



***Bombardier solutions for Euro Asian
Corridors***

Railway Days, Bucharest, October 5 - 6, 2010

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Interoperability: a Key Factor for Euro Asian Corridors

- **From the beginning, in 1991, Bombardier genuinely promoted the idea, initiated by the EU, of a well-defined European standard with open interfaces, to reduce the technical and economical trade barriers throughout Europe.**

- **Among the suppliers within the industry, we are one of the main drivers for open ERTMS standards and are committed to developing the standard into even broader openness.**

First ERTMS L2 in commercial operation

- **The world's first ERTMS Level 2 line in full commercial operation was brought into service by Bombardier in Switzerland between Olten and Lucerne in 2002.**
- **Our ERTMS L2 solution proved to be reliable and safe, meeting the very high standards set by Swiss Federal Railways, SBB.**
 - Test results show outstanding performance levels of 99.6% availability, reaching standards above conventional signaling systems.

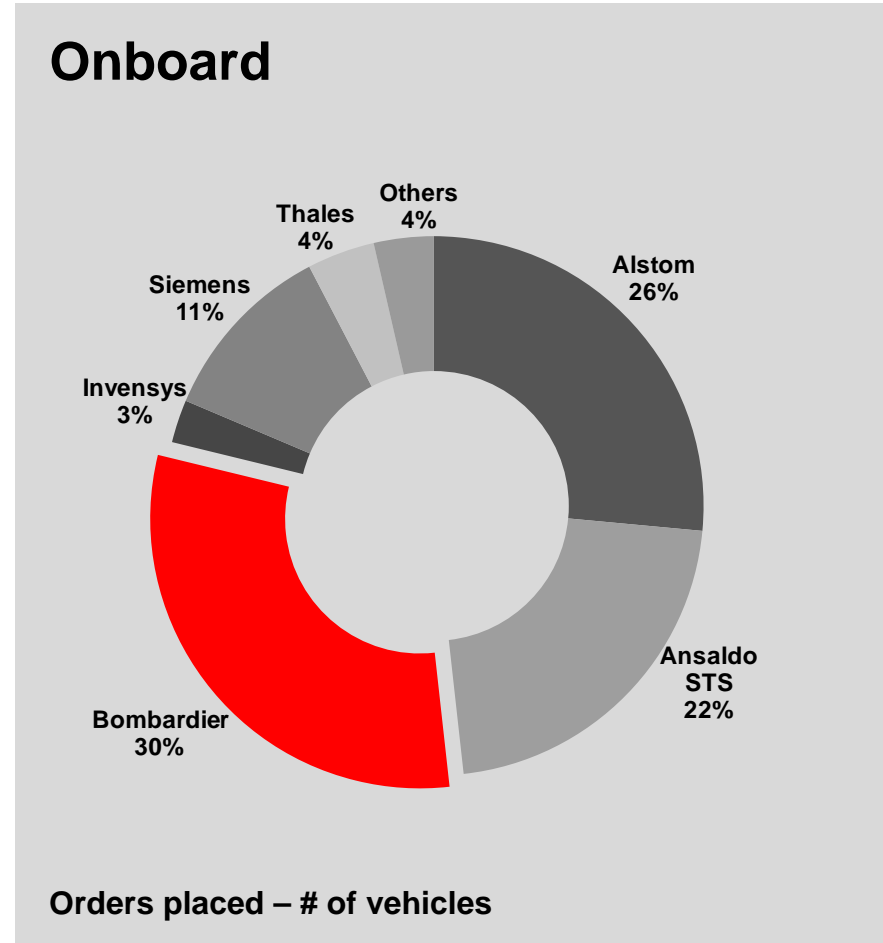
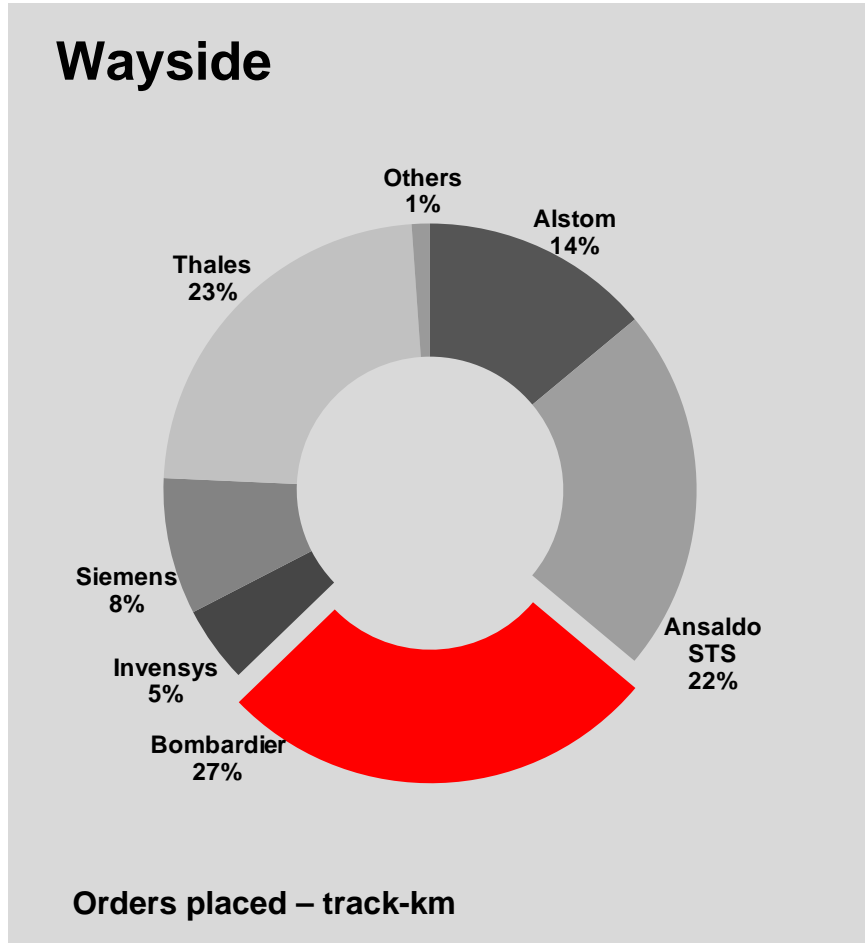


First successful interoperability trials between different suppliers of ERTMS L2

- In 2005 a real milestone for ERTMS interoperability was reached with Bombardier's successful interoperability tests: our ERTMS L2 equipment and equipment supplied by two independent UNISIG member companies on the Bev 21 ERTMS lines in The Netherlands.
- Various tests were performed in the presence of representatives from the European Commission and several European railways.
- Bombardier Radio Block Center ↔ Alstom and Siemens Trains
- Bombardier Train ↔ Alstom and Siemens infrastructure

ERTMS Market share

Bombardier is the clear market leader in ERTMS technology



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Based on UNIFE market data, 11th August, 2009

The future of Interoperability: ERTMS Regional

- **ERTMS Level 3 for Regional lines**
 - It is the evolution of the ERTMS
 - Utilises the onboard system from ERTMS/ETCS
 - Minimises use of wayside installations by using modern communications technology
- **April 2005:**
 - Bombardier received an order from Swedish Banverket to specify a system based on an UIC Functional Requirement Specification
- **December 2006:**
 - Bombardier received an order to develop the ERTMS Regional system and to implement the system on a pilot line
- **Banverket has signed a frame agreement with Bombardier for delivery and maintenance of ERTMS Regional systems for up to 20 years**

INTERFLO 250 – ERTMS L1 - Project references

- Albacete - Villar de Chinchilla - La Encina, Spain
- ATP, Taiwan Rail Administration, Taiwan
- Korean National Railroad, Korea
- Arlanda Express Airport Link, Arlandabanan, Sweden
- Oresund Link, Sweden – Denmark
- Vinkovci to Tovarnik, Corridor X, Croatia
- Saida – Mouley Slissen (Algeria)



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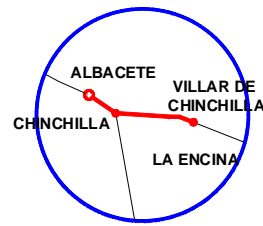
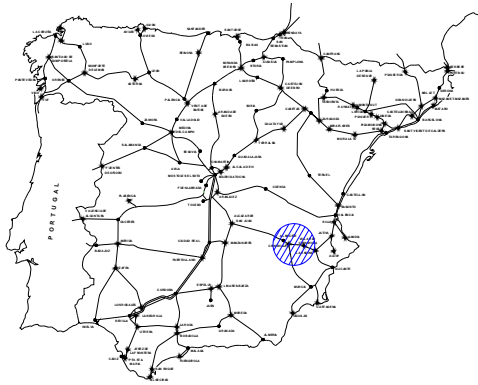


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INTERFLO 250 (ERTMS L1) - Project References

Spain



- Line length: 90Km
- 600 Eurobalises
- 100 LEUs
- 4 EBICAB 2000 systems
- Commissioned 2003

Italy

- Equipped line length: 2500 km
- 25000 Eurobalises
- 3000 Line Encoder Units (LEU)
- Installation test and commissioning of the system
- First line in service 2005



INTERFLO 250 (ERTMS L1) - Project References

Taiwan



- Line length: 1200 km of
- 156 stations
- 768 EBICAB 2000 systems,
- 13000 balises
- 2000 LEU
- In commercial operation since 14 July 2005

South Korea – KNR

- Line length: 760 kilometres
- 78 stations
- 413 EBICAB 2000 Systems
- 7000 balises
- 2260 complete LEU's
- In service since 2007



INTERFLO 450 (ERTMS L2) – Project references

Switzerland (Olten-Luzern)

- Line length: 35 km double-track
- 9 stations
- 1 RBC
- 220 fixed balises
- 59 vehicles, 5 types



China (WuGuang DPL)



- Line length: 1000 km, double track
- 120 vehicles
- 9 RBCs
- 9 *EBIComs*

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INTERFLO 450 (ERTMS L2) – Project references

Sweden (Botniabanan)

- Line length: 190 km
- 22 stations
- 1 EBICom (RBC)
- 1 EBIScreen (CTC)
- 600 Eurobalises

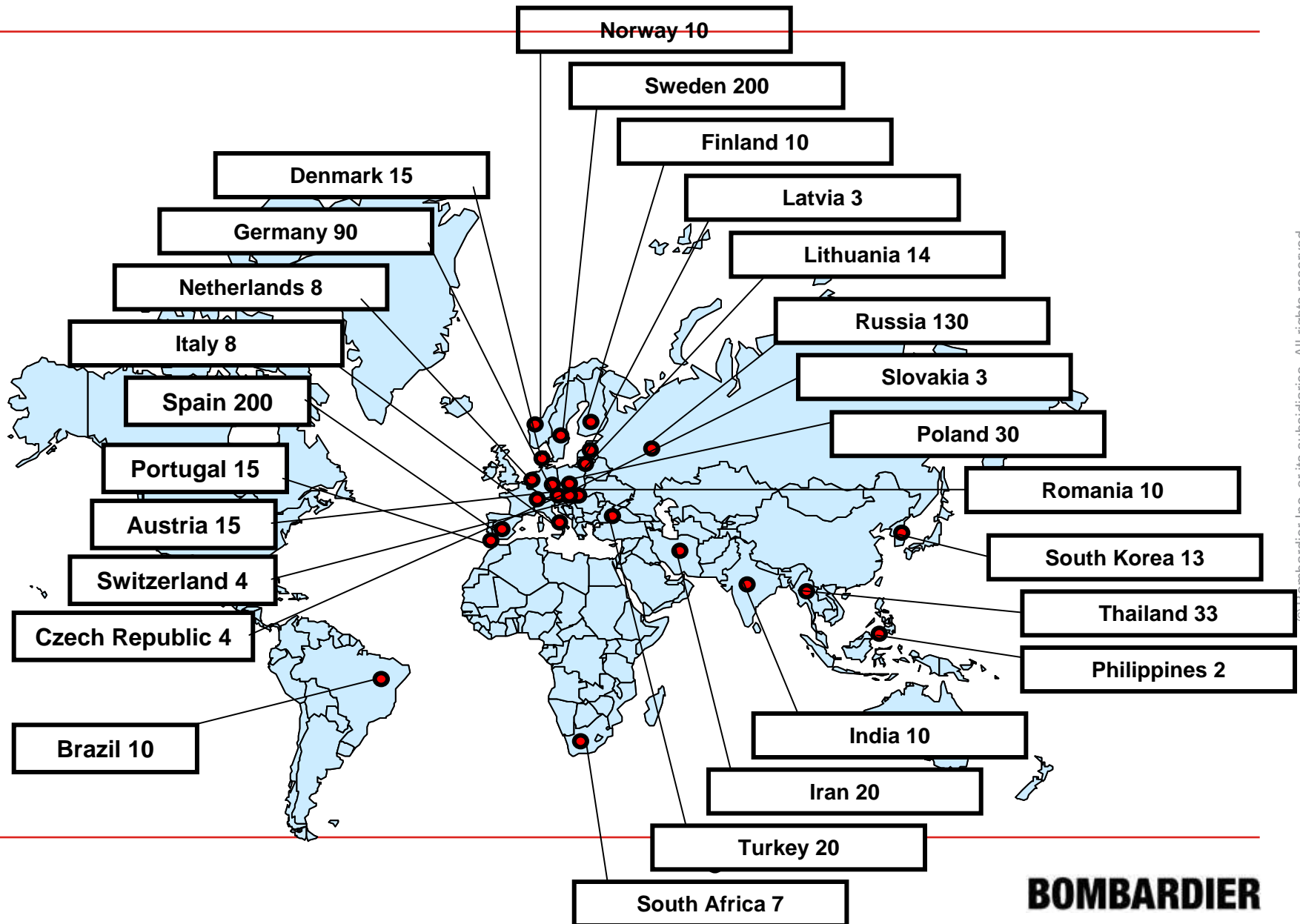


The Netherlands (Amsterdam-Utrecht)



- Line length: 35 km (four-track)
- 1 EBIComs (RBC)
- 2 EBILocks
- 400 Eurobalises

EBI Lock (CBI) installed base



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Conclusions

■ **Bombardier's successes in ERTMS technology**

- Bombardier's products are used as reference for the development of the ERTMS specifications
- Bombardier put in operation the world's first ERTMS Level 2 line in full commercial operation (Switzerland)
- Bombardier's products are used also by the competitors
- Bombardier's looks to the future of the ERTMS with the ERTMS Regional
- Bombardier put in operation the longest high speed implementation ERTMS Level 2 signaling technology (China Wuhan – Guangzhou line, 1000 km)

■ **Bombardier's successes in CBI technology**

- First CBI in operation in 1978 (Goteborg)
- More than 700 CBI installed world-wide
- Powerful processing units: one CBI able to control more stations

End of presentation