Introduction to High Speed Rail

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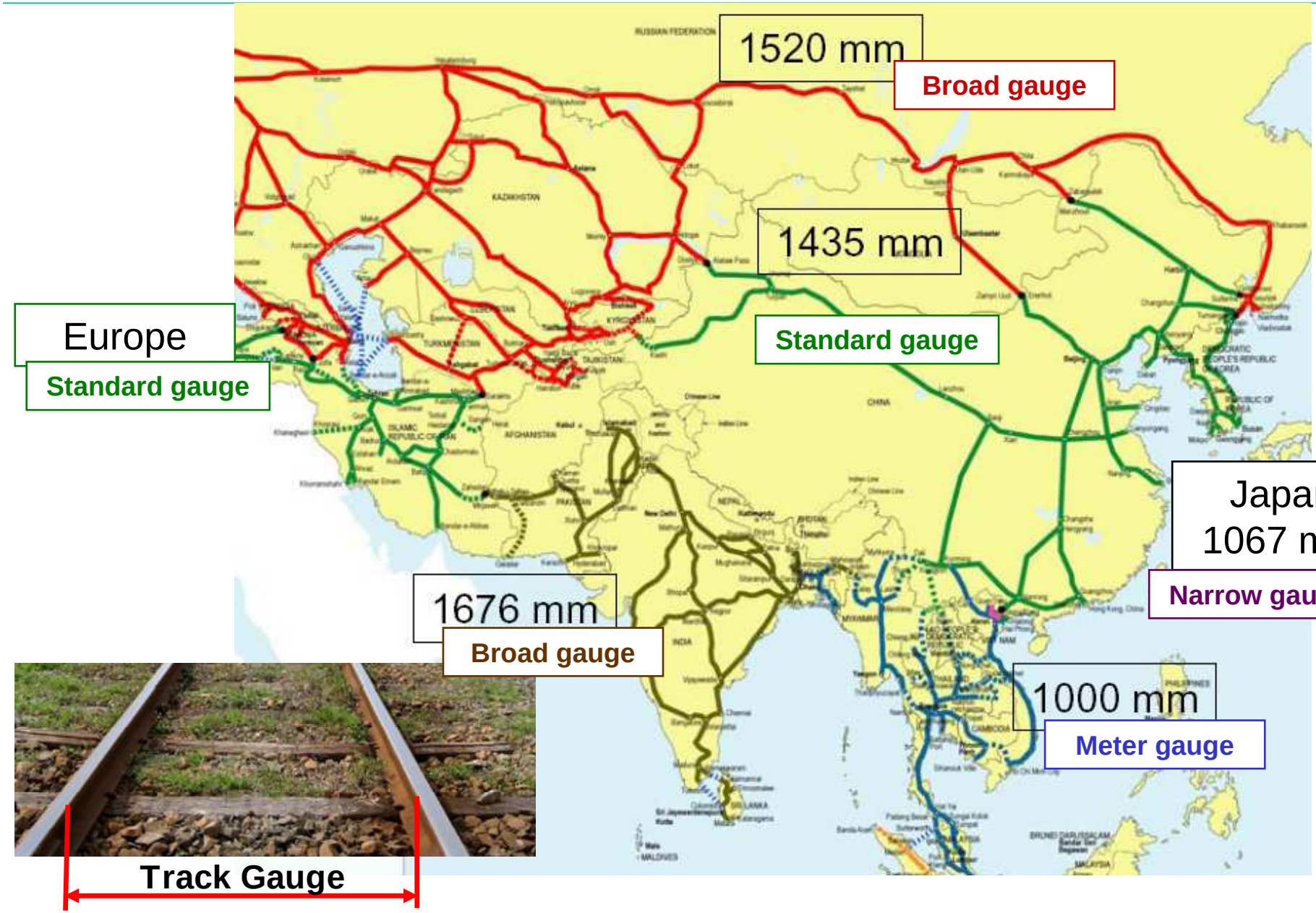
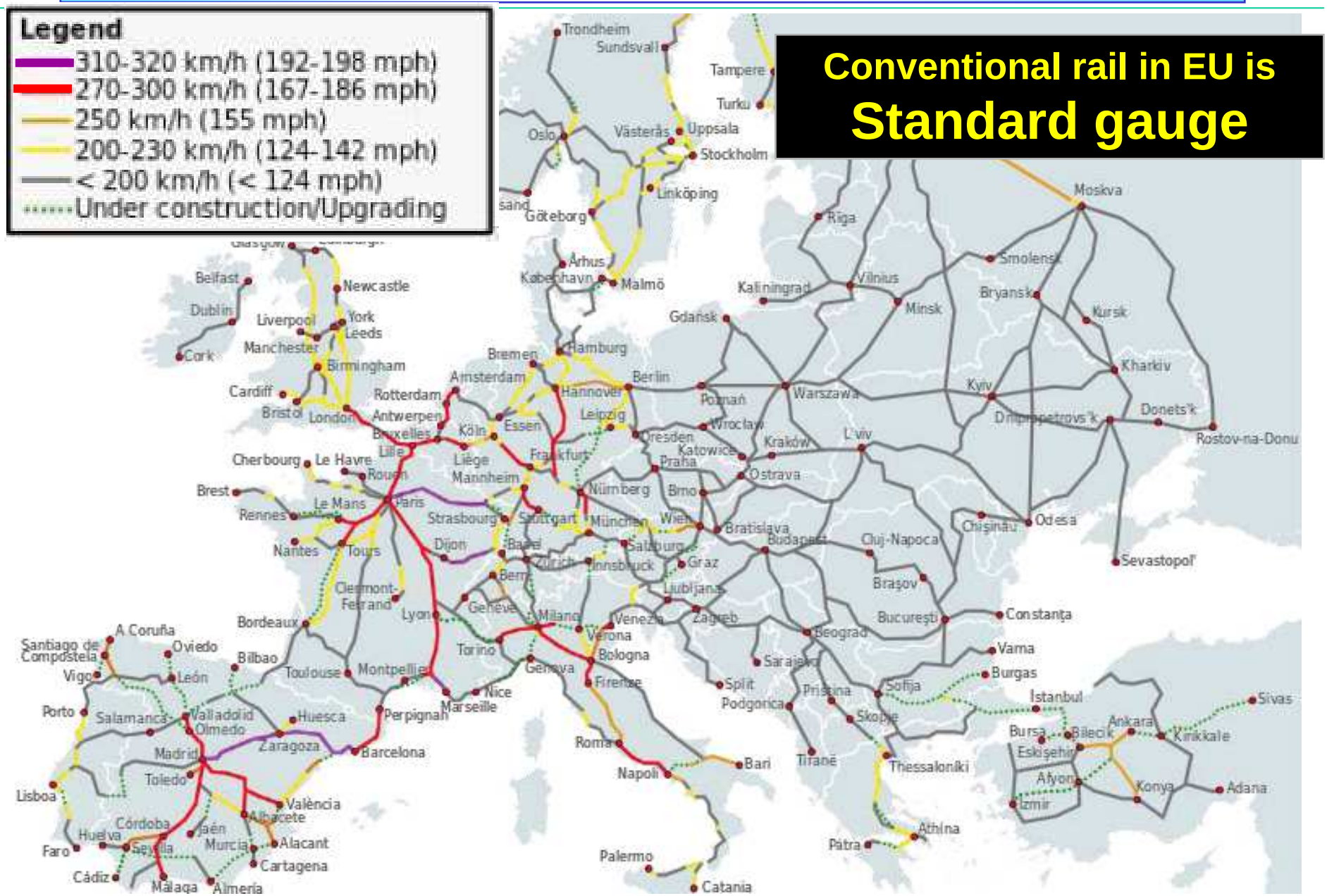
Gauge and Operation of HSR

Track Gauge of conventional rail in Asia



HSR Network in the world

HSR Network in Europe



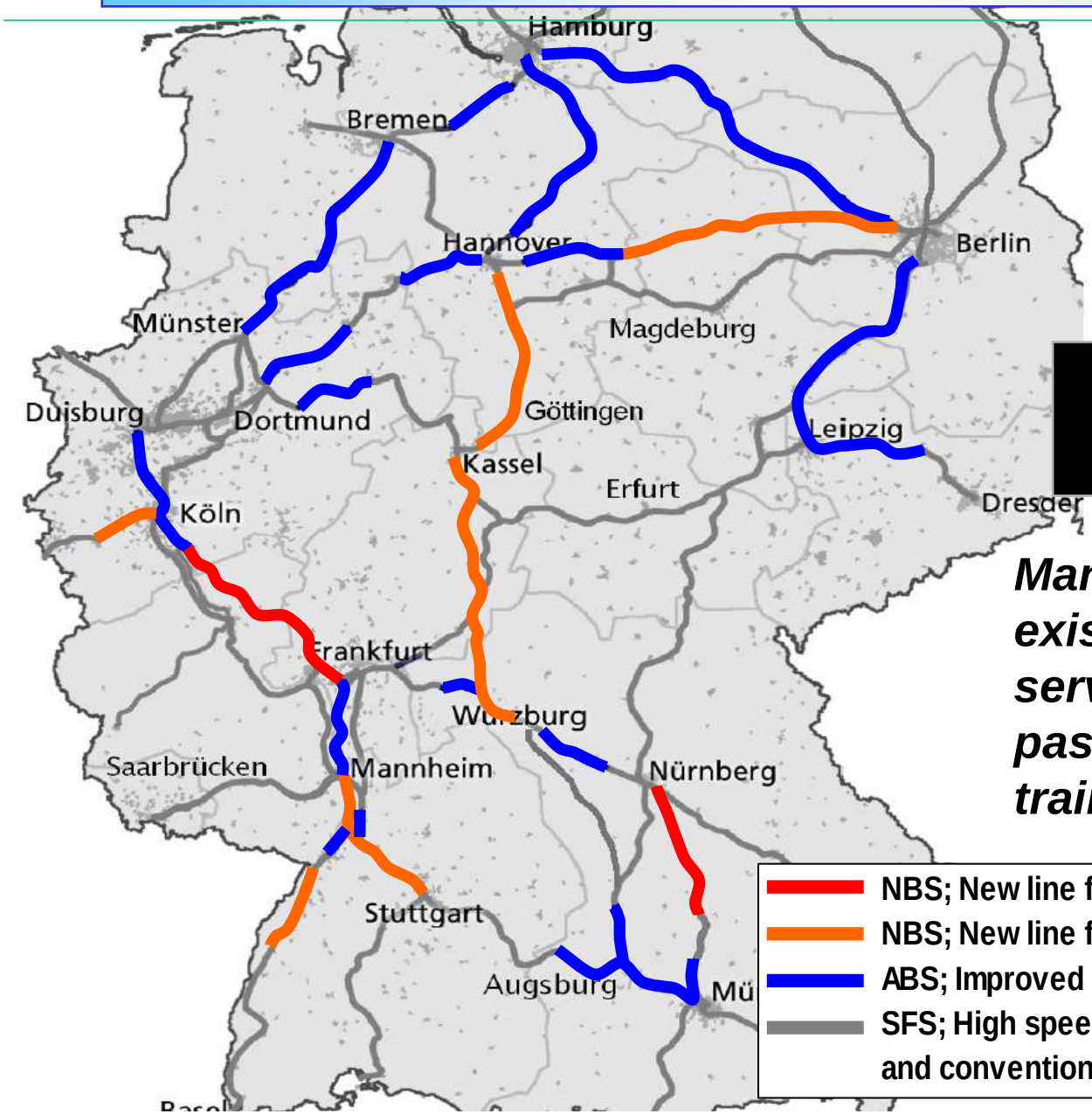
TGV network in France

Conventional rail is
Standard gauge

Many TGV trains operate on existing lines by mixed services with conventional passengers trains.

- LGV; New line for HSR
- New line for HSR
- Conventional line with TGV operation

HSR (ICE) Network in Germany

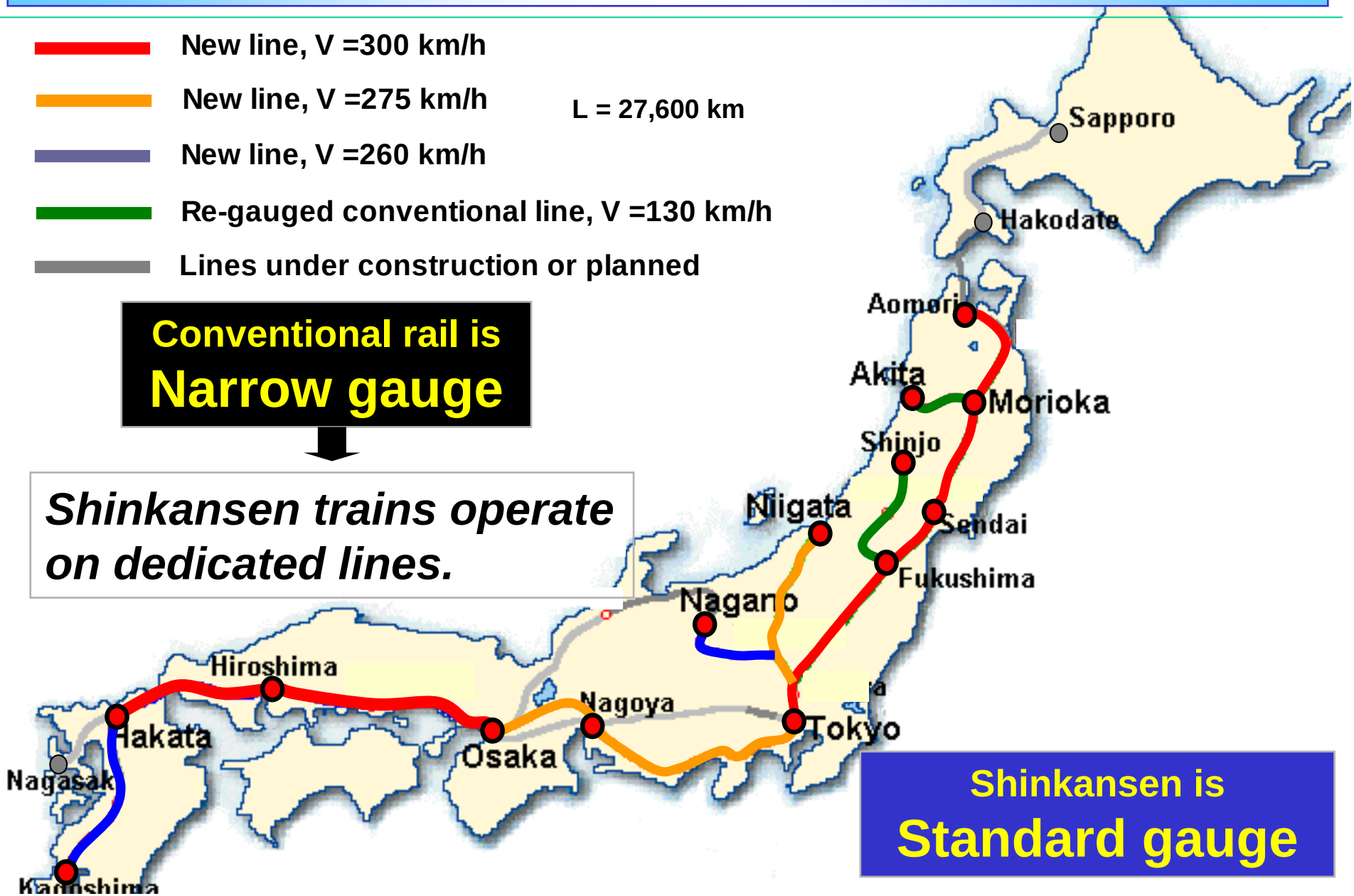


Conventional rail is
Standard gauge

Many ICE trains operate on existing lines by mixed services with conventional passengers and freight trains.

- NBS; New line for HSR (Vmax = 300 km/h)
- NBS; New line for HSR (Vmax = 250 km/h)
- ABS; Improved conventional line (Vmax = 200 ~ 230 km/h)
- SFS; High speed line including new and conventional rail (Vmax < 160 km/h)

HSR (Shinkansen) network in Japan



HSR Plan in Thailand

Existing SRT rail is Meter gauge

Thai HSR shall be dedicated rail.

Existing SRT network will be used for
- ***Commuter services***
- ***Regional transport***
- ***Freight services***

(NE); Bangkok ~ Nong Khai, 610 km
(S); Bangkok ~ Hua Hin ~ Padang Besar, 980 km
(E); Bangkok ~ Rayong, 220 km
(N); Bangkok ~ Phitsanulok ~ Chiang Mai, 680 km

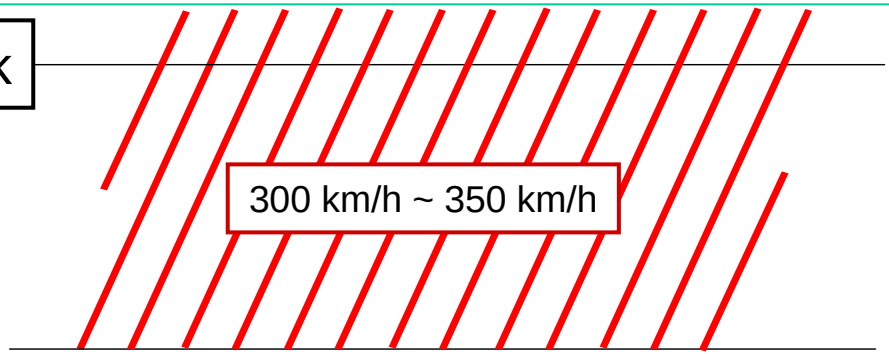
Maximum speed; 250 ~ 300 km/h
Travel time; Bangkok ~ Chiang Mai = about 3 hours

Operation and Capacity of HSR

Speed and Line Capacity

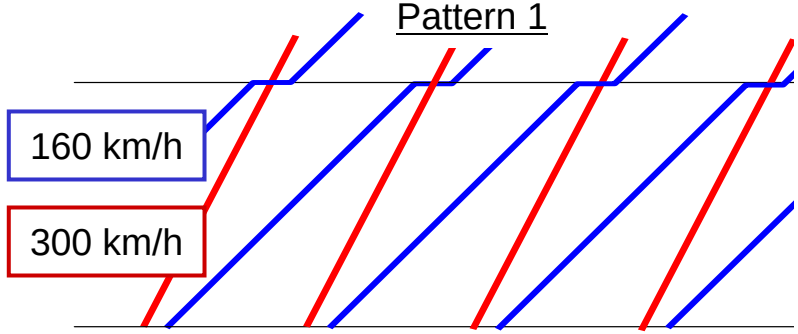
dedicated rail and mixed operation with conventional rail

1. HSR only on dedicated track

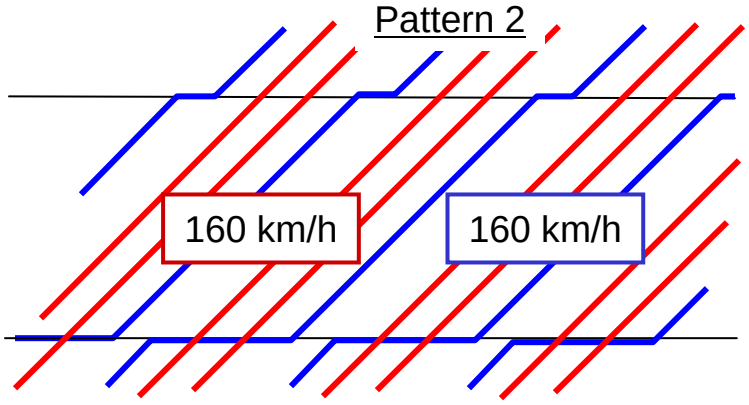


2. HSR + conventional passenger train

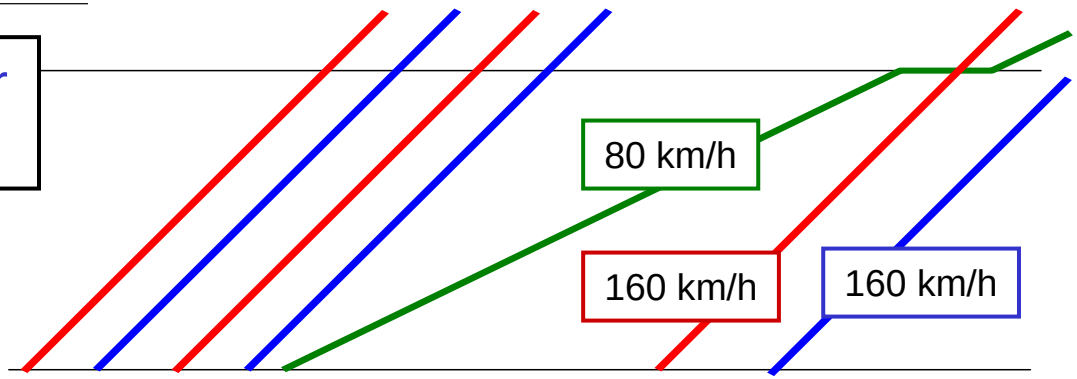
Pattern 1



Pattern 2



3. HSR + conventional passenger
+ freight train



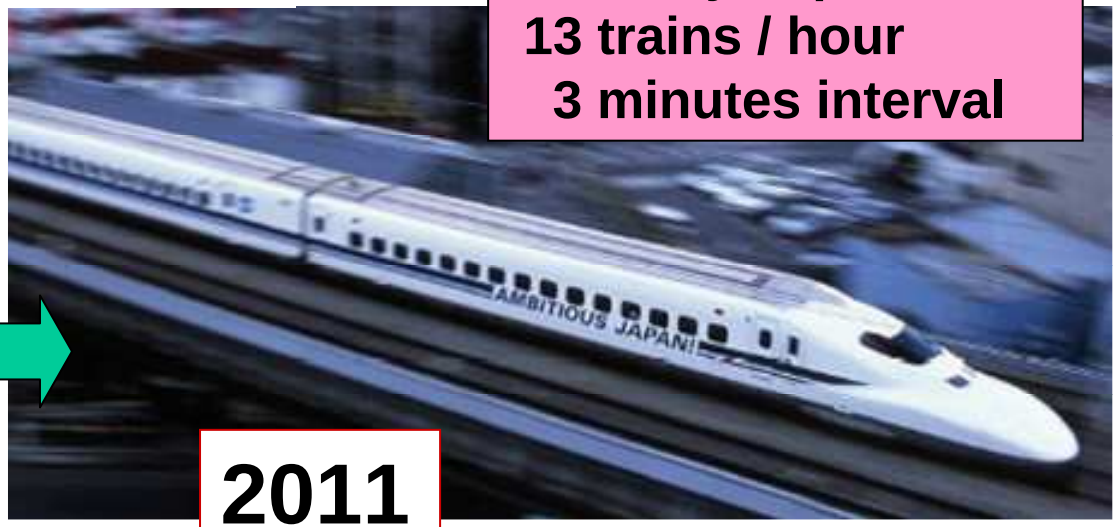
Allowable speed of passing each other with freight train is lower (ex.160 km/h).

Change in train diagrams

2 trains / hour

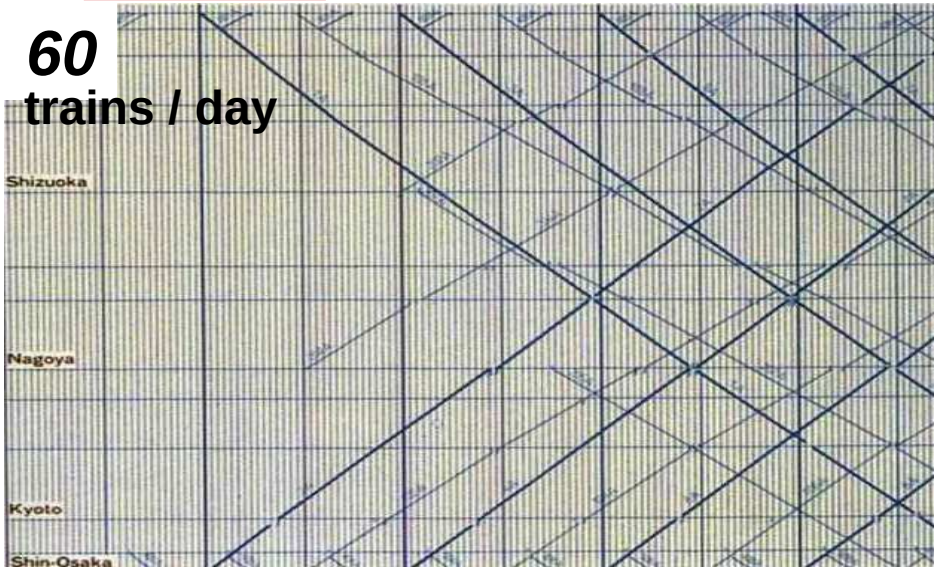
Tokyo ~ Osaka

Headway at peak time
13 trains / hour
3 minutes interval



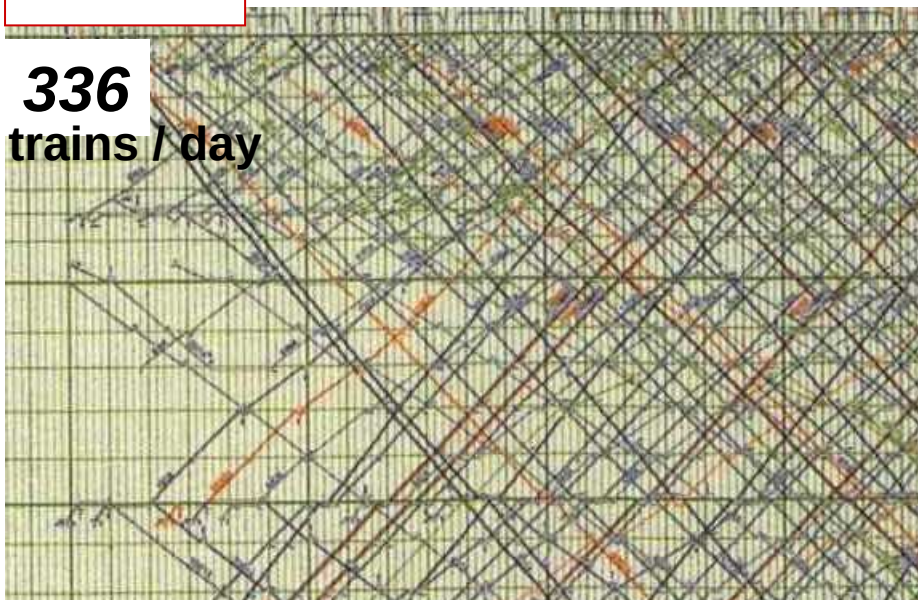
1964

60
trains / day



2011

336
trains / day



Wide body and Narrow body

Wide body EMU

(E2, N700, Velaro CN, CRH3 etc.)

5 seats/row with big capacity

Narrow body EMU

(E3, AGV, ICE3 etc.)

4 seats/row

5/4 = 25 % up

Narrow body is mainly used in Europe to meet narrow loading profile of UIC because of mixed operation with existing conventional rail of standard gauge.

Seat pitch and capacity

Shinkansen 700

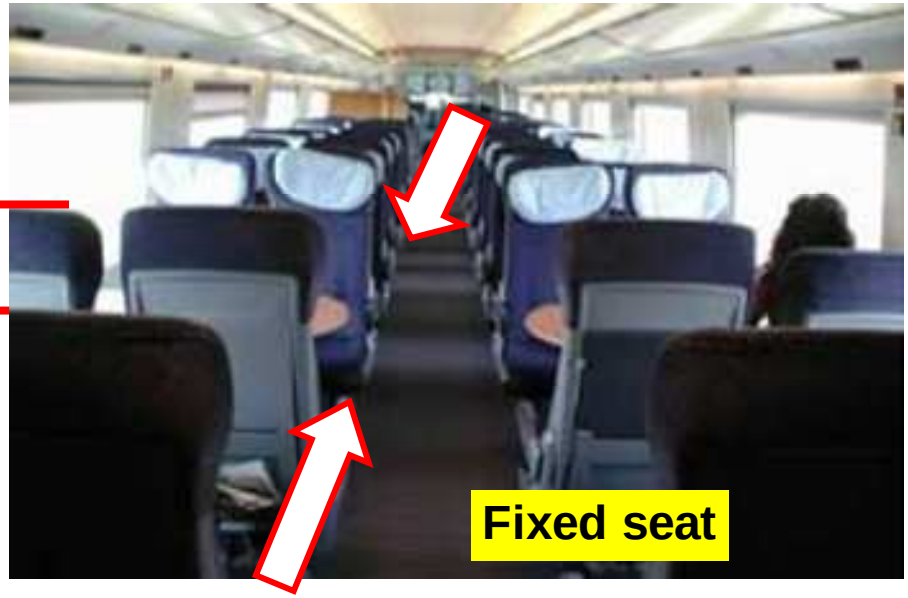
1040 mm

Short pitch ➡ Increased capacity

1040/920 = 13 % up

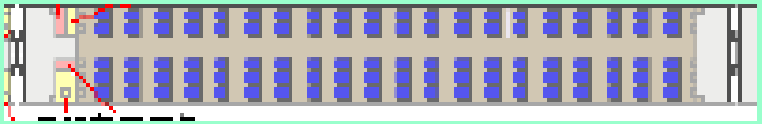
ICE-3

920 mm



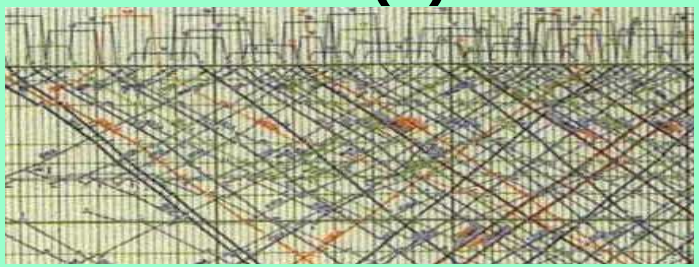
Line Capacity of HSR

1. **The average number of passengers per 25 m car (P).**
   Shinkansen (4 ~ 5 seats/row); P = 64 ~ 83 (passengers/car)
   ICE-3 (4 seats/row); P = 54 ~ 58 (passengers/car)



2. **The number of cars per train (N)**
   N = 6 ~ 16 cars/train

3. **The number of trains at peakhour per direction (T)**
   T = 6 ~ 11 trains/peakhour/direction



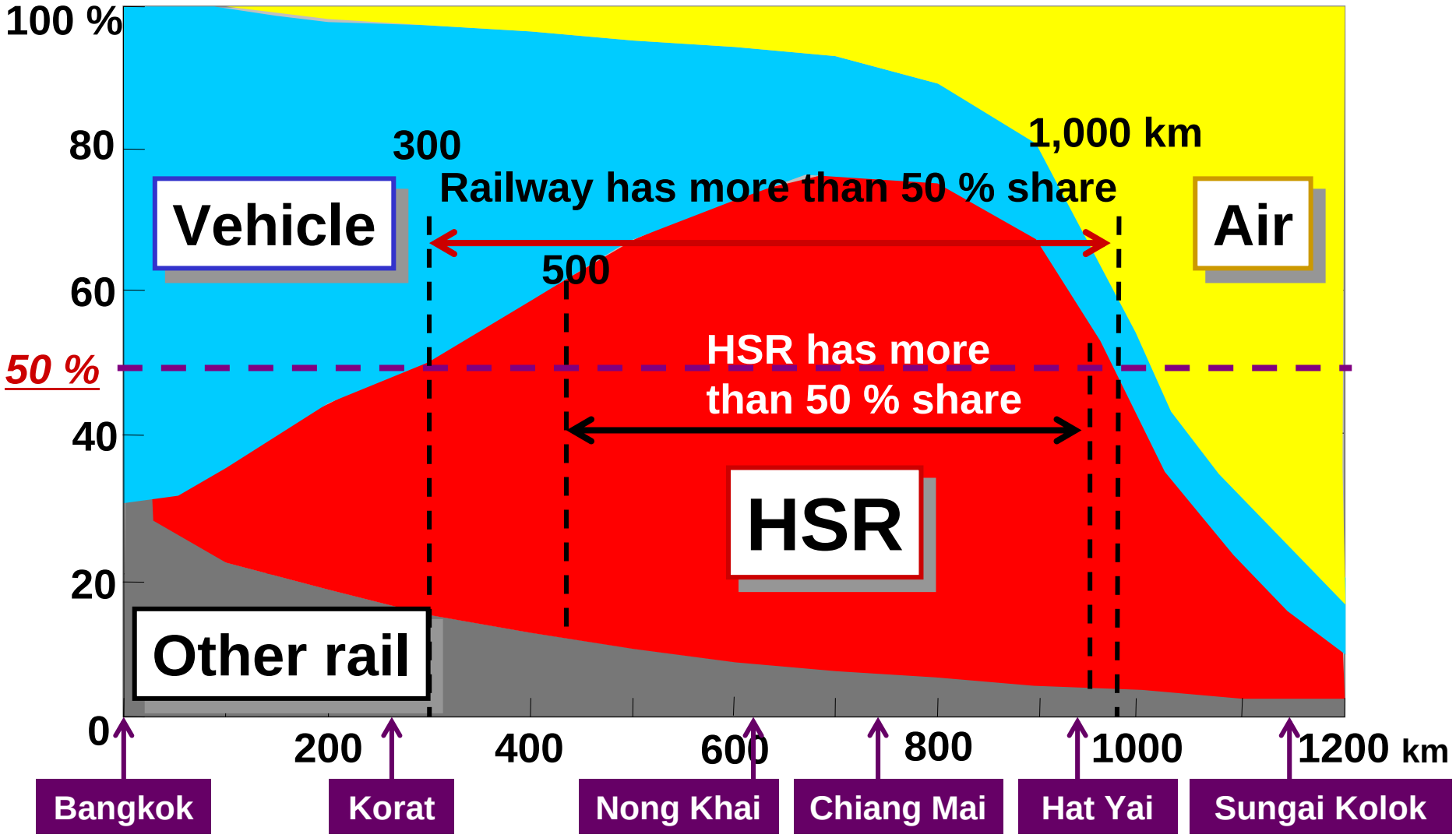
Line Capacity = P x N x T = 1,944 ~ 14,608
= <u>2,000 ~ 15,000</u> (passengers/peakhour/direction)

Expected Demand ⇒ **27,000 ~ 200,000 (passengers/day) at busy section.**

Market share of HSR in Railway business

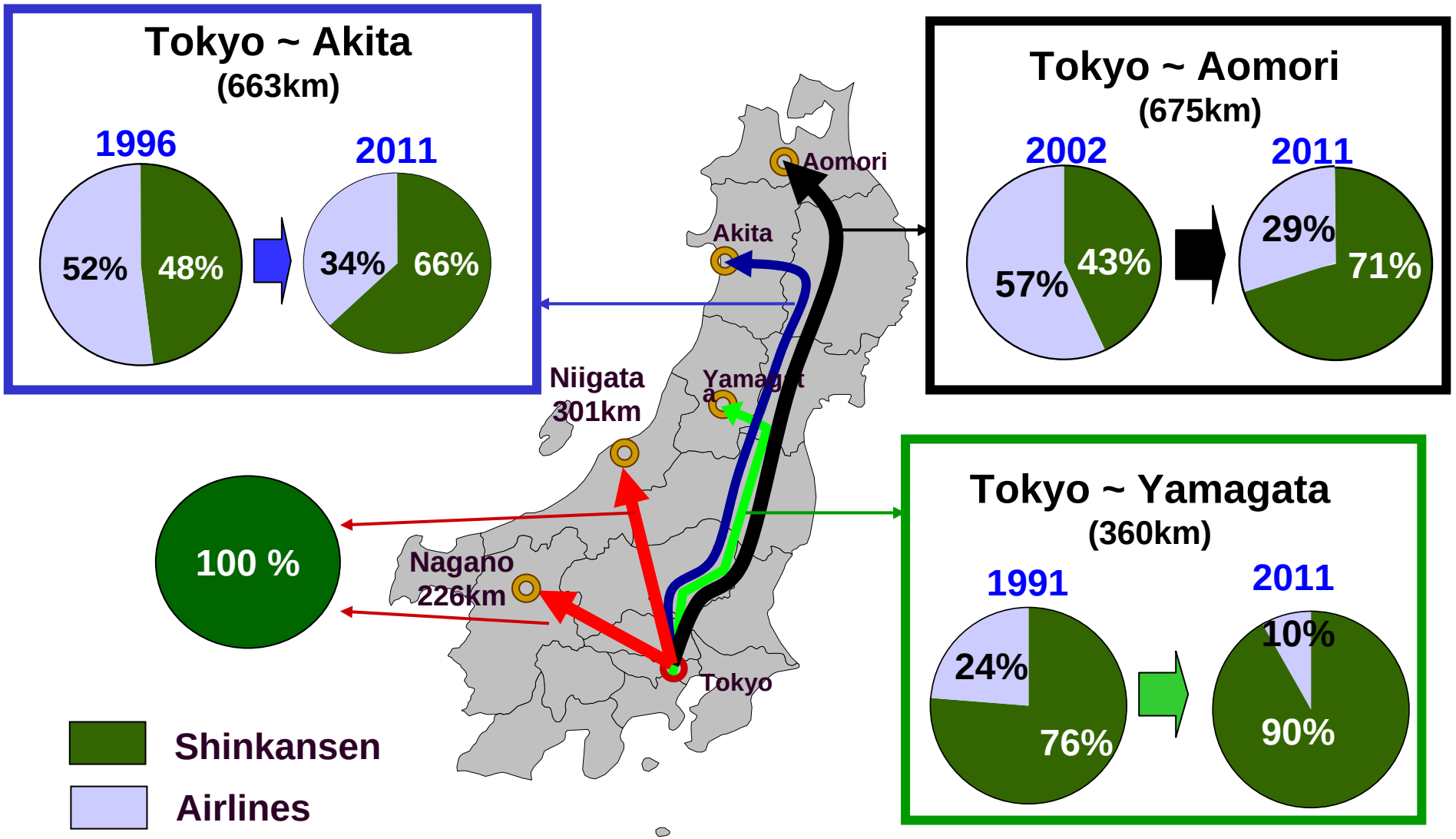
Target of HSR (Market share of railway)

Share and journey distance



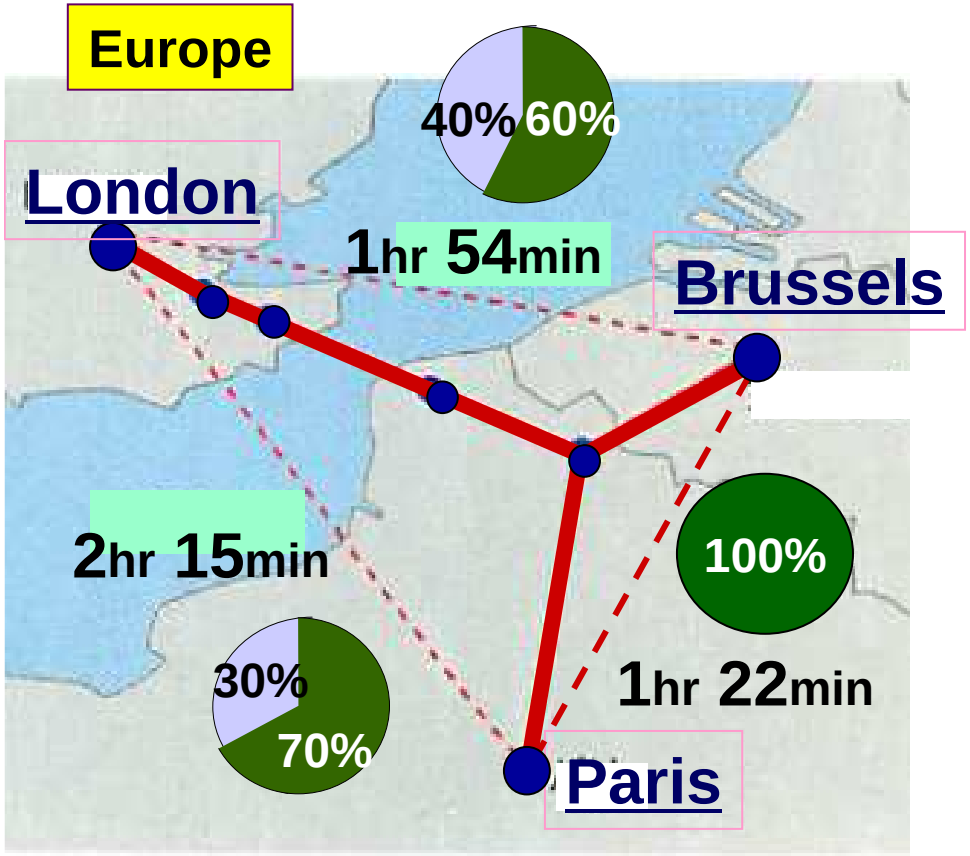
Competition with Airlines

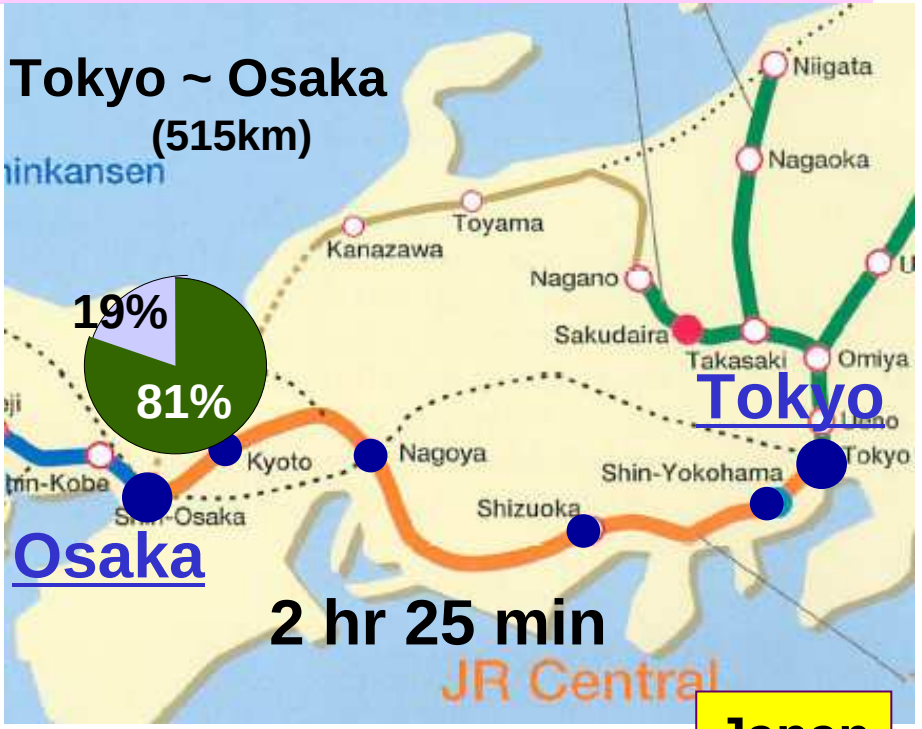
Before and *After* HSR service started



Travel time and share

Rail is dominant over air for shorter than 3 hours' travel.





Shorter Travel time is the key in HSR design.

Thank you !