

Sydney ATP Pilot Trial ERTMS / ETCS Technology

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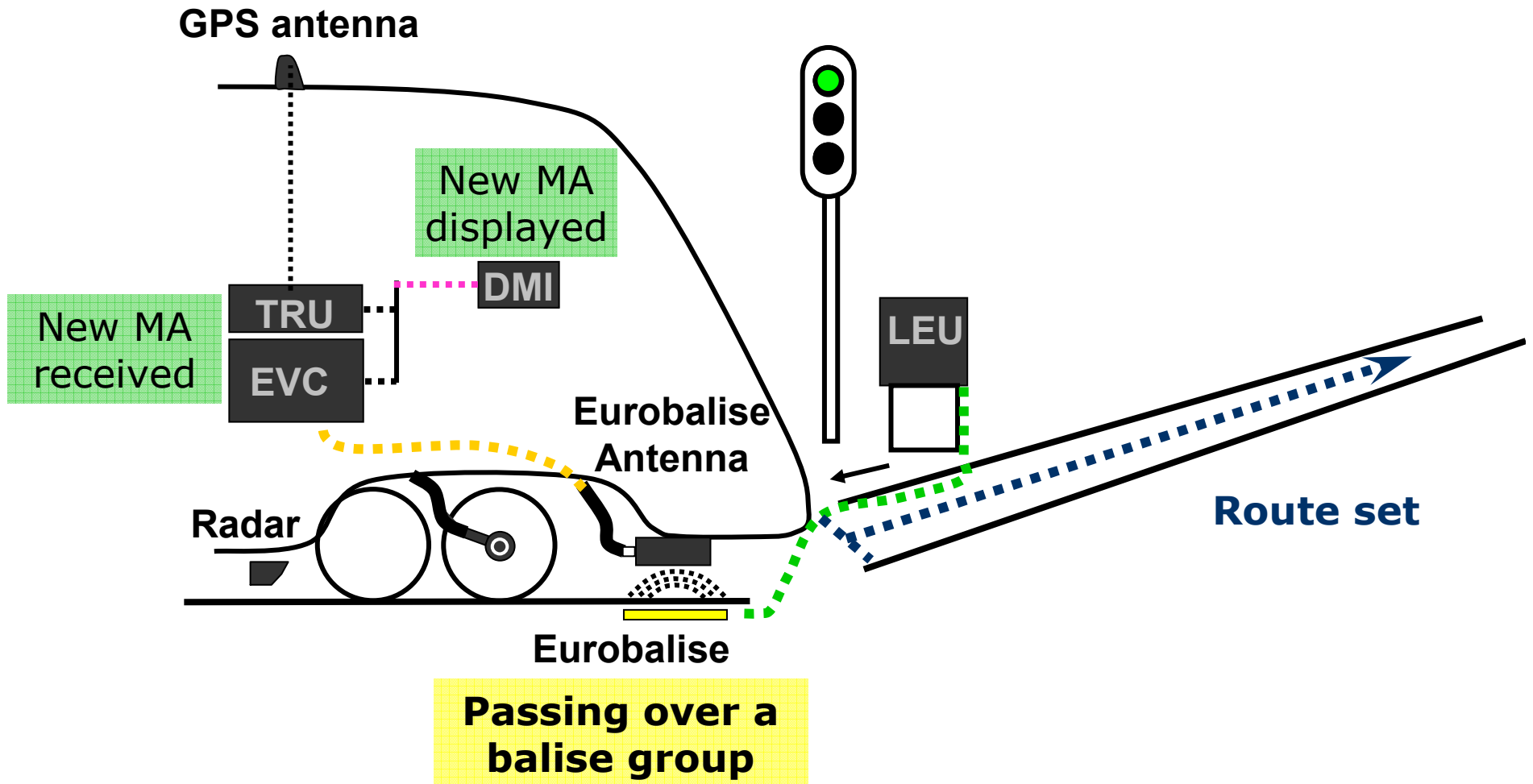
Agenda

Brief Outline of ETCS Level 1

Sydney ATP Pilot Trial

ERTMS Level 2

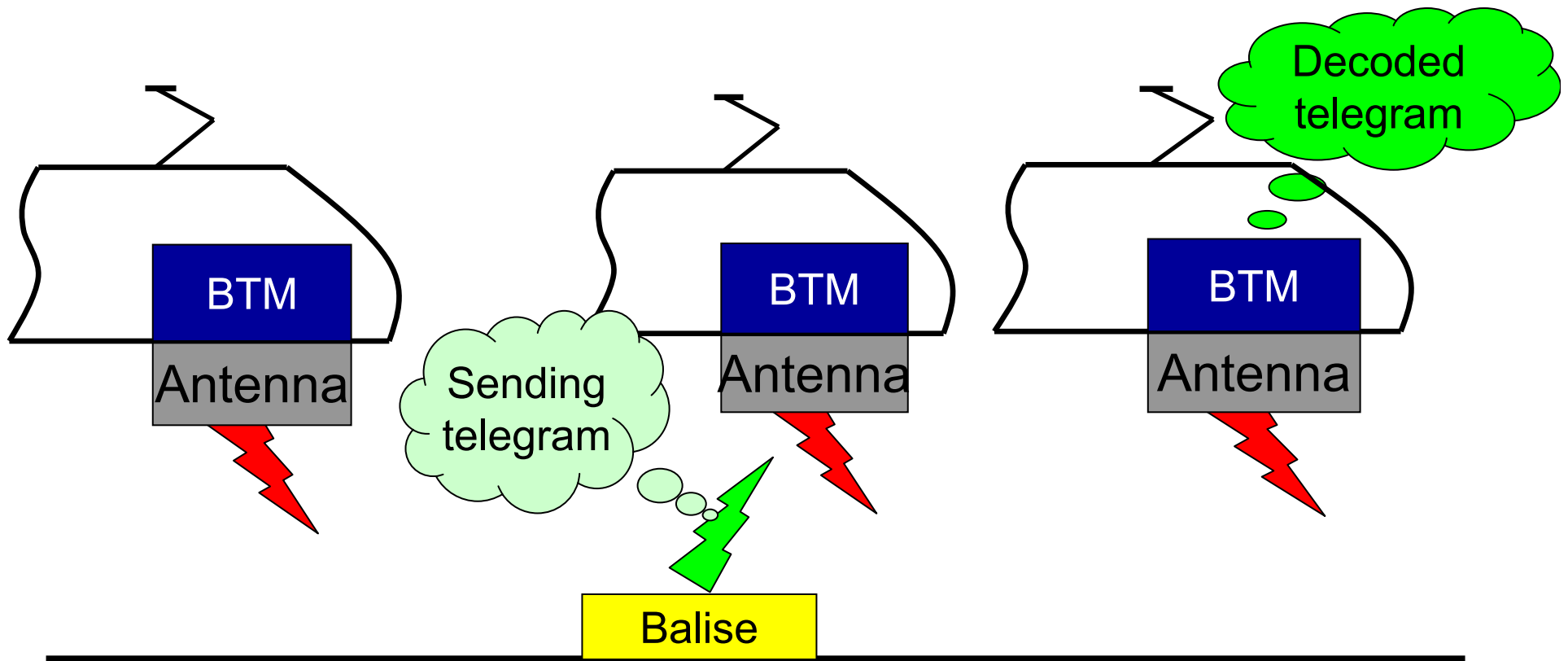
Basics - ETCS Level 1



View From Driver's Compartment



Basics - ETCS Level 1



FFFIS Air-Gap interface :

Tele-powering : 27.095 MHz / Toggled or CW

Up-link : 4.24 MHz with FSK @ 565 kbits/s

Generic Trackside Configuration

Signalling
Information
(Aspect, route)



LEU

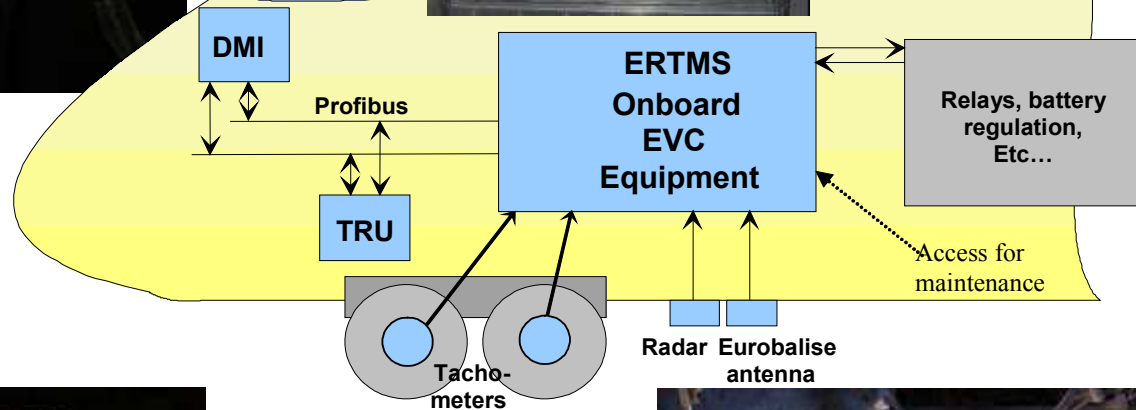


Fixed balise contains fixed data: speed profiles, gradients, linking (positional information)

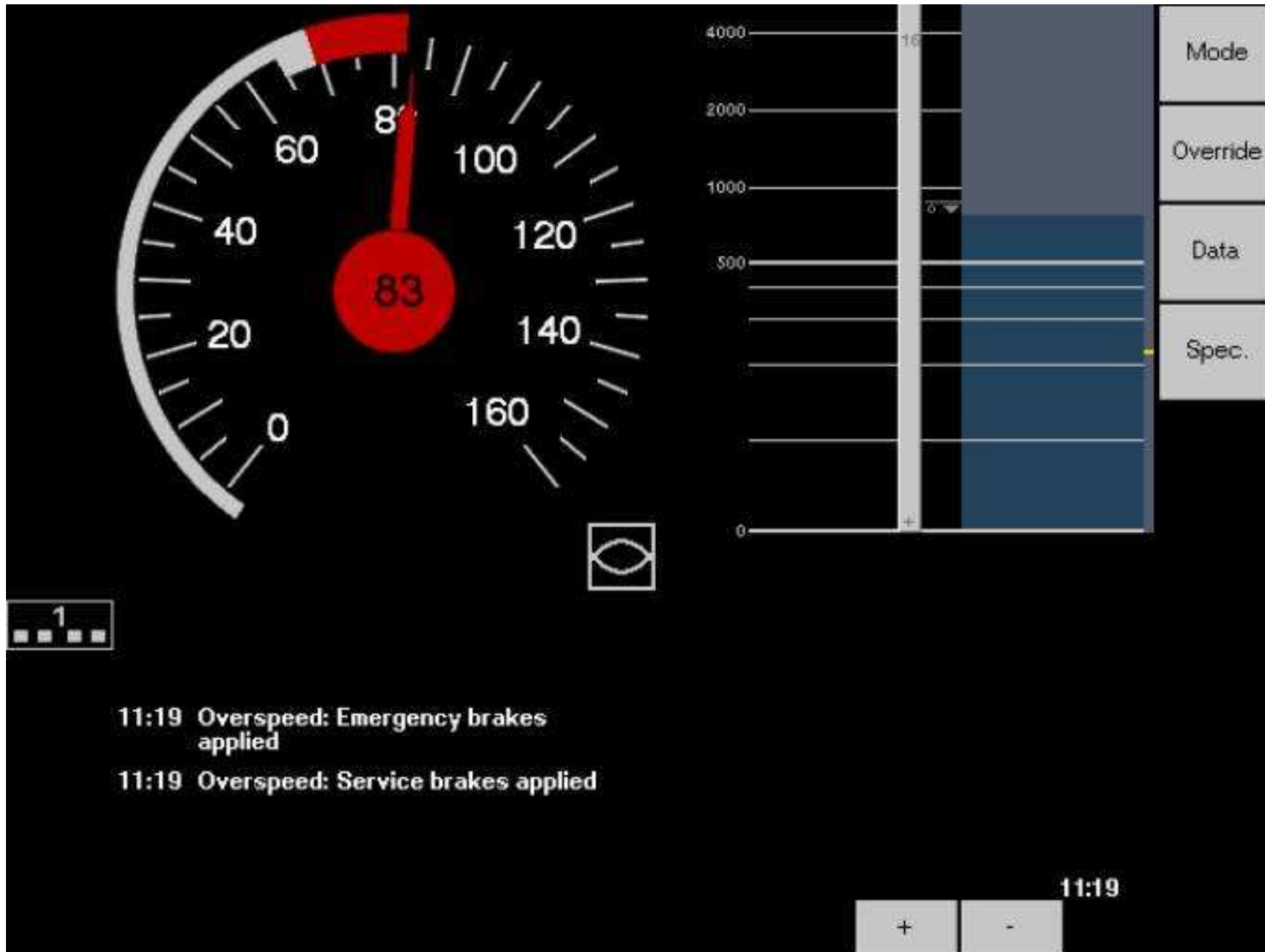
Trainborne Configuration



accelerometer



Trainborne Configuration – Driver Machine Interface



The background features a dark blue field with intricate, white, wavy lines that create a sense of motion and depth. These lines are organized into several distinct, overlapping patterns that resemble stylized waves or the paths of particles. A central point where multiple lines converge is highlighted with a small, light-colored square. A horizontal, semi-transparent teal bar is positioned across the lower portion of the image, serving as a backdrop for the title text.

The Project

Sydney ATP Pilot Trial, Background

- **Project Drivers**
 - Improved safety
 - Prove the potential for line capacity improvements
 - Supports future Signalling Strategy
- **ETCS/ERTMS chosen**
 - Highly flexible application
 - Already proven in many countries
 - Available from multiple suppliers
 - Interoperable between suppliers
- **Request for Tender issued – October 2006**

Sydney ATP Pilot Trial, V-Set

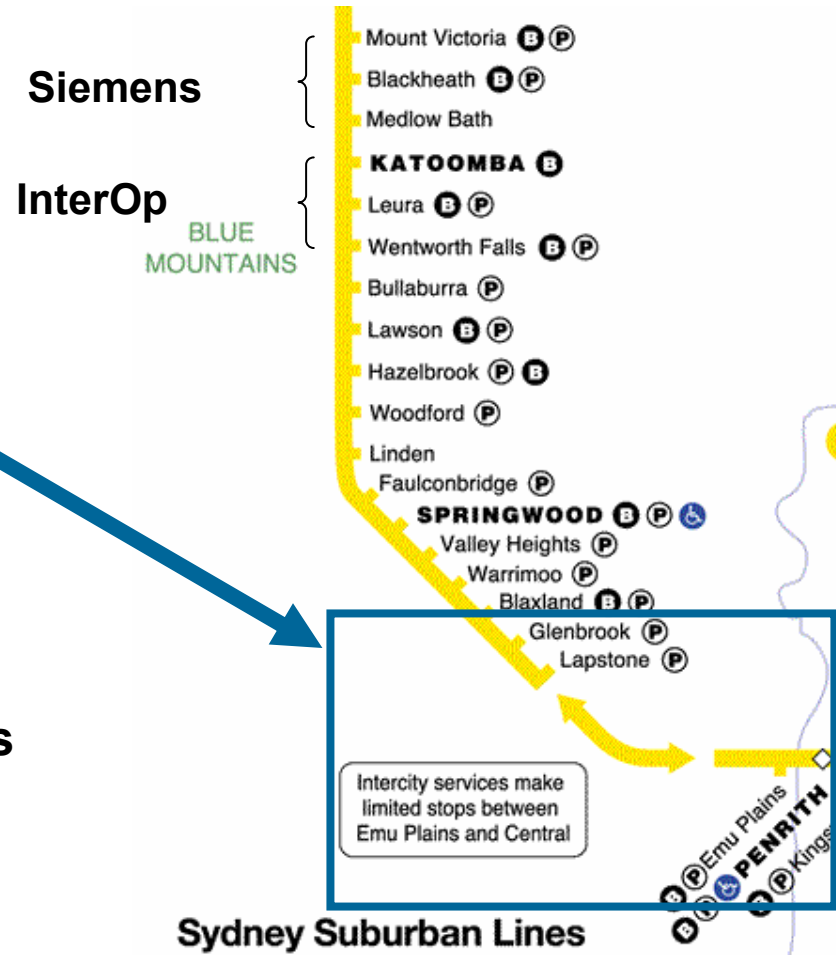


Chosen for;

- Space for equipment
- Operates in trial area
- Simple interfaces
- Good representation of the older fleet

Sydney ATP Pilot Trial, Trackside Scope

- 14 Route Kilometres
- Penrith Yard
- 82 Eurobalises
- 38 Line Equipment Units
- 24 Location Huts / Relay Rooms
- 10 Km of cable



Sydney ATP Pilot Trial – Trackside Installation

- **START OF TRACKSIDE INSTALLATION – 4TH August 2007**

6 Weeks

- Installation over 14 Km in a live rail network
- One weekend possession only during which 95% of balises were installed
- Constructing cable route, pulling cables and installing in live locations
- UGI Worksite Protection Officer
- Zero interruption of services
- Zero injuries



- **READY TO TEST – 3rd October 2007**

Sydney ATP Pilot Trial Project – Trackside Test & Commission

- **START OF TRACKSIDE TESTING – 4TH October 2007**

3 Weeks

- Signed-Off Installation Work Package
- FAT Testing of LEU Assemblies
- Approved / accredited staff
- Testing of Pink internal wiring
- Programming LEUs & Balises
- Manipulating LEU inputs
- Verifying Balise Telegrams
- Signed Commissioning Work Package



- **FINAL COMMISSIONING – 28TH October 2007**

Sydney ATP Pilot Trial Project – Trainborne Installation, Test & Commission

- **START OF TRAINBORNE INSTALLATION – 18TH February 2008**

3 Weeks

- Approved Trainborne Circuit Book
- Highly Experienced Subcontractor
- Agreed Installation Methodology
- Daily supervision & assistance

- Proposed alternative DMI mounting
- Included Driver DMI training

- Improved on Programme



- **READY FOR COMMISSIONING – 10TH March 2008**

Sydney ATP Pilot Trial - Trial Running



Sydney ATP Pilot Trial - Trial Running

- Based on Test Cases defined by CDG – TET.
- Three periods of 5 consecutive weeks between November 2007 and April 2008, one period per supplier
- UGAC had the last period (March-April 2008), also trialling the simplified cab version.
- Main conclusion : SUCCESSFUL OUTCOME !
 - Interoperability was clearly demonstrated
 - Application to RailCorp network is not an issue
 - Further work needed to
 - Braking curves characterisation and
 - optimisation
 - Standardisation & harmonisation of DMI

Sydney ATP Pilot Trial - Project Timetable



The Sydney ATP Pilot Trial “Alliance”



IRSE Victoria conference
Alstom ERTMS L2 experience

M. Lababidi
18/06/2008

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Agenda

1st topic

ERTMS L2 and Alstom projects

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2nd topic

ERTMS L2 advantages

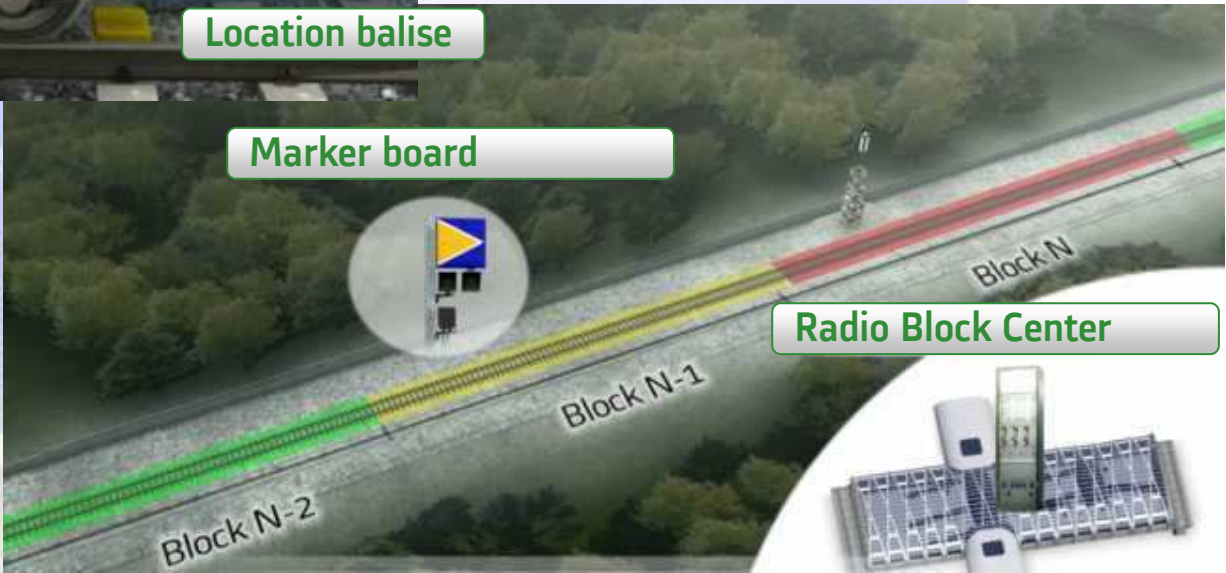
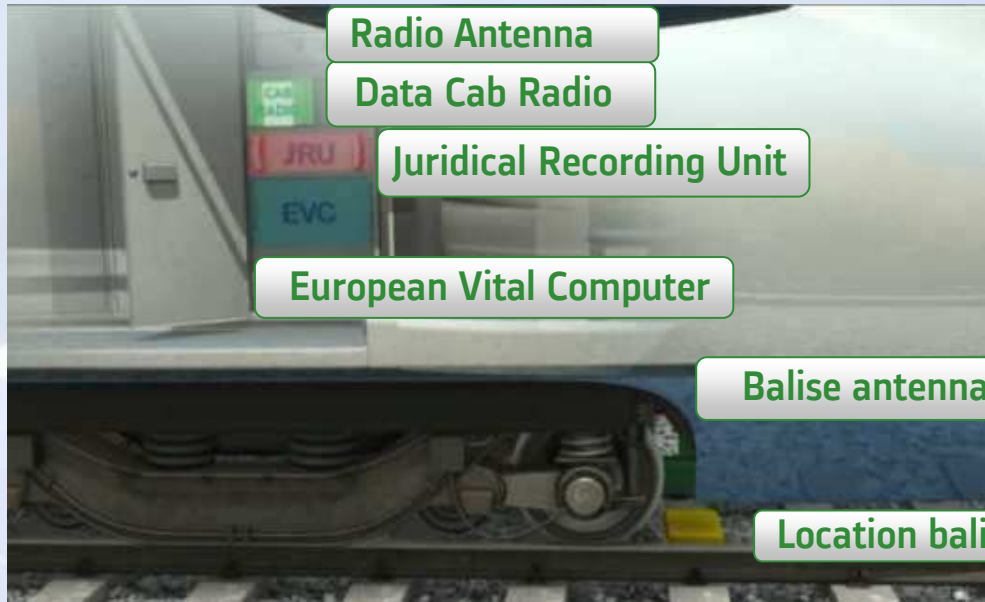
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ERTMS L2 versus L1

- Level 1 is a continuous supervision of speed and location with a mono-directional spot transmission (Eurobalises)
- Level 2 is a continuous supervision with bi-directional transmission (GSM-R)
- The operational difference between ERTMS Level 1 and Level 2 is mainly optimisation of the capacity and high RAM performance.

ERTMS Level 2 equipments



Alstom ERTMS Level 2 trackside experience

- Over 5 000 km of tracks and 30 RBCs
- 6 ERTMS L2 projects in operation
 - Switzerland:
 - Bern-Olten **ALSTOM**
 - Loetschberg
 - Italy:
 - Roma-Napoli **ALSTOM**
 - Torino-Navara
 - Milano-Bologna
 - Netherlands:
 - Betuweroute **ALSTOM**
 - Germany:
 - Berlin-Halle-Leipzig
- 8 ERTMS L2 projects currently under Tests & Commissioning

Over 20 ERTMS Level 2 projects in Europe

Alstom ERTMS experience on high-speed lines



Roma-Napoli

Commercial operation at 300 kph since Dec 2005

- ERTMS level 2 no back-up
- Network size: 216 km of track
- Headway: 5mn. 22 runs per day
- 30 trains
- 4 types of trains (ERT500,470, new Cisalpino & Pendolinos)



Achievements at feb 2008

- Number of runs: 15 104
- Distance covered: 3 020 800 km
- Hours of operation: 21 900 h

Presentation Betuweroute - P 27

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Alstom ERTMS experience on trackside projects



Mattstetten-Rothrist

Commercial operation at 200kph since 2006

- ERTMS level 2
- Network size: 55km
- 478 trains
(SA-NBS + Pendolinos)
- 11 types of trains
- Headway : 2 min
- Speed: 200kph
- 240 runs per day



Re420



Re460



Tm234



ICN



Re465



Re620



Am841



ICbt



Ae610



Re425



IC2000

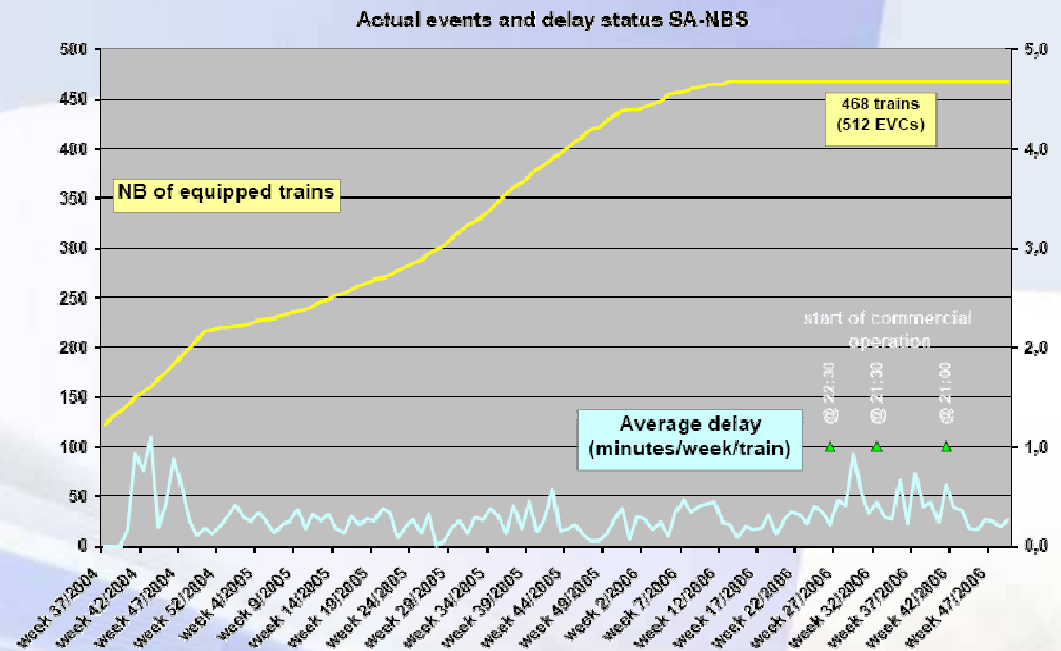




Mattstetten-Rothrist

Commercial operation at
200kph since 2006

- 6 Millions of operating hours with an average delay of less than 20 sec per week per train
- Mixed traffic



Source: Mattstetten-Rothrist line (SBB) Dec 2006

Achievements at feb 2008 under ERTMS L2

- Number of runs: 96 437
- Distance covered: 3 872 520 km
- Distance covered every month: 21 900 km

Alstom ERTMS experience on freight line for European corridors



Betuweroute

Commercial operation since Jan 07

- Betuwe Route part of the A corridor (Rotterdam-Genova) ERTMS level 2
- 150 km route
- 4 type of trains (BR203, BR189 G2000, G1206)



Other Alstom projects for European corridors migration

- *Corridor A : Locomotives from Mitsui, Vossloh (BR189, BR 203)*
- *Corridor C : Locomotives from SNCB (T18, I11)*

Betuweroute project

Betuweroute

Commercial operation since Jan 07

Part of the freight corridor A crossing 4 European countries from Rotterdam (NL) to Genoa (IT)

- Section 1: dual track line A15
- Section 2: Rotterdam harbour



Rotterdam harbour

40 km

A15

110 km

A15 project features

- Traffic performance target:
 - Headway between trains: 4,5 mn
 - Throughput: 10 trains per hour
 - Availability:
 - Secondary failure : 20 mn cumulated delays over 10 days
 - Major failure : 1 failure every 2 years
 - Significant failure : 1 failure every 3 years



Target overtaken by Alstom

- Project size :
 - 228 marker boards, 22 signals
 - 101 point machines, 305 Track circuits
 - 753 Compact Eurobalises
 - 18 LEUs
 - 515 elementary routes, 59 work zones

Rotterdam harbour project

Rotterdam harbour line

Delivery date: June 2008

- No implementation of the new infrastructure due to:
 - Existing network complex and supporting busy shunting
 - 25 kV not yet available
 - GSM-R coverage complexity due to many trains
 - Local control of point machine, special equipment
 - Existing traffic control
- Project size:
 - 150 marker boards, 195 signals
 - 235 point machines, 550 track circuits
 - 900 Compact Eurobalises (including 200 switchable balises)
 - 195 LEUs
 - 160 work zones, 1900 elementary routes



Agenda

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ERTMS L2 and Alstom projects

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2nd topic

ERTMS L2 advantages

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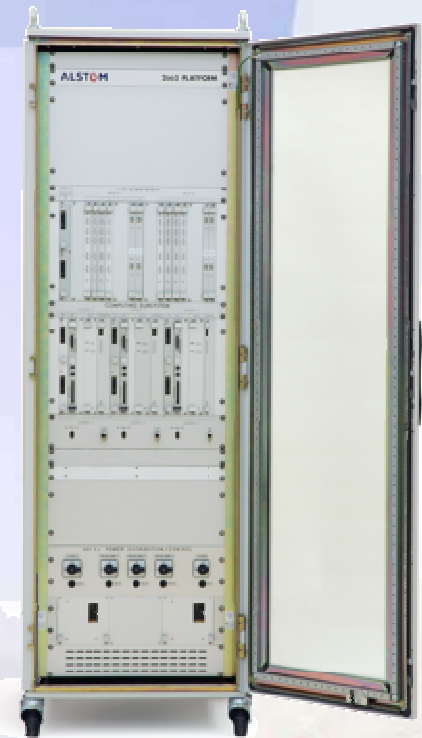


ERTMS Level 2 advantages

- All types of operation:
 - High Speed (e.g. Rome Naples, Turin Navara)
 - Freight (e.g. Betuwe Route)
 - Mixed (e.g. Swiss New Lines- Mattstetten-Rothrist)
- Allows speeds up to 500 km/h (according to specifications)
Balises, Antenna, GSM-R tested at 512km/h on LGV East
- Headway: Increase of performance by > 20 % (down to 2min headway on Swiss New Lines)
- Avoiding mismatch of information between signals and cab display

For new lines and re-signaling projects

- Generates less trackside equipment
- Increases performance allowing more capacity
- Allows to have a JRU (juridical recorder) trackside recording through the RBC
- Provides high RAM performances and decreases significantly vandalism impact



Performance and Life Cycle Costs

For migration and upgrades

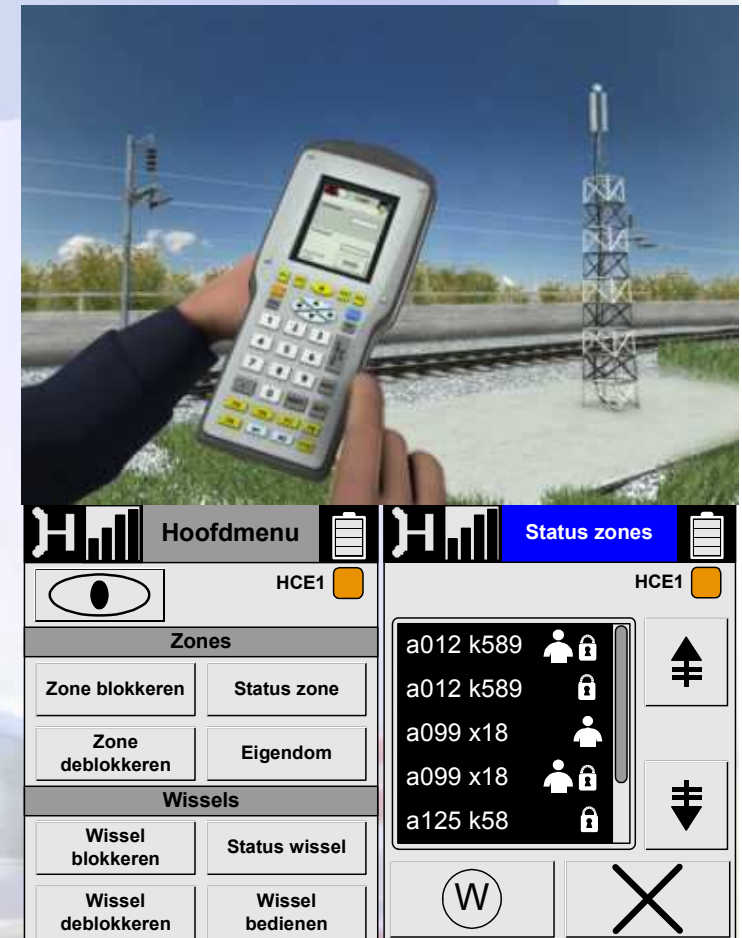
- Offers better upgrading strategies
- Offers more efficient tools for maintenance and personnel protection when working on the tracks
- Offers better management within project implementation and shadow running concept



A15 project maintenance equipment

Alstom exclusivity: the Hand Held Terminal

- Requirements
 - Working personnel protection
 - Efficient maintenance with minimum impact on traffic
- Features and functions
 - Behaves as a remote operator interface to the RBC
 - Provides information on trains location in the nearby
 - Allows to take possession of a track section and to release it in a safe way
 - Connects to the RBC via GSM-R



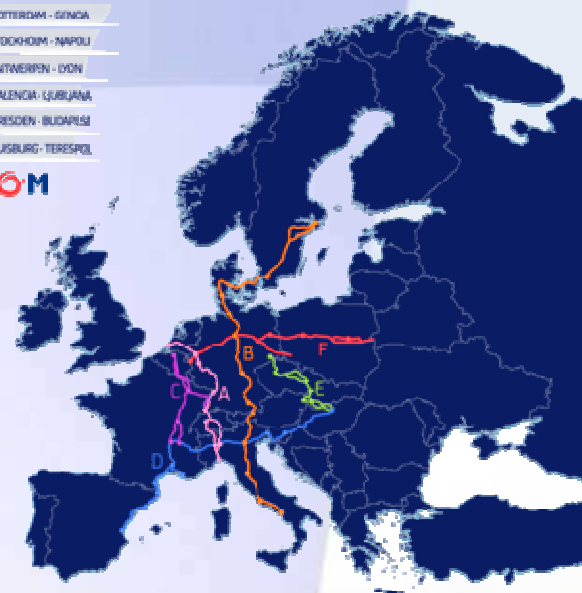
Allows safer and faster maintenance

A common choice

Already significant return on experience from:

- Industry side with several successful projects involving multiple parties
- Operators side with mature operating rules taking the best of the installed solution

... allowing successful deployment along the main corridors



A better common understanding about issues and solutions to interoperability

The background features a dark blue field with intricate white line art. The lines are thin and form a series of overlapping, curved patterns that resemble a stylized, multi-lobed shape or a complex wave. The lines are most dense in the center-left area, where they form a small, bright white square-like shape. From this central point, the lines radiate outwards, creating a sense of depth and movement. The overall effect is that of a digital or scientific visualization.

Questions ?