometres.

The Serbian Railways wagon load system centres around four main marshalling yards in Novi Sad, Belgrade, Lapovo and Nis, with a number of other distribution yards. The yard in Belgrade acts as the main hub in the freight transport system.

EIB is currently financing track renewals on the Serbian core network as part of a wider infrastructure renovation project; this also contributes to the improvement of Pan-European Corridor X routes from Croatia and Hungary to Serbia and the line connecting Beograd with the port of Bar in Montenegro.

MZ Makedoncki Zekeznici–Macedonian Railways

Macedonian Railways is the public enterprise responsible for railways in the Republic of Macedonia. All domestic lines within Macedonia are operated by Macedonian Railways. There are international connections to Greece (Corridor X passes through Macedonia), Bulgaria and Kosovo. New rail links are planned to connect with the existing east-west line (through Beljakovci, Kumanovo, Skopje, Tetovo, Gostivar and Kicevo), to provide links with the Black Sea in Bulgaria and with Durrës on the Adriatic Sea in Albania (Corridor VIII).

The table below provides general rail freight statistics in Macedonia up to 2007. Taking into account the fact that Macedonian Railways is by far the dominant operator in the country, these data reflect the operational results of the railway in general.

Table A12.0.12 Revenue and expenditures of railway transport in Macedonia, in 1,000 dinars (2007)

Revenues/ Expenditures	In Denars
Total revenues,	3,320,904
- of which from transport of goods and RIV	1,862,901
Total expenditures	3,363,021

Source: Macedonia Statistical Review, 2008

Table A12.0.13 Transported goods, Macedonia, in 1,000 tonnes

	2004	2005	2006	2007
Total	2,641	3,129	3,800	4,686

Source: Macedonia Statistical Review, 2008

Table A12.0.14 Turnover of goods, Macedonia, in 1,000 tonnes/km

	2004	2005	2006	2007
Total	426,344	530,044	614,424	778,581

Source: Macedonia Statistical Review, 2008

Željeznica Crne Gore–Railways of Montenegro

Railways of Montenegro is the national railway company of Montenegro, with a monopoly of rail passenger and freight transport within Montenegro.

Kosovo Railways

After restructuring, the Kosovo Railway Joint Stock Company now consists of the Kosovo Railways Infrastructure division and the Kosovo Railways Operations Division. The latter is responsible for the transport of goods and passengers.

For freight, Kosovo Railways operates conventional and container transport. Combined transport schemes have also been introduced.

The economic crisis has had a clear impact on Kosovo railways: the closure of mines and some factories has affected the volume of freight transport. The financial situation has led Ferronikeli, a key provider of freight for Kosovo railways, to abandon the transport of minerals by rail, leading to major losses for Kosovo Railways.

In 2008 Kosovo Railways transported 832,256 net tonnes of freight, which was an increase (of 41.4%) over 2007. The income from freight operations in 2008 was 3,452,140 euro, some 39.7% higher than the previous year.

During 2008 the number of containers transported by Kosovo Railways was 941, a decrease of 20.9% compared to 2007. One of the main reasons for this decline was a series of strikes in the port of Thessalonica.

Hrvatske Zeljeznice–Croatian Railways

HZ Croatian Railways is a state-owned railway company providing all domestic and international rail transport and combined transport. Among other services offered by HZ Croatian Railways are:

- Warehousing services.
- Cargo reload.
- Rental of own real estate.
- Rental of other land-based means of transport.
- Wagon maintenance.

Following restructuring, JSC Hrvatske Zeljeznice has been reorganised into several departments and HZ Cargo is in charge of all freight operations.

ZFBH – Railways of the Federation of Bosnia and Herzegovina

There are two railway administrations in the Federation of Bosnia and Herzegovina; ZFBH Railways and ZRS (the railways of the Republic of Srpska JSC).

ZFBH is a state-owned company which performs freight and passenger rail transport in Bosnia and Herzegovina, providing;

1) Public transport of cargo via domestic and international rail transport and combined transport.
2) Maintenance, reconstruction, modernisation, construction of wagon stock and other equipment necessary to perform transport services.
3) Maintenance, modernisation and development of railway infrastructure.
4) Organisation and safety of railway transport.

Freight transport on the lines of Bosnia and Herzegovina is limited to the regular movement of wagonload consignments in privately owned rolling stock. As shown in the following table, traffic volumes have increased steadily in recent years.

Table A12.0.15 Goods transported on the lines of ZFBH, in 1,000 tonnes

	2003	2004	2005	2006
Total rail transport, of which	4,658	5,307	6.742	6,558
- domestic	3,527	5,307	3,299	3,060
- international	1,131	2,116	3,443	3,498

Source:
http://195.130.35.116/zfbh.ba/zfbhenx/index.php?option=com_content&task=view&id=34&Itemid=120

Table A12.0.16 Goods transported on the lines of ZFBH, in tonnes-km (million)

	2003	2004	2005	2006
Total	239.2	504.2	861.9	772.2

Source:
http://195.130.35.116/zfbh.ba/zfbhenx/index.php?option=com_content&task=view&id=34&Itemid=120

Kazakh Railways (Temir Zholy)

JSC "National Company Kazakhstan Temir Zholy" was set up in March 2002. This is a state-owned company providing freight and passenger transport in Kazakhstan under the supervision of the Ministry of Transport and Communications of Kazakhstan. During the restructuring period (2004-2006) some non-key activities (maintenance, social services) were hived off from NC KTZ.

Table A12.0.17 Transported goods by NC KTZ, in 1,000 tonnes

	2006	2007
Total rail transport, of which	246,880	260,546
- domestic	135,028	140,292
- export	83,777	84,760
- import	17,750	22,295
- transit	10,325	13,199

Source: NC KTZ Annual Report 2008

Table A12.0.18 Turnover of goods on the lines of the NC KTZ, in tonnes-km (million)

	2006	2007
Total rail transport, of which	191,189	200,752
- domestic	76,771	79,351
- export	78,417	74,638
- import	18,512	24,180
- transit	17,489	22,582

Source: NC KTZ Annual Report 2008

As shown in the table above, traffic volumes are increasing. During 2007 Kazakh Railwaysstan operated 1006 container trains to and from various neighbouring and East European countries.

China Railways

Almost all rail operations in the People's Republic of China are handled by the Ministry of Railways, which is part of the State Council of the People's Republic of China. There are 16 railway bureaus and 2 railway group companies under the Ministry of Railways.

For freight, there are 3 railway freight service providers (licensed applicants):
1) China Railway Container Transport Co. Ltd. (CRCT.).
2) China Railway Special Cargo Services Co. Ltd. (CRSCSC).
3) China Railway Express Co. Ltd. (CRE).

All three companies own transport facilities such as containers and road vehicles, but not the rail tracks or rail wagons. CRCT is specialised in container transport. The company owns 173,000 TEU of containerss, 9130 container flat trucks and 18 large container freight terminals as well as many other smaller stations throughout China. Complementarily, CRSCSC specialises in non-container freight transport, mainly cars, over-sized cargo and refrigerated cargo. CRE provides door to door express parcel services.

The table below shows the total cargo transported by rail as well as infrastructure investment during the period 2005-2008:

Table A12.0.19 China Railways: total cargo transported by rail and infrastructure investments between 2005-2008

Year	Cargo (million tonnes)	Turnover (billion ton.km)	Infrastructure investments (billion CNY)
2008	3,287.34	2,482.84	337.16
2007	3,144.74	2,353.23	179
2006	2,871.56	2,171.47	155.28
2005	2,683.49	2,052.59	88.02

Note: The cargo volume does not include parcels.
Note: The investment only refers to spending on basic infrastructure.

The international transport of rail freight cargo to and from China (via Alatav connecting to Kazakhstan and further towards the west, amounted to 12,04 million tonnes and 13,1 million tonnes for 2007 and 2006 respectively, including 191,000 TEU (2007) and 142,900 TEUs (2006).

OSJD Organisation for cooperation of railways

Fostering of cooperation between the railroads of different countries is included in the remit of various different international organisations, such as the International Union of Railways (UIC) and the Organisation for Cooperation of Railways (OSJD).

In particular, the aim of OSJD is to create and improve the coordination of international rail transport especially between Europe and Asia and to help to develop cooperation between railway companies and other international organisations. 27 countries are members of this organisation (including Azerbaijan, Albania, Belarus, Kazakhstan, China, Korea, Moldova, RF, Ukraine and the Baltic States). Several European railways, including Deutsche Bahn (Germany), SNCF (France), ΟΣΕ (Greece) and VR (Finland), have the status of "observer" in OSJD activities. OSJD cooperation is carried out at two levels: intergovernmental and at the level of the railways.

In 2008, within the framework of the OSJD Commission on Transport Policy and Development Strategy, work was concentrated on the facilitation of border crossing procedures in the international railway transportation of passengers and goods by rail, on the development of key OSJD transport corridors, on identifying solutions to various railway transport policy issues and on various other ways of improving the competitiveness of rail transport.

Ways to facilitate railway border crossing procedures were addressed by the OSJD, UNECE and OTIF organisations in their joint preparatory work for an International Conference on these issues under the aegis of the United Nations. A number of documents, actions and recommendations have been drawn up, the implementation of which would make it possible to considerably reduce the time required for railway border crossings. In 2007 much attention was paid by the OSJD to updating the OSJD legal base, which specifies the conditions for international railway traffic (the SMPS and SMGS agreements). In the course of this revision of SMPS and SMGS, certain successes has been achieved, which have made it possible to adapt these papers to current requirements and to take into account recent changes in economic and political relationships between OSJD Member States. It is worth noting that during this period, close cooperation between CIT and OSJD has led to the drawing up a uniform CIM/SMGS consignment note which will facilitate railway border crossing procedures. The implementation of this project is ongoing and it is likely in the longer term to result in significant reductiond in railway border crossing times. Work on the RID provisions, aimed at harmonising the Rules for the Transportation of Dangerous Goods, also continued in 2007 and this has also become an aspect of OSJD activities. Harmonisation of the 2007 RID Rules with Annex 2 of SMGS has been possible. Work has also proceeded in various other fields, such as coordination of train schedules and amendments to the PPW Agreement. Leaflets on various railway technical issues have been compiled and issued in the fields of rolling stock, gauges, rail track and structures, communications systems, data transmission and SFT, power supply and electric power traction, organisation of paperless-technology transportation, coding and information technology, as well as in the fields of scientific, technical and economic information (STEI).

Considerable attention has been paid to improving financial and accounting activities of the OSJD Member States in order to reduce their levels of debt. In 2007 the AWG on the harmonisation of OSJD basic documents continued their activities, enabling the drawing up of a draft Convention on direct international railway and combined traffic, the OSJD Statute and Statutes of the Assembly of the Heads of Railway Companies. Successful cooperation with a range of international organisations such as UNECE, UNESCAP, OTIF, CIT and UIC continued. In 2007 joint work between the OSJD and ERA commenced in order to analyse the interoperability issues relating to the EU and non-EU 1,520mm systems (1524mm in the case of Finland). In November 2007 a cooperation agreement was signed between OSJD and the Coordinating Council on Trans-Siberian Transportation.