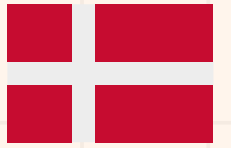




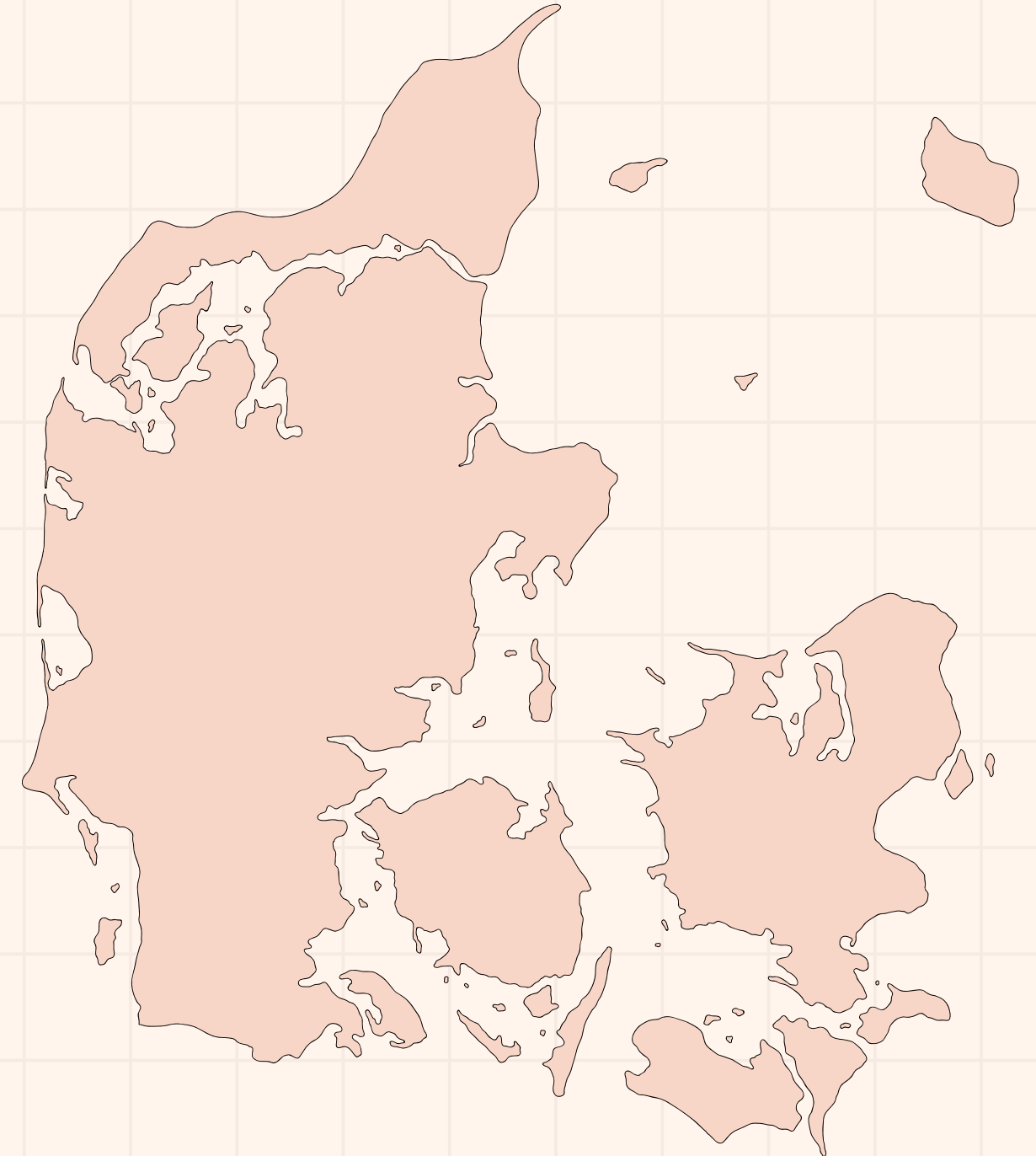
#SIGNALLING



ERTMS® IN DENMARK

Have you ever heard about **Banedanmark's ambitious plan** to modernise its national rail network with ERTMS®?

Do you know **how Denmark is implementing ETCS Level 2** across its entire railway network to replace decades-old signalling systems?



LET'S FIND OUT...



ERTMS[®] in Denmark

The turning point

01

In January 2009, the Danish Parliament approved a strategic decision to modernise the national railway network.

The plan

02

Banedanmark, the state-owned rail infrastructure manager, launched an ambitious plan to upgrade the entire main line network.

The scope

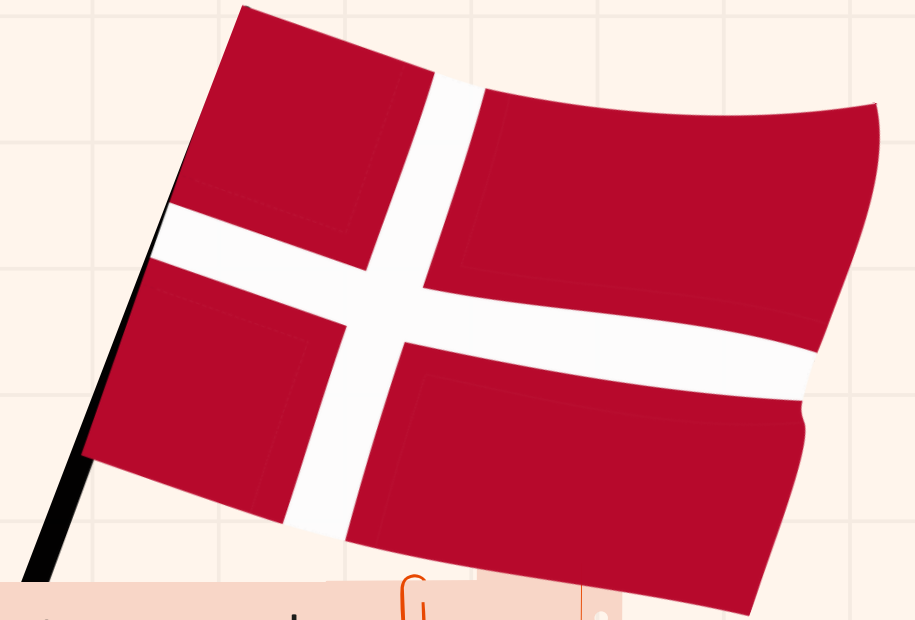
03

Over 1.800 km; 217 stations; 393 level crossings
Target completion: before 2033.

Key transformation

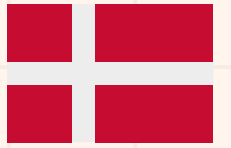
04

Digital shift: Banedanmark is removing the existing interlockings and signals and replacing them with ERTMS[®], including cab signalling.





ERTMS[®] in Denmark



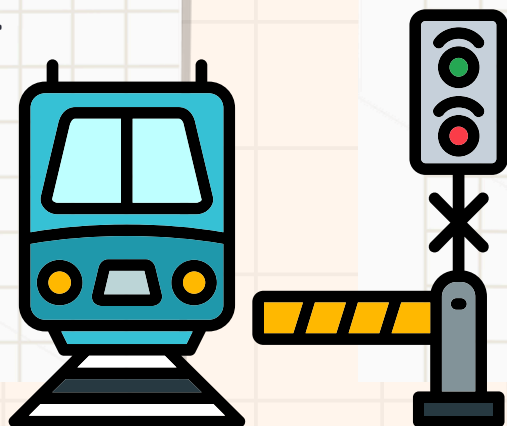
What is the signalling **challenge** in Denmark?

Is ERTMS[®] **the answer** to this signalling challenge ?



The signalling challenge in Denmark stems from a **heterogeneous portfolio of ageing systems, some dating back to the 1910s**, that are increasingly difficult and costly to maintain due to obsolescence and lack of spare parts.

These outdated systems also cause significant operational issues, **accounting for approximately 50% of train delays** while facing capacity constraints and limited availability of skilled maintenance personnel.



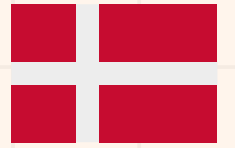
Yes, **ERTMS[®] is the answer to the signalling challenge in Denmark**, as it was strategically adopted to replace an ageing and fragmented signalling landscape that was costly to maintain, prone to failures, and responsible for over half of train delays.

It offers a modern, interoperable, and reliable system capable of ensuring long-term performance while addressing capacity, maintenance, and supply limitations across the national network.





ERTMS® in Denmark



How the implementation is being executed?

Evaluation of solutions

Banedanmark conducted a detailed assessment of ERTMS® solutions.

Two consortia were selected:

- Eastern zone (approx. 700 km: Zealand, Funen and Lolland-Falster).
- Western zone (approx. 1.200 km: Jutland).

Investment & Support Funding

- Total cost: DKK 24.6bn (€3.3bn).
- Additional DKK 57m (€7.7m) fund until 2025 to support freight operators' retrofitting.

Long-Term Support

Suppliers committed to 25 years of continuous maintenance and support.

Rolling Stock Upgrade (2012)

A separate contract was placed in 2012 for the upgrade of existing rolling stock (originally amounting to more than 700 vehicles)

Initial Deployment Strategy

Originally, implementation prioritized the core network before secondary lines.

Strategy Adjustment (2017)

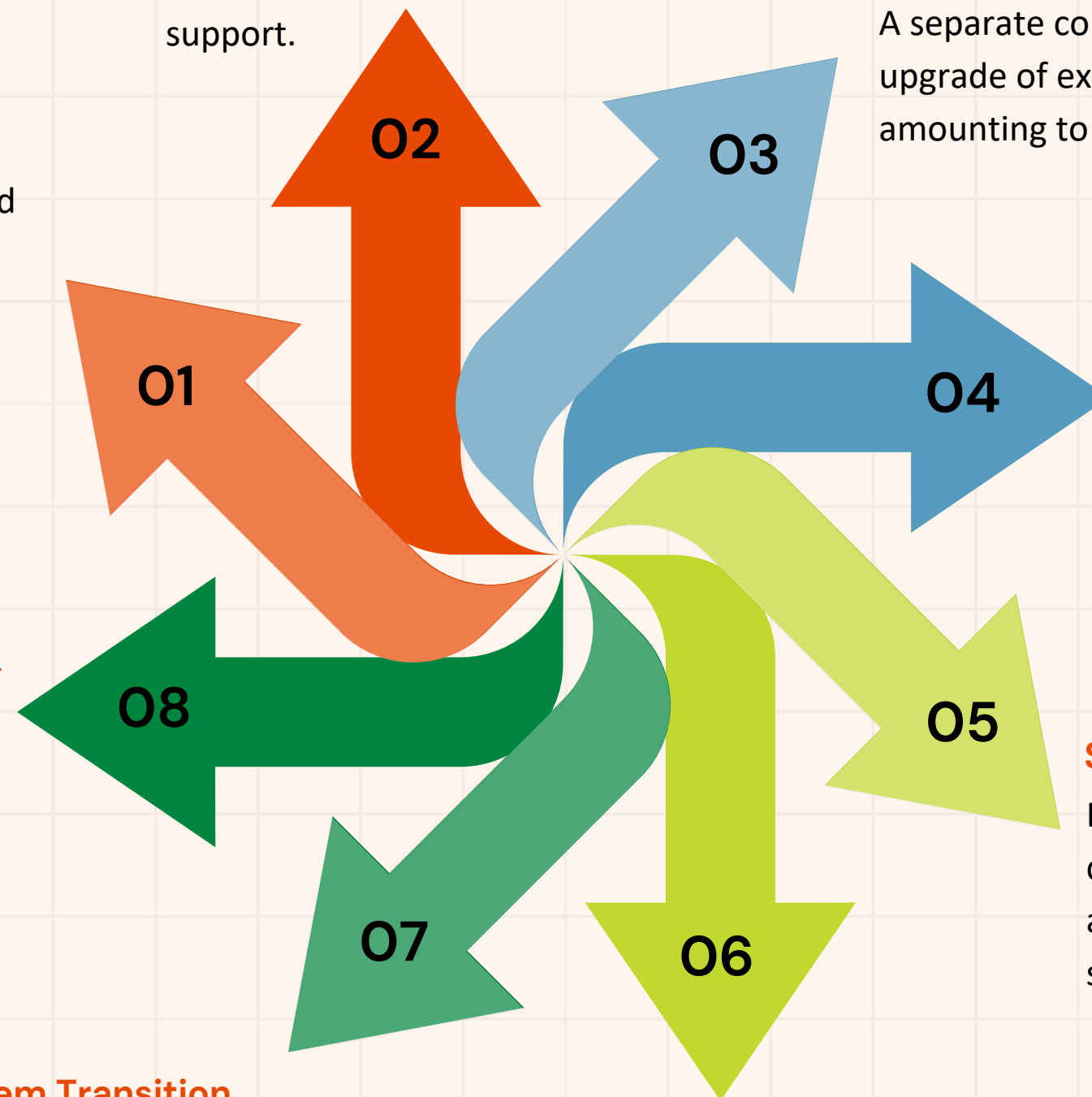
Due to technical and regulatory challenges, the approach shifted to a migration model driven by rolling stock retrofitment.

System Transition

Class B systems are removed simultaneously with the commissioning of ETCS Level 2.

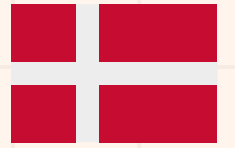
Migration Approach

Trackside ETCS installation follows where upgraded trains are ready, bringing simpler branch lines first.





ERTMS® in Denmark



Current status

The first route to enter in operation with the new signalling system was Frederikshavn - Lindholm in October 2018, followed by other 11 routes:

-  Roskilde - Køge in December 2019
-  Struer - Thisted in April 2020
-  Langå - Struer - Holstebro in March 2021
-  Køge - Næstved in August de 2021
-  Mogenstrup - Nykøbing F. Vest in December 2021
-  Vejle - Holstebro and Herning - Skanderborg in August 2022
-  Vigerslev - Ringsted in April 2023
-  Esbjerg - Holstebro - Skjern - Herning in June 2023
-  Aarhus - Aalborg Airport in October 2024
-  Lunderskov - Esbjerg - Bramming - Tønder in April 2025
-  Fredericia - Aarhus in March 2026

Commissioning for the rest of the lines

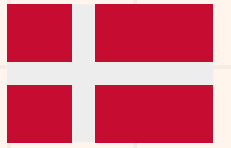
is expected no later than 2033:

-  Roskilde – Kalundborg: works have finished; the decision on commissioning date is pending.
-  Odense – Svendborg and Ringsted – Mogenstrup in the 2nd half of 2026
-  København / Vigerslev – Peberholm; Ny Storstrømsbro; and Fredericia – Middelfart – Padborg – Tinglev – Sønderborg in the 1st half of 2027
-  Ny Kong Frederik IX bro and Nykøbing F. Vest – Femernforbindelsen in the 2nd half of 2027
-  Korsør – Middelfart and Gammel Kong Frederik IX bro in 2028
-  Femern Tunnel; Ny Bane Vestfyn; and Ringsted – Korsør in 2029
-  Roskilde – Ringsted in 2030
-  København – Østerport in 2031
-  København/Vigerslev – Roskilde and Østerport - Helsingør in 2033

The programme is now progressing well. Over 1.100 route km commissioned. The remaining 750 route km will be commissioned no later than 2033. Retrofitment of the white and yellow fleets is expected to finish in 2026.



ERTMS[®] in Denmark



About retrofitting...

Originally planned:

➔ Retrofit 700 vehicles with ERTMS[®]

Actual outcome:

✓ 321 vehicles retrofitted

Including yellow fleet and a large part of the existing white fleet.

🚆 Banedanmark's retrofitment project finished in 2026.

🔑 Main point: industrialization has taken longer than expected but when in place it works.

Key benefits:

🚆 -50% signalling-related delays.

⚡ Higher speeds & shorter travel times.

📊 Increased network capacity.

🛡️ Uniform safety level across the network.

📊 Improved traffic information.

