High-Speed Overnight Trains—Potential Opportunities and Customer Requirements

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Abstract The European high-speed network already offers an alternative to intra-European air traffic for short distances (500–1000 km). High-speed traffic has so far been limited to daily connections. By making targeted use of the overnight jump, the train could also be an alternative to air travel for distances of up to 2000 km. This paper shows the potential opportunities for the use of high-speed overnight trains in Europe and defines the requirements for services and vehicle equipment from the point of view of rail passengers.

Keywords High speed · Rail · Passenger demand · Overnight trains

1 Introduction

Compared to high-speed trains running during the day, conventional night trains often use obsolete rolling stock. Furthermore, in many cases the speeds are below those of day-train traffic, which results in long travel times for relatively short distances and often means that the destination is not reached even after the night's rest. Air traffic presents strong competition to rail transport because of relatively low ticket prices. This has led to reducing night traffic through decreasing demand. At the same time, high-speed transport is being developed in Europe.

The new construction of lines for correspondingly higher speeds and the use of modern high-speed trains result in correspondingly shorter travel times between European metropolises. In many cases, competition for conventional night-train traffic has also contributed to a reduction in night-train traffic.

This paper addresses the question of whether it is possible for railway infrastructure to set up high-speed night train services in Europe. The question arises as to whether it will be possible in the future to cover long distances in a reasonable time

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during the night hours with the infrastructure already in place, and the infrastructure planned or under construction. Furthermore, the paper examines on which of these possible potential connections there is already a high passenger volume in air traffic and thus the high-speed night train can appear as a possible direct competition to it.

2 Principles and Requirements for Night Train Services

Before the potential opportunities of high-speed night traffic are discussed, some principles and requirements are presented. In the night train, sleeping compartments, couchettes and sleeperettes are used for travel, in addition to seating coaches, as customers spend most of their time asleep. There are different requirements both for the coach material (comfort) and the personnel as well as for the attractiveness of the arrival and departure times. In addition, as there are many differences in the railway infrastructure in Europe that have evolved over time, the problem of interoperability arises due to the long distances covered by night trains. It is also important to consider the possibilities offered by railway-coach connections and whether these should be used for high-speed night trains in the future (Hödl 2006).

2.1 Departure and Arrival Times

Attractive departure and arrival times are crucial for the use of night trains. In the course of a survey undertaken for a research project at Institute of Transport Economics and Logistics of the Vienna University of Economics and Business Administration, travellers in night trains were asked, among other things, about the importance of various reasons for their decision to travel by night train. Eighty percent of the respondents indicated that departure and arrival times are ‘very important’ or ‘important’. The only considerations more important for the respondents were the use of the night as travel time as well as safety while travelling and cleanliness (Hödl 2006).

In order to analyse the importance of departure and arrival times, in a research project referring to improve attractiveness of over-night trains various reasonableness categories are used for business travellers. The categorisation used includes: travel duration, the time without departures, transfers and arrivals (the time the train travels without stopping) and the maximum number of transfers. Figure 1 shows the various reasonableness categories (Binder 2011).

Night-train connections are described in category Reasonableness 1. This category identifies 20:00 in the evening as the preferred departure time. The arrival time in the morning should be between 06:00 and 08:00. A continuous travel time of at least six hours with no transfers are also important for the acceptance of a night train. It is not possible for operators to position transfers in night trains on the market and therefore, transfer-free travel has high priority. In order to be able to survive in competition with

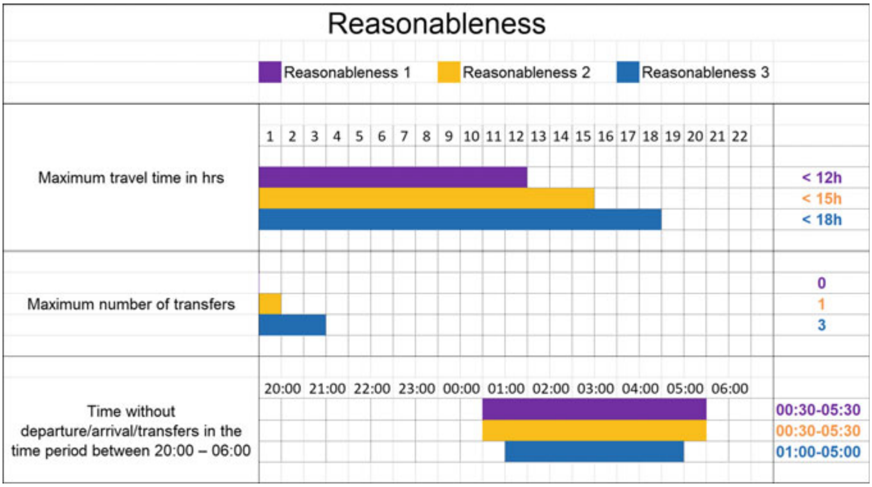

Fig. 1 Three-part classification for the reasonableness of rail connections within Europe

air travel, the travel time itself is not so decisive for the attractiveness of a connection as long as it lasts a maximum of 12–14 h.

Reasonableness 2 refers to the number of transfers a passenger will accept. A one-time transfer one-time transfer and is still assessed positively in principle, as it is quite reasonable to travel with another train after the night connection as long as the total travel time is not too long. The maximum one-time transfer is described as the upper limit of reasonableness for connections between European capitals. In this case, the connections must function optimally. Another option to increase the reasonableness would be to extend the time without departures, transfers and arrivals.

Travel that falls into category 3 is no longer relevant for the night-train market because of poor attractiveness referring to a very long travel duration and the number of transfers. In most cases customers choose the aircraft for such connections (Binder 2011).

2.2 *Possibilities by Means of Through-Coach Connections*

By using through coaches or portioned trains, parts of the train may have varying destinations or departure points. Through coach means that one or more coaches with different destinations are attached to different trains. Portioned trains means that after one portion of the route, the train is usually divided into two parts, and then the individual parts each proceed to a different destination station. Conversely, this concept is also possible if two trains from different source stations are brought together to reach the destination station. The advantage of the system of portioned trains and through coaches is that it is also possible to provide areas with a direct connection that are not directly on a night-train route (Hödl 2006). In addition, the cost savings (less rolling stock and personnel required) on through-coach connections also make it possible to serve connections with low demand (Binder 2011).

If it is assumed that multiple units will be used in a future high-speed night passenger train service, then the portioned concept is an obvious choice. The advantage is that modern high-speed multiple units are equipped with automatic central-buffer couplings, which makes the coupling process much simpler, faster and safer (Wikipedia 2014/03/13). It is not possible to use through coaches in the actual sense with multiple units. This would require the use of locomotive-hauled trains, which may not reach the maximum speed necessary to cover longer distances at night.

2.3 Interoperability Issues

With the aim of operating high-speed night trains over distances of up to 2000 km within Europe, the question of the necessary interoperability inevitably arises. Since the railway network in Europe consists of many historically grown railway systems, the different technical standards make cross-border rail traffic more difficult. Differences between European Union Member States in vehicles, technology, signalling, safety regulations, braking systems, types of traction current and speed limits mean that trains in international traffic have to stop at "borders". This limits the competitiveness of the railways and slows down traffic, a feature that does not appeal to customers who would potentially use night trains.

Four directives have been published by the European Union with the aim of reducing existing differences, of which the two oldest have already lost their validity and have been replaced by a new directive:

- Directive 96/48/EC on the interoperability of the trans-European high-speed rail system (expires 19.07.2010)
- Directive 2001/16/EC on the interoperability of the trans-European conventional rail system (expired 19.07.2010)
- Directive 2004/50/EC amending the above mentioned directives.
- Directive 2008/57/EC on the interoperability of the rail system within the EU Community.

Directive 2004/50/E updates the existing legislation on high-speed rail systems and extends Directive 2001/16/EC to the whole European-rail network. The first step in the area of interoperability was taken with the adoption of Directive 96/48/EC. In order to achieve the proposed objectives, drafts of technical specifications for interoperability (TSIs) have been drawn up by the European Association for Railway Interoperability, which represents the interests of infrastructure managers, railway companies and industry. The TSIs serve as technical solutions to meet the essential requirements of interoperability and are also intended to contribute to the operational capability of the railway system. Directive 2001/16/EC introduced collaborative procedures for the development and adoption of TSIs for both conventional and high-speed rail. (Europe Legislation 2014/03/13)

An example of a TSI is the European Rail Traffic Management System (ERTMS), which when finally deployed will bring benefits in terms of safety, performance, punctuality and reliability (Rambausek 2009).

The latest Directive 2008/57/EC now serves as the legal basis for the TSIs and was created as a replacement for Directives 96/48/EC and 2001/16/EC in order to harmonise the rules for high-speed and conventional rail in one directive (BAV 2014/05/15). The objective of Directive 2008/57/EC is to accelerate the integration of the railway network of the European Union through technical harmonisation (Europe Legislation 2014/05/14).

With regard to high-speed night trains, it is to be hoped that the construction and planning of international connections of high-speed lines and the resulting expansion of international traffic will enable European regulations to take effect and eliminate the lack of interoperability (Rambausek 2009).

2.4 Requirements for the Coach Material

In contrast to day trains, night trains have three to four different classes, which can be chosen according to the needs and financial means of the passengers. These include the classic seating coach, the sleeping coach and couchette coach as well as sleeperettes (sleeping armchairs) on some connections.

Seating coach:

These are used as large-capacity coaches or as compartment coaches for six persons, in some countries also for eight persons (e.g. Spain) and are often air-conditioned. There is usually no surcharge for the seating coach, but a reservation is often required (Hödl 2006).

Sleeperettes:

Sleeping armchairs are usually operated as large-capacity coaches and meet the rest needs of travellers more than classic seating coaches, also because the light is often almost completely extinguished at night. However, the sleeperettes were not well received by passengers because they prefer the comfort of a flat bed. Therefore they were replaced with couchettes by many railway companies (Hödl 2006).

Couchette coach:

These are used as compartment coaches for four or six persons with simple berths. The compartment can still be used in the evening hours as a classic seating compartment and only before the night’s rest will the berths be folded out either by the passengers or by the passenger attendant. The berths are equipped with sheets, blankets and pillows. The sanitary facilities usually consist of a central washroom and toilets, but there are no showers. There is a care service in the form of a wake-up service and in some instances a small breakfast (Hödl 2006).

Sleeping coaches:

These are used as compartment coaches with one to three folding beds and offer a hotel-like service. Each compartment has a washing facility, and some have their own shower and toilet. There is care service in the form of a wake-up service, breakfast in bed up to small meals in the compartments (Hödl 2006).

The CRH1E electric railcar in China, which is based on the platform of the Bombardier ZEFIRO 250, shows what the future development towards high-speed night trains could look like. This is described by Bombardier as the world's fastest sleeper train and is currently in service on the Beijing-Shanghai route. The 16-part train reaches a top speed of 250 km/h and consists of a luxury sleeping coach, 12 standard sleeping coaches, a dining coach and two second-class seating coaches (Wikipedia 2014/03/15).

2.5 General Requirements for Passengers on Night Trains

The best possible use of travel time is essential for the attractiveness of night trains in comparison to other means of transport such as air travel. In general, the big advantage of using night trains is the so-called "night jump". This means that the travelling of, sometimes, large distances happens while sleeping. When using an airplane in order to be able to attend a meeting at the destination in the morning, travel must begin the evening before, and then the night must be spent in a hotel at the destination. Or alternatively, the first flight must be taken very early in the morning, which also entails major restrictions on comfort. However, in order to be able to use the travel time efficiently, a variety of requirements must be considered. While for travellers who opt for seating coaches, sleeperettes or couchettes, the main focus is on the fare. While for travellers who use sleeping coaches, much higher demands are on the usability of the travel time and thus the equipment of the vehicles.

In general, the smoothest possible running and a reduction of noise emissions and noise levels are important for all coach types. It is also important for all travellers that their luggage can be sufficiently accommodated. On average, it can be assumed that one piece of luggage per person is taken on the night train (Rüger 2004). This corresponds approximately to the size of normal checked luggage in air travel. As far as accommodation is concerned, it should be taken into account that there are actually sufficient luggage racks per person and therefore per piece of luggage. Please note that only about 20% of travellers are prepared to, and a maximum of 50% of travellers are able to, put their luggage in an overhead storage! (Plank 2007).

For travellers in sleeping coaches it is important to be able to use the travel time before sleeping in the evening as well as after getting up in the morning in a meaningful and efficient way. The same requirements then apply for night travel as in day traffic. For example, for business travellers it is important to have a seat and a table in the compartment in order to be able to work. It is important for all travellers to have a power supply for the use of technical devices. Since more than one device is usually used, at least two sockets per person should also be available in the compartment. A well-functioning internet is also expected along the entire route; this must work across borders especially for trains in international service (FLEXICOACH 2012). Not all travellers expect their own shower and toilet in the compartment, but these days they are part of an appropriate standard. At least half of the compartments should be equipped with a shower and WC.

3 Potential Opportunities in the European Infrastructure Network 2025+

In order to determine the potential for a high-speed night train service, it is necessary to present an overview of the existing infrastructure and the infrastructure under construction or planning, which enables the corresponding traffic. The main bases for assessment are the corridors of the Trans-European Transport Network (TEN-T) and the European Transport White Paper. On the basis of the future intra-European infrastructure network, possible travel times and exemplary connections for the high-speed night train will be investigated.

The 2011 Transport White Paper of the European Commission sets out the vision for European transport in 2050 and a strategy for its implementation. One of the objectives of this vision is to triple the length of the existing European high-speed network by 2030. According to the White Paper on Transport, the creation of a single European transport area is crucial for strategic implementation. The remaining barriers between modes of transport and national systems will be removed in order to facilitate the integration process and encourage the emergence of multinational and multimodal operators. There are major challenges in the internal market for rail transport services, where technical, administrative and legal barriers need to be removed to facilitate entry into national rail markets (White Paper 2011).

For the implementation of a single-transport area, there are corridors defined by the European Union, which together form the TEN-T networks (Trans-European Network Transport). The TEN-T Community guidelines for the development of the trans-European transport network serve as a framework for the development of internationally important transport infrastructure within the EU by 2020. There are currently 30 priority projects with completion planned by 2020, of which 18 are railway projects. The objective of the railway corridors is, inter alia, the interconnection of 15,000 km of railway lines designed for high-speed, the reduction of bottlenecks with the realisation of 35 cross-border projects and the connection of 38 major airports by rail to the conurbations (Europe 2014/04/10).

The travel times possible in the European infrastructure network in 2025 depend on the extent to which the national and international railway projects are realised on the basis of the TEN-T. In order to get an overview of the possible future connections, the future travel times from the three European cities Paris, Frankfurt am Main and Vienna to other European cities were determined in the course of this work. In addition to the central location of these three cities, Paris and Frankfurt am Main are the second and fourth largest airports in terms of passenger volume in the European Union (Wikipedia 2018/10/17).

Due to the central location of the cities, the accessibility in the different regions of Europe can be well represented and through the passenger data of the airports (e.g. passengers by destination, flight offers by destination) potential opportunities for possible future connections are represented. The possible travel times are shown starting from the respective city with arrows in different colours. Each colour means a different travel time. Travel times from approx. eight hours to approx. fourteen hours are shown. If new lines or upgraded lines are already in operation or no new lines or upgrades are planned until 2025 and therefore the current travel times are decisive, the travel times are determined by means of an online query of timetables of different European railway companies (OeBB 2018). If new or expansion projects are known on the routes, the travel times are determined via the various information pages of infrastructure projects, infrastructure managers and railway companies, which indicate the travel times planned for the future on their routes. The travel times are not calculated on the basis of the future maximum speed specified for the route in question but are purely information from project operators and railway companies on the future travel time.

Between the Western European countries of France, Spain, Italy, Germany, Great Britain and the Benelux countries, there are potential opportunities with travel times under 12 h. This is due to the progressive development of domestic high-speed networks in these countries and the development of international high-speed links between these countries (Binder 2011). In 2009, 5500 km of high-speed lines were in operation in France, Italy, Spain and Germany and a further 8411 km were under construction or planning (Rambausek 2009).

However, for the travel times given in Figs. 2, 3 and 4, some decisive projects still need to be realised, including the expansion of international connections between the individual high-speed systems. There are already individual examples of international connections today. Since the opening of the last section for passenger transport between Barcelona and Figueres in 2013, Spain and France have had a cross-border high-speed line (UIC 2014). The travel time between Paris and Barcelona is now only 6 h and 25 min. Another example is the Eurotunnel between France and Great Britain, which provides a travel time of 2 h and 17 min between Paris and London. Further international high-speed connections are already under construction or in the planning stage. These include the new line between Lyon and Turin, including the Monte-Cenis Base Tunnel, which will enable a travel time of two hours instead of the previous four hours between these two cities (Railway Technology 2014). Further examples are the Brenner Base Tunnel between Italy and Austria including access routes, which should enable a travel time of three hours between Munich and

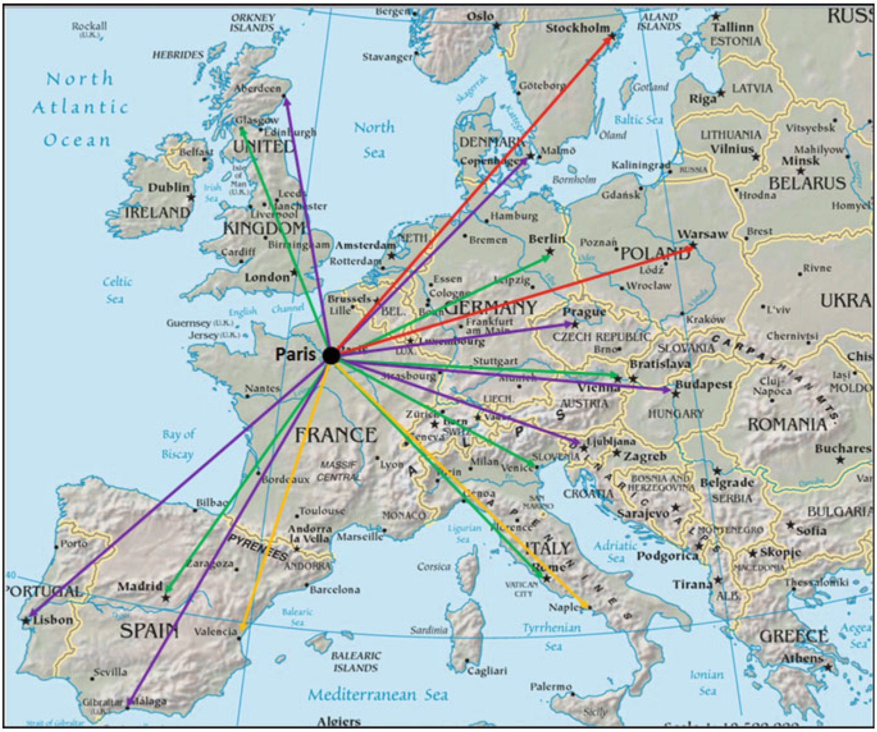

Fig. 2 Representation of possible travel times 2025 from Paris; green ≈ 8 h orange ≈ 10 h purple ≈ 12 h red ≈ 14 h

Verona (BBT 2014) and the Fehmarnbelt Tunnel, which represents a new connection between Germany and Denmark under the Baltic Sea and should reduce the travel time from Hamburg to Copenhagen to three hours (Fermers 2014).

Work on another project, the Madrid-Lisbon high-speed line, has been suspended for the time being due to the financial crisis, and completion by 2025 is questionable. (Caboruivo 2014) Another cross-border project is the modernisation of the Budapest-Belgrade link. The travel time on the 400 km route is to be reduced from the current eight hours to just four hours (Serbian railways 2014). In addition to these cross-border projects, there are several other decisive national projects that will lead to future travel time reductions. France and Spain, in particular, are planning and building high-speed lines, but projects are also underway or planned in Germany, Italy, Poland and Sweden (Wikipedia 2018/10/17).

Obviously, there is a strong west-east disparity in future travel times. According to the forecast maps for the high-speed network in Europe in 2025, the high-speed lines will be located in Western Europe, as is currently the case, and therefore longer travel times are to be expected in Eastern European countries in the future as well (Rambausek 2009).

Fig. 3 Representation of travel times 2025 from Frankfurt/Main; green ≈ 8 h orange ≈ 10 h purple ≈ 12 h red ≈ 14 h

Figures 5 and 6 illustrate which distances [air-line distance according to the online distance calculator (air-line 2018)] can be covered at which travel times from Paris and Frankfurt am Main in 2025. The following relations serve as an example of the great difference in travel times between Western and Eastern Europe: the future possible travel time from Frankfurt am Main to Madrid (distance as the crow flies 1446 km) is approx. 12 h, while the future possible travel time from Frankfurt am Main to Bucharest (distance as the crow flies 1455 km) is approx. 23 h.

When using high-speed lines at night, any operational restrictions must also be taken into account. For example, there are high-speed lines designed for mixed operation, whereby the line is used by both passenger and freight trains. Mixed operation often results in reduced line performance and the timetable design is very complicated. Therefore, on mixed routes freight transport is often limited to the night, which inevitably results in lower maximum speeds even for night trains. In addition to use by freight trains, there may also be restrictions due to maintenance work and inspections at night (UIC 2013).

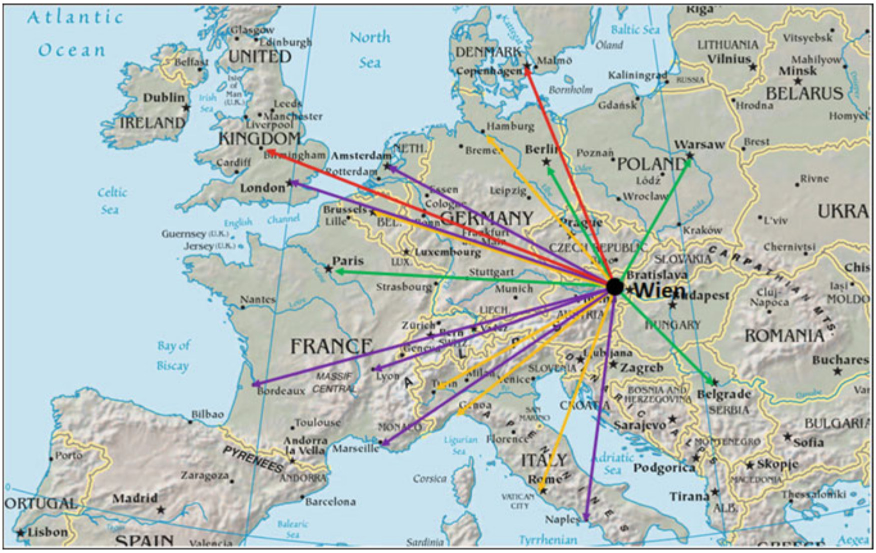

Fig. 4 Representation of travel times 2025 from Vienna; green ≈ 8 h orange ≈ 10 h purple ≈ 12 h red ≈ 14 h

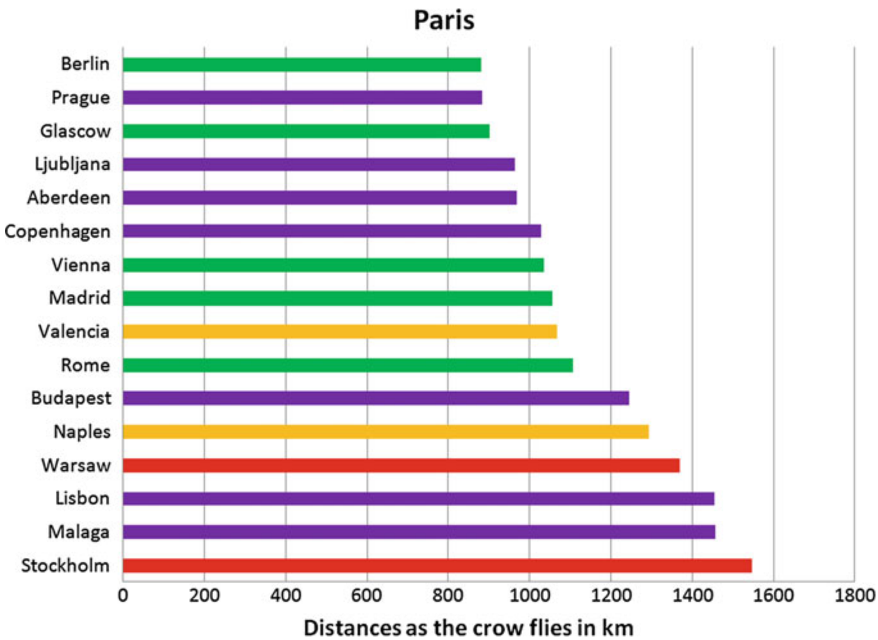

Fig. 5 Distances as the crow flies from Paris, travel times: green ≈ 8 h orange ≈ 10 h purple ≈ 12 h red ≈ 14 h

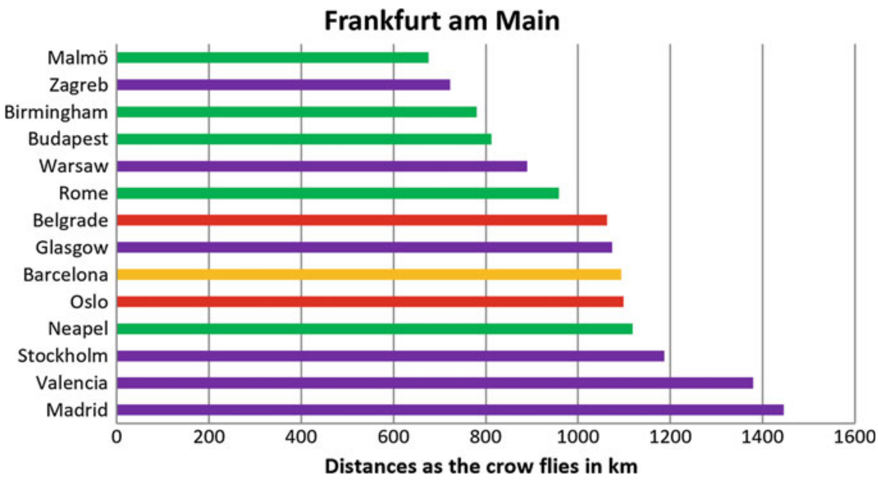

Fig. 6 Distances as the crow flies from Frankfurt/Main, travel times: green ≈ 8 h orange ≈ 10 h purple ≈ 12 h red ≈ 14 h

4 Economic Efficiency and Use

In addition to the necessary infrastructure to enable high-speed night trains, it is also crucial to consider whether the possible future routes will have sufficient potential in terms of demand. To answer this question, the volume of intra-European air traffic is examined in more detail. By looking at current and projected passenger volumes on different air routes within Europe, it can be estimated whether there is a high-passenger potential on these routes and whether the high-speed night train can be used economically as a direct alternative to air transport.

In 2012, the number of passengers carried in the aviation sector in the then 27 EU Member States (EU-27) amounted to 826.7 million according to Eurostat, the European Statistics Authority. Of this total air transport, 510.5 million passengers (about 62% of the total) are passengers on flights within the then EU-27. This figure is made up of 159.5 million domestic passengers and 351 million international intra-European passengers. Within the then EU-27, the largest passenger flow is between the United Kingdom and Spain, with 31.4 million passengers. This is followed by Germany–Spain with approx. 22 million passengers and Germany–United Kingdom with 11.8 million passengers (DLR 2012).

The flight data for each airport are used to illustrate the potential opportunity with regard to the utilisation of the high-speed night trains, illustrated in Fig. 7 starting from Frankfurt am Main Airport.

With the possible travel times in the European infrastructure network 2025 and the passenger data from European air traffic, various exemplary connections can be represented. An example of such a connection can be found in the UIC study on

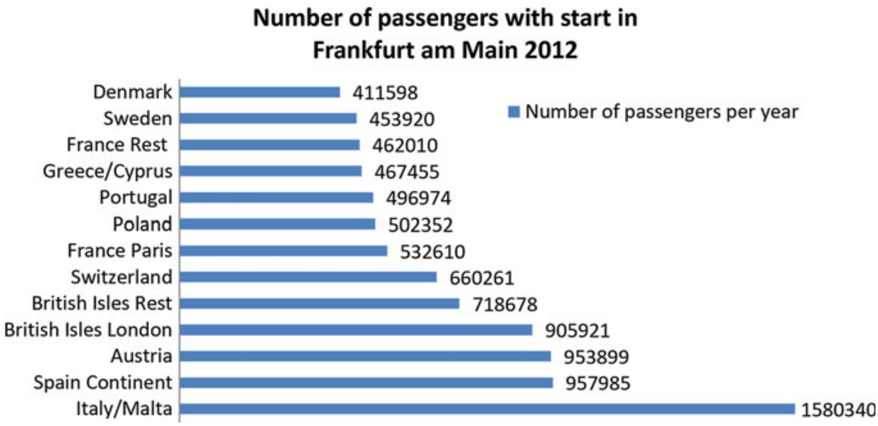

Fig. 7 Passengers on board for departures from Frankfurt Airport 2012 for flights within Europe (scheduled and charter flights) (Masuch 2014)

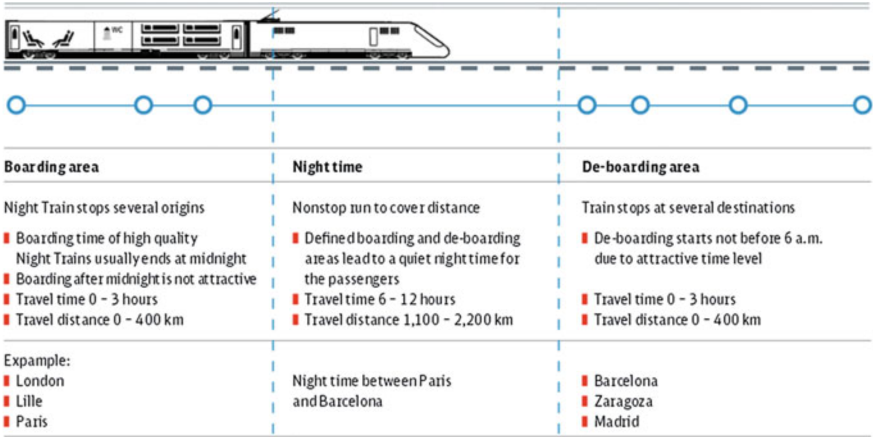

Fig. 8 Example of a night train connection from Great Britain to Spain (UIC 2013)

high-speed night trains from 2013 in which a connection from Great Britain to Spain is presented as an example (see Fig. 8).

The "boarding area" is the period during which the train stops at one or more stations so that passengers can board the train. The travel time of this area is specified in the study between zero and a maximum of three hours, also depending on the number of stops. The distance covered is between 0 and 400 km. The next area is the "night time", where in order to give the passengers a night's rest, the train travels through without stopping. It will take six to twelve hours to cover 1100–2200 km. The last area is called the "de-boarding area", where the train stops at only one or more selected stations, as in the first area, to allow passengers to disembark. The travel time should also be between zero and a maximum of three hours and the distance travelled between 0 and 400 km (UIC 2013).

The scheme used in the UIC study, with “boarding area”, “night time” and “de-boarding area”, can also be applied to other connections, e.g. connections from Frankfurt am Main. With the air traffic data from Frankfurt am Main Airport and the general European air-traffic passenger flows, it is possible to estimate on which routes a higher passenger volume prevails. The largest number of passengers is on flights from Frankfurt to Italy and Malta (Fig. 9). Although passengers to Malta are not relevant as potential customers for high-speed night trains, the majority of passengers to Italy and Malta shown in Fig. 9 are passengers travelling to Italy. (Frankfurt Airport 2014) An example of a connection from Germany to Italy would be from Frankfurt to Naples. Here the travel time in 2025 is only about 8 h, so it seems reasonable to extend the distance to Brussels or Amsterdam in order to achieve a suitable travel time in north-south relation. A train could start at eight o’clock in the evening in Amsterdam and after a journey of 2 h 44 min would be in Cologne and another hour in Frankfurt. After a further approx. six and a half hours the train would then be at approx. seven o’clock in the morning in Rome and after a further 1 h 18 min travel time in Naples. Florence or Bologna would be a possible stopover in the morning.

Although most passengers fly from Frankfurt to Italy and Malta, the strongest passenger flows at the federal level are between Germany and Spain. In 2012, approximately 957,000 passengers took off from Frankfurt for Spain, excluding the Balearic Islands and the Canary Islands. An exemplary connection is offered from Frankfurt via Paris to Barcelona and Madrid. In the future, the journey time between Frankfurt and Madrid would be approximately 12 h (see Fig. 10).

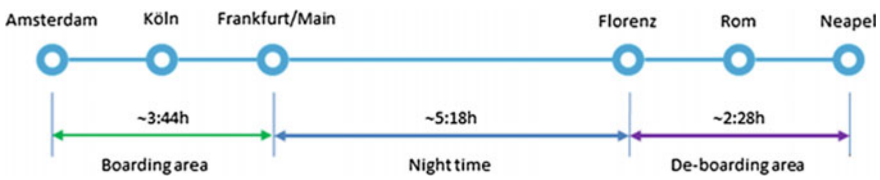

Fig. 9 Exemplary Amsterdam-Naples connection

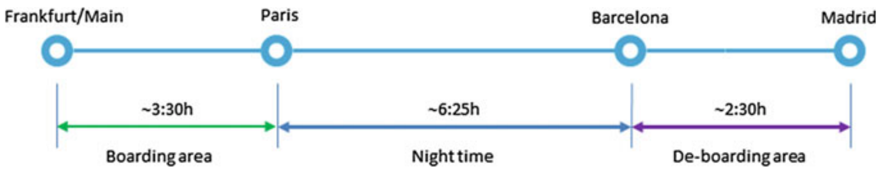

Fig. 10 Exemplary connection Frankfurt/Main-Madrid

5 Conclusion

Due to the already existing high-speed lines in many countries of the European Union, the potential for high-speed night trains already exists today. However, there are strong differences between Western and Eastern Europe. For example, in Western European countries such as Spain, France, Italy, Germany, the Netherlands and Belgium dense high-speed networks and national programmes for further expansion have been in place for years, resulting in a corresponding reduction in travel times. In contrast, in the EU Member States such as Romania, Bulgaria, Croatia, the Czech Republic, Hungary, Greece as well as the Balkan states, travel times in terms of distance travelled are far longer than in Western Europe. Even though the further expansion of the high-speed network is the declared goal of the European Union, it is currently largely restricted to Western Europe. From today's point of view, at least until 2025, no significant reduction in travel time can be expected on Eastern European connections and therefore, the potential for high-speed night trains in that area is rather low. An exception is Poland, where there are already plans for the construction of a high-speed network. Although a large network of high-speed lines already exists in Western Europe, it is mainly cross-border high-speed links between these networks that are still lacking. There are already connections between France and Spain and between France, the Netherlands, Belgium and England. However, other important high-speed links are under construction or in the planning stage. These include: the Brenner Base Tunnel with access routes, the route from Lyon to Turin with the Monte-Cenis Base Tunnel, the Fehmarnbelt crossing and the connection between Madrid and Lisbon. After the completion of these and other crucial projects, which largely correspond to the corridors of the TEN-T, there is potential for many intra-European relations. Connections up to 1400 km could be covered within 12 h (category 1 of reasonableness), e.g. the connection Frankfurt-Madrid, Amsterdam-Naples or Paris-Lisbon. The London-Madrid relation shows that some of these connections are already possible today. A continuous network of high-speed lines would currently allow a travel time of less than 12 h. The necessary interoperability must be ensured for cross-border connections. It is particularly important here that the interoperability directives laid down by the EU are implemented accordingly and that there are no national differences in the high-speed network. Differences between national networks may lead to an extension of travel time through possible necessary border stops. Possible operational restrictions on the high-speed lines due to maintenance or mixed operation at night must in any case be observed but should not lead to any significant restrictions if planned accordingly.

In air transport, the largest flows within the EU Member States are between the United Kingdom, Spain, Germany, Italy, France, the Netherlands and Belgium. Based on flight data from Vienna and Frankfurt airports, it can be seen that there are seasonal differences in the offers for different routes. On the Frankfurt-Madrid route, for example, approx. 1400 seats per day are offered in July and approx. 650 per day in January. If the annual passenger traffic is calculated on one day, an average of approx. 2600 passengers per day fly from Frankfurt alone to the Spanish mainland.

Germany-wide it is approx. 11,000 per day. Even on lower-volume routes such as between the United Kingdom and Portugal, an average of 7000 passengers fly daily in one direction. On the routes where there is a potential due to the high-passenger flows, it is desirable that part of the passengers use the high-speed night train instead of the aircraft.

Potential customers are, for example, business travellers who could save themselves a flight and a night in a hotel by using the train. Another important group are people who are afraid of flying, especially those who only board a plane when there is no alternative. Ultimately, it is also a question of environmental awareness. Many customers could be motivated to switch to the high-speed night train by arguing that CO_2 savings can be achieved by avoiding flights. An essential advantage of the train compared to the airplane is shown by the exemplary connections. With the high-speed night train, it is possible to plan as many stops as desired within the time frame of the "boarding area". Thus, the passengers can be "collected" from the area. This possibility almost does not exist when flying. The same applies to the time frame of the "de-boarding area" where the passengers are distributed back into the area. The major advantage of an overnight train compared to air travel is that destinations away from large airports can be reached directly and not, as in many cases with the use of airplanes, the means of transport has to be changed again in order to reach the start or target destination. By train, you can reduce the number of journeys to and from the airport.

In summary, it can be said that there is potential for intra-European high-speed night trains from the infrastructure side, and that this potential will increase as the network expands by 2025 and beyond. However, most of this potential is currently limited to Western European countries.

Even though concrete opportunities, with regard to possible passengers, still need to be examined separately, the current passenger figures for various destinations within Europe in any case suggest that a corresponding supply of high-speed night trains will be accepted and that there will be sufficient demand.

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