

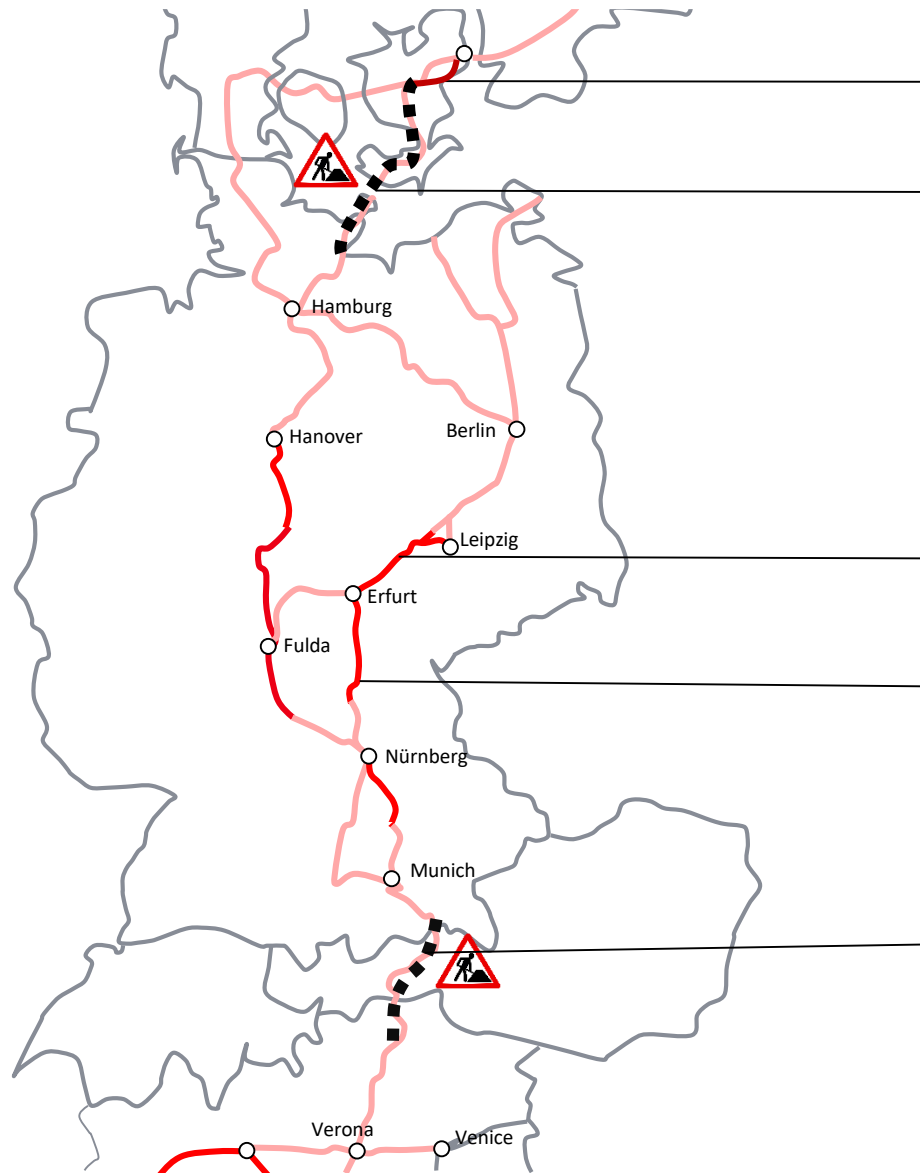


Improvements of international cross border traffic along the Scandria[®] Corridor in mid-/long-term period

Scandria[®] Alliance General Assembly and Rail Forum

02.11.2021 | Berlin

Major infrastructure projects strengthen Germany's role as a core transit country along the Scandria® Corridor



New HSL Copenhagen - Ringsted

- Opened for traffic in June **2019**

Fehmarn Belt Fixed Link

- Reconstruction of Ringsted-Lübeck section incl. full electrification
- Replacing ferry service with a new under sea tunnel
- Travel time to be reduced by over two hours
- Completion expected in **2029**

HSL Leipzig/Halle – Erfurt

- Opened for traffic in December **2015**

HSL Erfurt - Ebensfeld

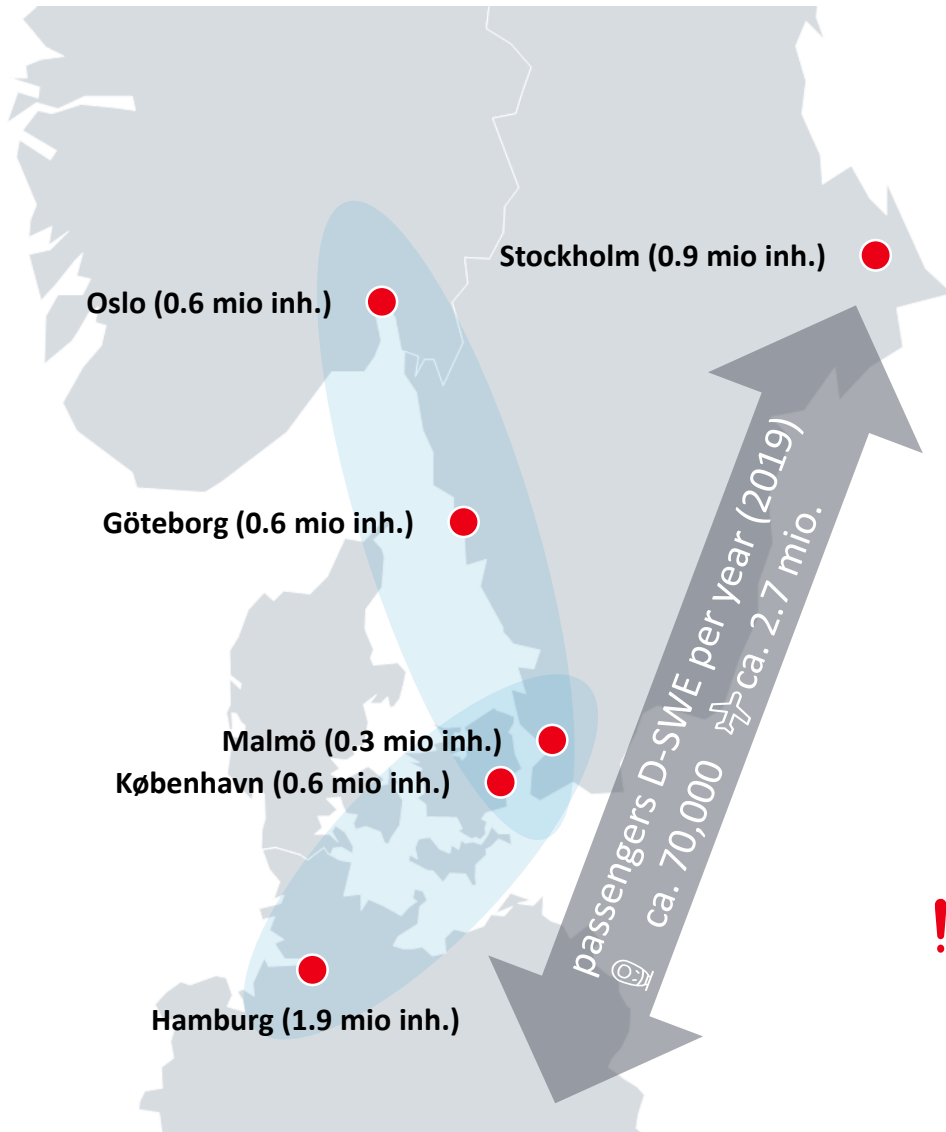
- Opened for traffic in December **2017**
- Travel time Munich – Berlin reduced by approx. two hours together with HSL Leipzig/Halle – Erfurt

Brenner Base Tunnel

- New base tunnel
- Further new-built track and tunnels
- Travel time to be reduced by approx. one hour
- Completion expected in **ca. 2032**

- Significant national offer improvements have followed the infrastructure improvements.
- Cross border connections to the northern and southern neighbors are limited by natural barriers and will be improved by two major infrastructure projects.

Focus Scandinavia: A lot of potential in an economically strong and culturally connected region rests uncovered



Status quo

- Offer: 3-4 train pairs/day Hamburg – Copenhagen, from Summer 2022 one night train Hamburg – Stockholm
- No direct day trains between Germany and Sweden/Norway
- No direct connection south of Hamburg
- High travel times due to deviation via Jutland
- Diesel trains with limited capacity



Chances

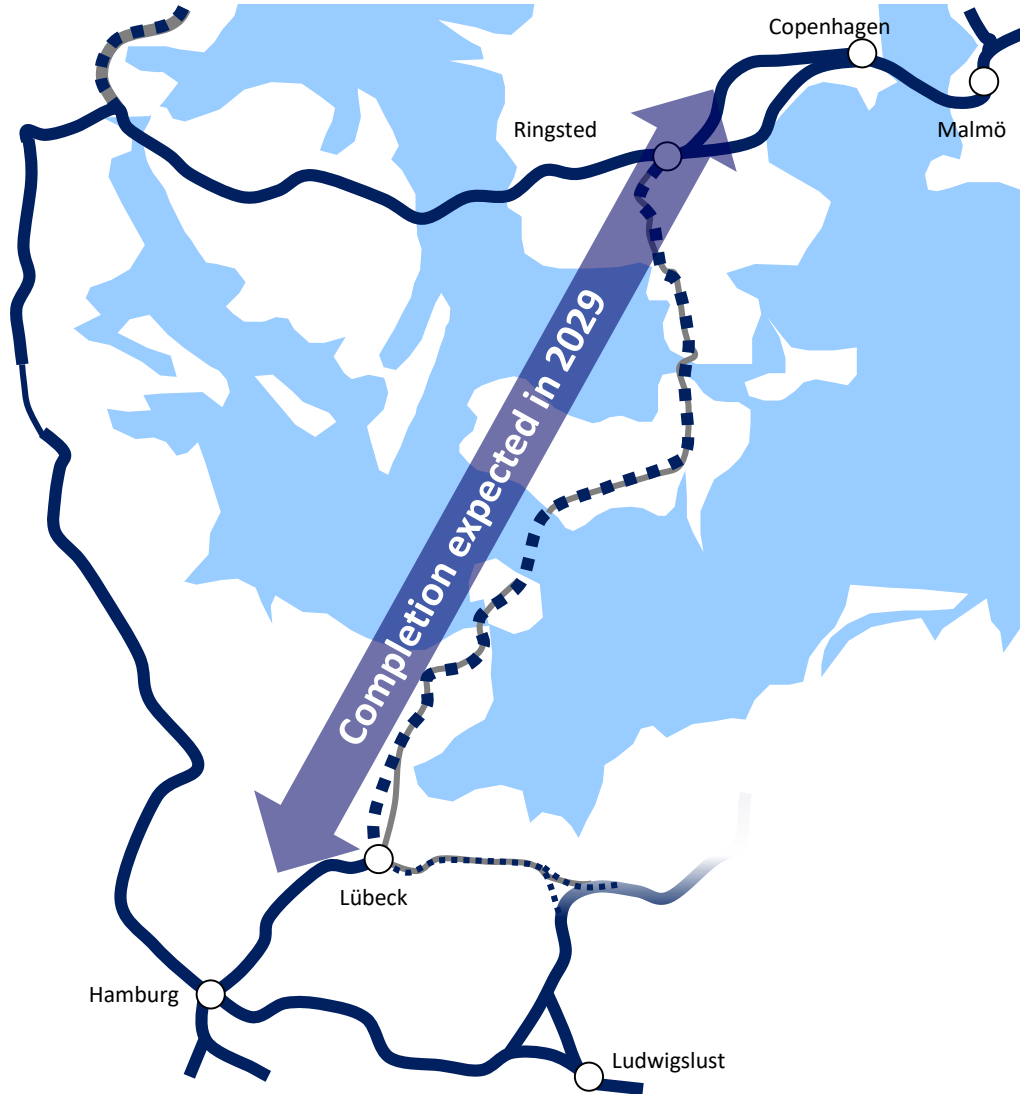
- Introduction of DSB's **new electric trains** with increased capacity and **technical prerequisites for use in Sweden**
- Social trends leading to significant increase in demand of sustainable transport
- Long term: infrastructure improvements (→ Fehmarn Belt Fixed Link)

Risks

- **High cost** for implementation of **national train protection** systems while the full equipment of the infrastructure with ETCS is not foreseeable (Göteborg earliest 2029, Copenhagen earliest 2030)
- **Financing** equipment of trains with national train protection systems (EU funding only for ETCS)
- Lack of funding for Swedish STM (specific transmission module) for the new DSB trains **endangers direct trains to Sweden before 2029**



Fehmarn Belt Fixed Link: Improving rail connections from mainland Europe to Scandinavia



Lübeck – Ringsted (Fehmarn Belt Fixed Link)

- Doubling of existing track
- Increased Vmax
- New Fehmarn Sound Tunnel replacing the single-track bridge in Germany
- Realignments in both Denmark and Germany
- Electrification
- Core element: new combined road/rail tunnel under Fehmarn Belt

Journey times after completion (D-Takt 2030)

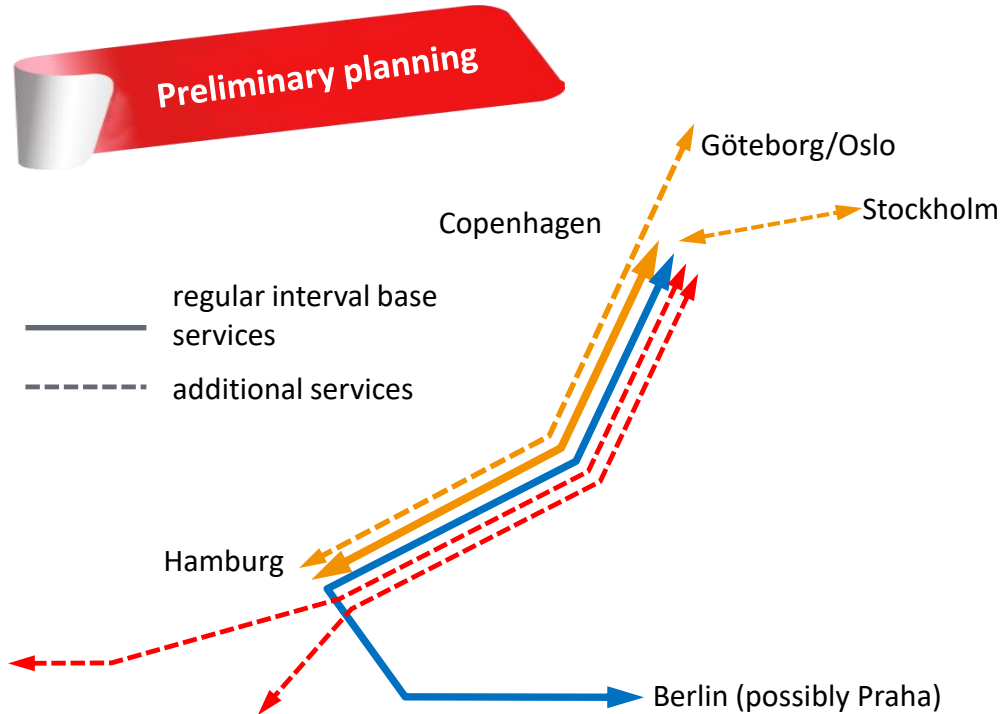


Berlin – Hamburg – Copenhagen **~7h** → **~4h50**

Hamburg – Copenhagen: **~4h40** → **~2h50**

Hamburg – Copenhagen – Göteborg: **~9h30** → **~5h40**

Outlook into offer concepts beyond 2029: linking Scandinavia to mainland Europe with frequent and fast connections



4-h service +

4-h service +

Sweden services (under investigation) +

Additional connections to further destinations in Germany (under investigation)

Final concept (draft)

- More frequencies between Hamburg and Copenhagen
- Competitive way of transport in comparison to other means of transport
- Possible direct connections to further destinations in Germany, Sweden and other countries under evaluation
- Modern trains types of different railway undertakings forming together an attractive offer

Potential risks and challenges

- Timely completion of infrastructure both in Denmark and Germany is essential
- Procurement and delivery of rolling stock in time important for the extended operation
- Interoperability along the whole route (ETCS) simplifies possible prolongations
- Capacity in Hamburg area because of increasing long-distance and regional traffic

Vehicle overview



A modular concept allows a stepwise approach towards the final concept

Current services (2019-2023)



IC L75 Hamburg – Copenhagen

- Rerouting trains via Padborg instead of ferry
- Faster connection with increased capacity
- Fehmarn Belt route closed for reconstruction
- Initially, continued use of DMUs

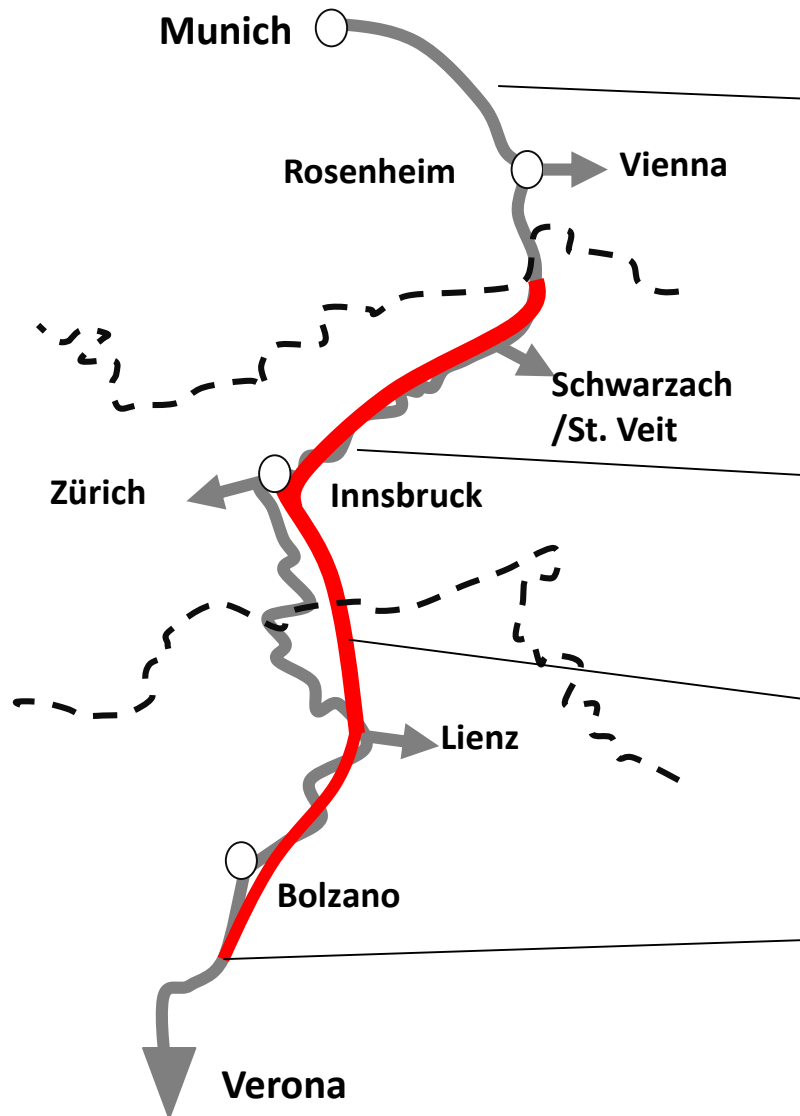
IC L76 Hamburg – Aarhus

- DMUs as no electrification beyond Fredericia

Target solution (ca. 2029)



Brenner Base Tunnel project: a faster link from the Munich area to Italy



Munich – Austrian border

- Additional double-track route that also carries trains of other axes
- Preferred route variant determined
- Mostly tunnel sections
- Not ready before 2040

Border - Innsbruck

- Construction of two separate tracks supplementing the old route
- New tracks allow higher speeds
- Mostly complete, missing part is due for construction by approximately 2023

Brenner Base Tunnel

- 64 kilometres long base tunnel
- Opening for traffic expected by 2032
- Much faster and shorter connection than existing route

Italian section

- Further improvements and realignments
- Increasing travel speed and capacity

Journey times after completion (2032)

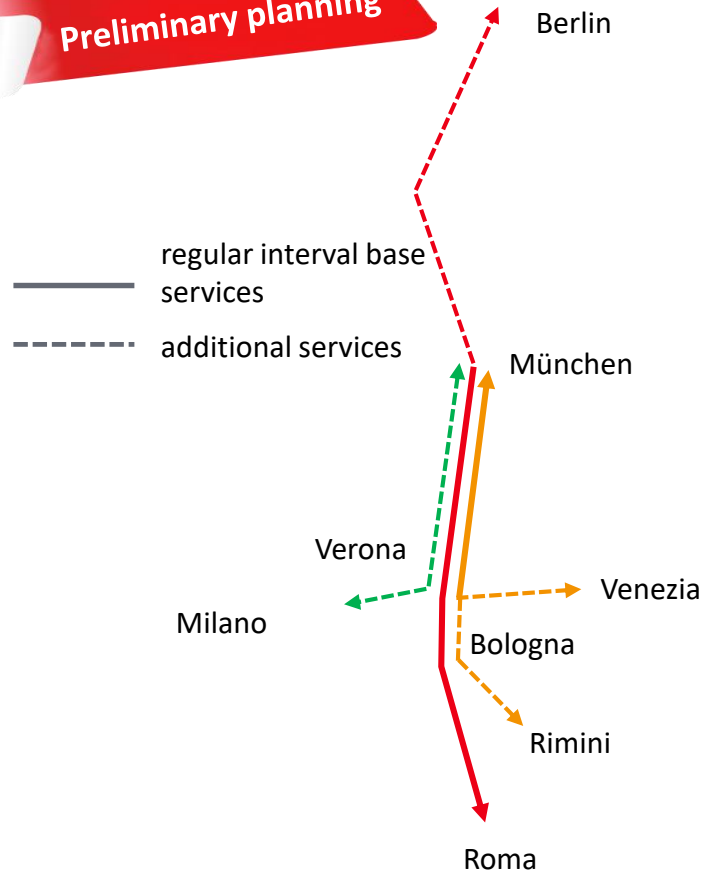


Munich – Verona:
~5h20 → ~4h20

Outlook into offer concepts beyond 2032: crossing the alps with frequent and fast connections



Preliminary planning



basic 2-h service +

Express 2-h service

Final concept (draft)

- Higher competitiveness allows more frequencies via Brenner Railway
- Modern trains types of different railway undertakings forming together an attractive offer
- With reduced travel times due to completion of base tunnel additional destinations could be reached (f.e. Roma or even Berlin)

Potential risks and challenges

- Timely completion of infrastructure is essential
- Procurement and delivery of required rolling stock necessary
- Special national regulation for vehicles (for instance automatic fire extinguishing system in Italy) makes the procurement very complex with very limited number of producers and long homologation times
- Interoperability along the whole route
- The route is already running at full capacity in its German section; development is vital for further achievements

Vehicle overview



Direct connections to Milan and Rome are to be created even before the opening of the tunnel



Preliminary planning

Current services (-2022)



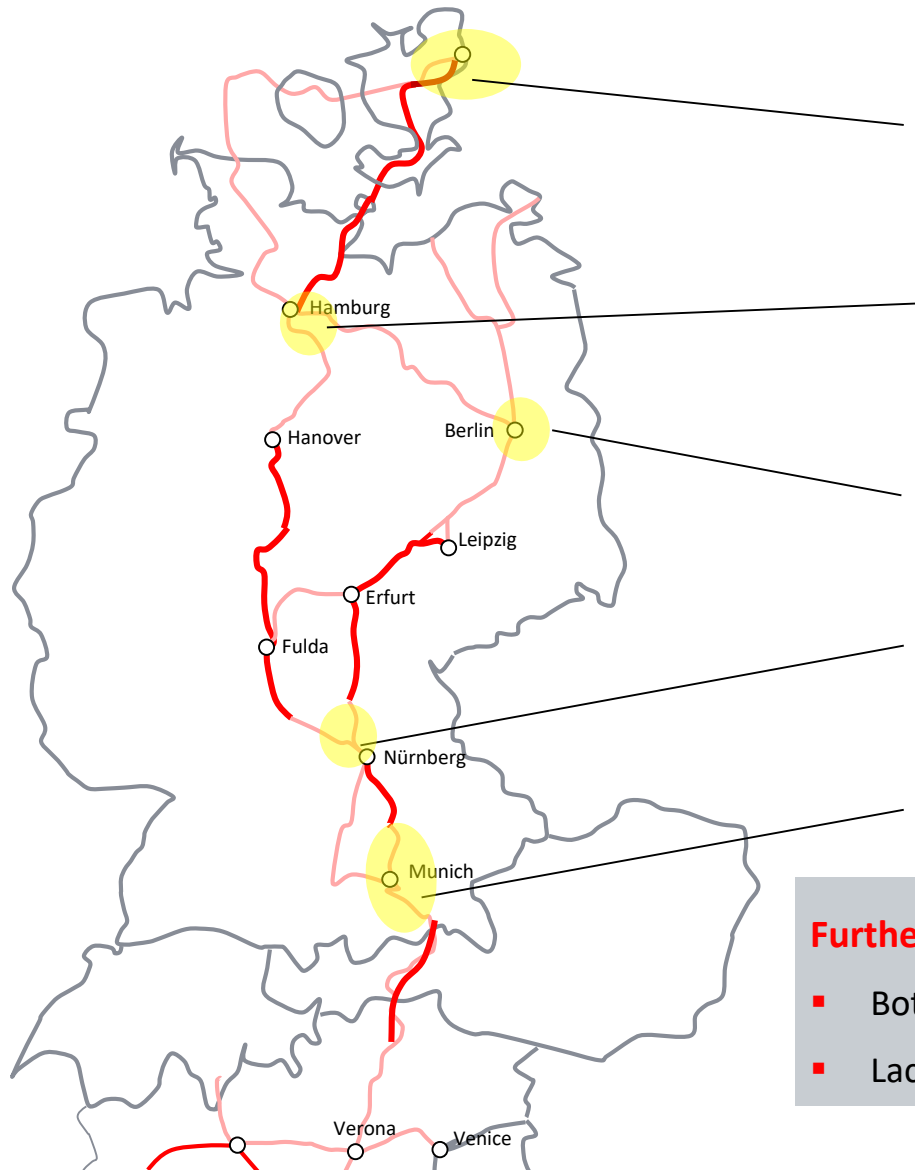
EC L89 Munich – Italy

- ÖBB/DB Italia Joint Venture runs EuroCity trains from Munich via Brenner to Verona and beyond (mostly Bologna or Venezia)
- Rolling stock deployed: Austrian coaches and locomotives

Target solution (ca. 2032)



Overall capacity and speed will still be limited by various bottlenecks – further development required



Copenhagen area / Oresund bridge

- Lines partially run at full capacity
- Trains need to change direction in Copenhagen before continuing to Sweden

Hamburg

- Central station and lines around Hamburg overloaded with more and more traffic being planned
- High risk for delays

Berlin

- Central station and lines around are overloaded

Nuremberg

- Central bottleneck between on Scandria® Corridor
- All trains need to go through Nuremberg, no bypass

Munich area

- Lines between Ingolstadt and beginning of Brenner Railway are overloaded
- Trains need to change direction in Munich Hbf

Further infrastructure development necessary for success of Scandria® Corridor

- Bottlenecks especially in metropolitan areas while other lines are well-developed
- Lack of bypasses and capacity

