

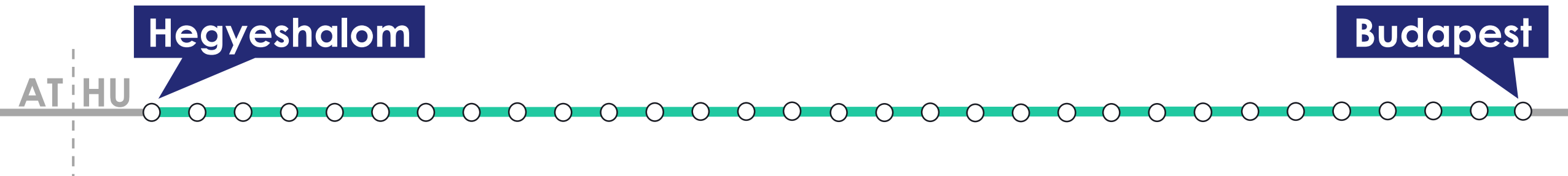
ETCS Level 1 Hegyeshalom – Budapest

Small steps, large
improvements

www.thalesgroup.com

Main facts about line Hegyeshalom – Budapest in Hungary

- ▶ From the Austrian border to Budapest
- ▶ Main line between Hungary and Austria
- ▶ Connection to further international destinations from the west



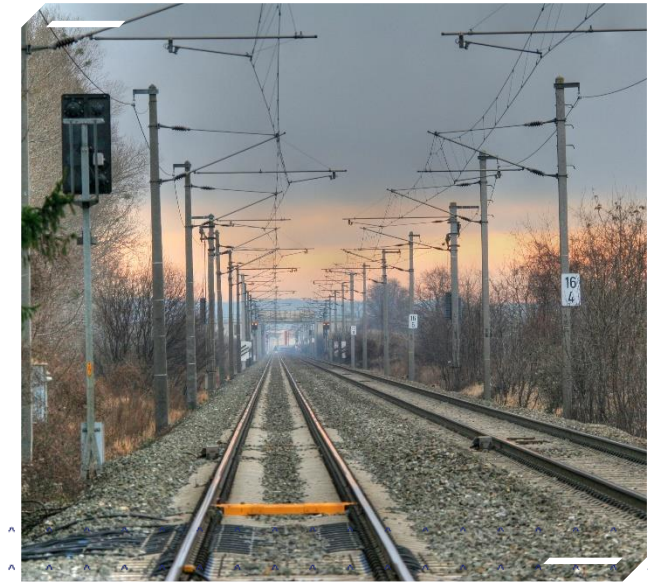
Initial situation

- ▶ Track length: **180km**
- ▶ Between **200 and 300 trains** per day
- ▶ Certain sections **limited** to 100 / 120km/h
- ▶ **Mixed traffic** of ETCS and non-ETCS
- ▶ Passenger and freight trains have to stop at border → **change** of drivers



Currently used train protection systems

- ▶ **ETCS Level 1** on certain sections
- ▶ **National systems**

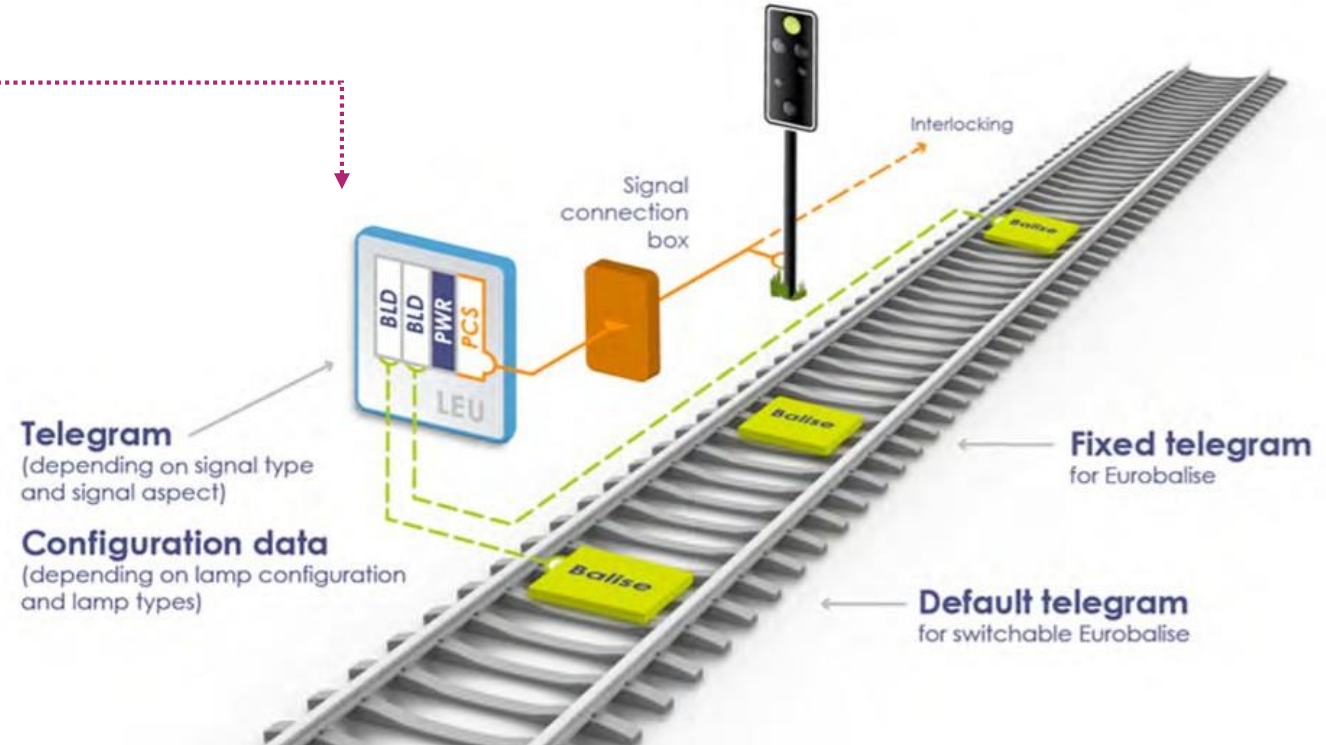


> Additional signalling systems

- ▶ Electronic Interlockings
 - Thales ELEKTRA 1, ELEKTRA 2
- ▶ Relay interlockings
- ▶ Centralized Traffic Control
- ▶ Peripheral Systems
 - E.g. Thales AzLM axle counters

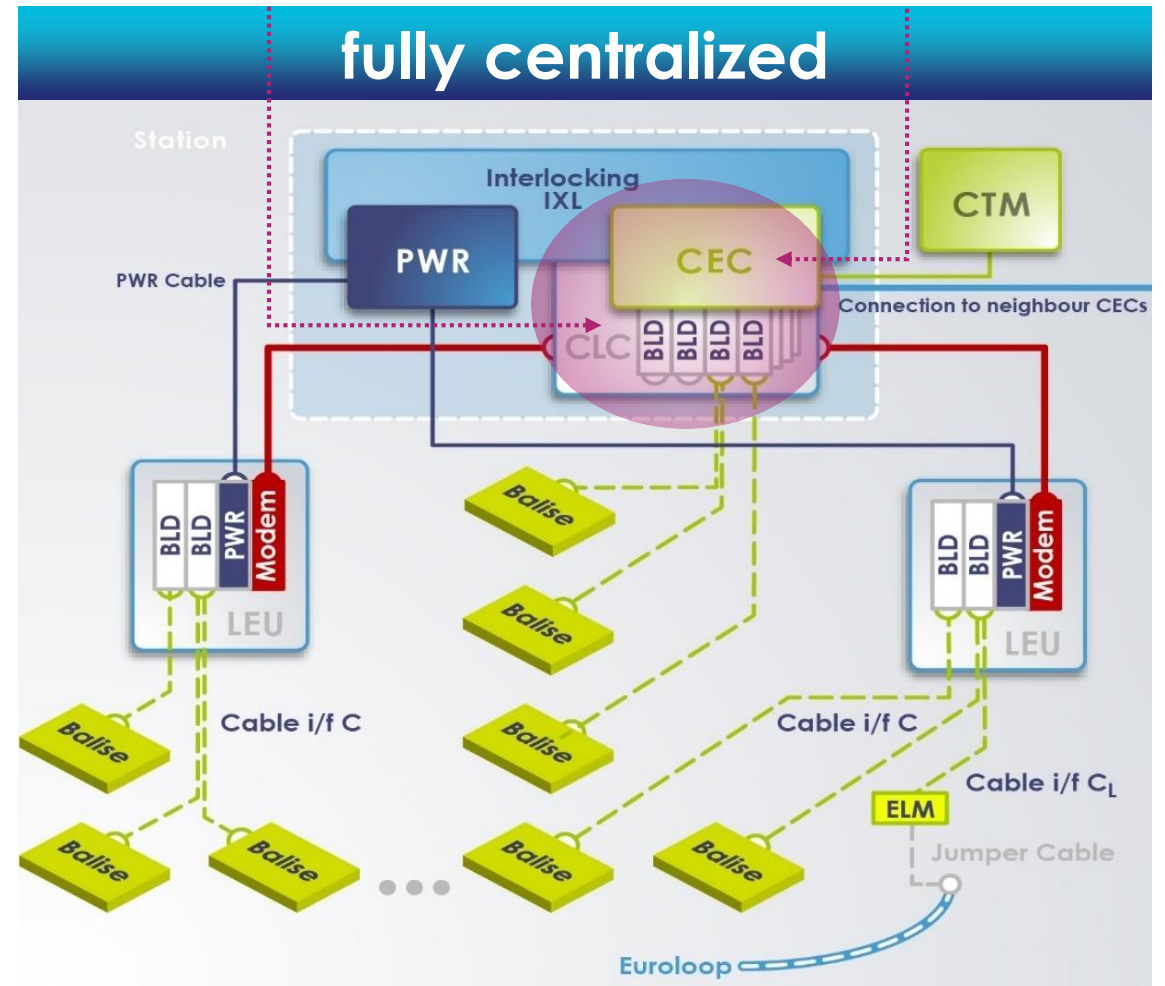
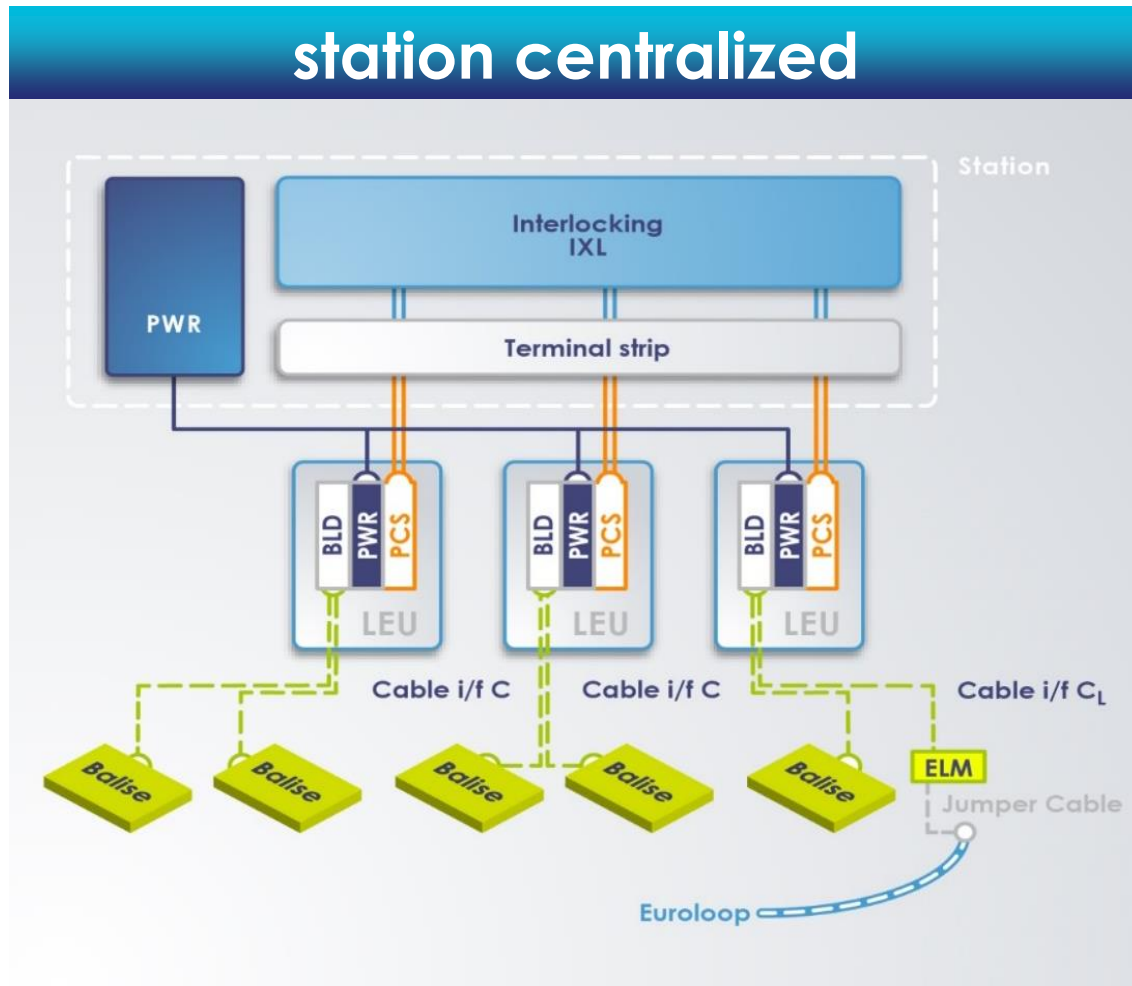
Currently used train protection systems | Focus ETCS trackside

- ▶ LEU solutions on the track
 - **decentralized**
(signal driven)
 - **station centralized**
(signal driven aggregated)
 - **fully centralized**
(direct connection to interlocking)



Currently used train protection systems | Focus ETCS trackside

centralized lineside controller centralized ETCS controller



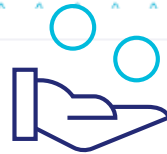
Upgrade plan | ETCS Level 1 on complete line | **Impact and Synergies**



Ensuring high speed line of **constant** 160km/h



Reduced travel time by 10-12 min.
→ Cross-border traffic without stops



Cost efficient solution
→ Use existing trackside equipment (e.g. signals)

Upgrade plan | ETCS Level 1 on complete line | Benefits

- ▶ **Reuse of existing interlocking independently of their technology**
 - Trusted and well functioning relay interlockings
 - Further upgrade of existing interlockings possible

- ▶ **Independent from radio systems**
 - GSM-R obsolescence vs. future FRMCS

- ▶ **High performance through centralisation**

Upgrade plan | Focus ETCS Level 1

New functionalities = assimilation to ETCS Level 2 benefits

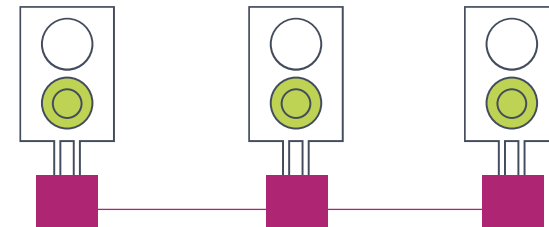
▶ Remote Diagnostics for LEUs

- ✓ LEU status and vitality
- ✓ Signals vitality
- ✓ Remote Maintenance
- ✓ Intuitive control via GUI



▶ LEU Information Coupling

- ✓ Enabling three section Movement Authorities
- ✓ Smooth, fast and eco friendly train operation



Upgrade plan | Train protection system after Upgrade

▶ ETCS Level 1 **on full line**

- NEW** ▶ –Including Remote Diagnostics and LEU Information Coupling
- FUTURE** ▶ –Remote Temporary Speed Restrictions
- FUTURE** ▶ –New FlexLEU

▶ National systems

> Additional signalling systems

- ▶ Electronic Interlockings
- ▶ Relay interlockings
- ▶ Centralized Traffic Control
- ▶ Peripheral Systems

LEU next generation: FlexLEU

Flexible & Modular design



- ▶ **Reduced space requirement**
- ▶ **Remote** diagnostics and management possible
- ▶ **Reduced cables**
 - Future option: GSM-R / LTE / 5G / FRMCS

INCREASED PERFORMANCE



LEU MANAGEMENT
& DIAGNOSIS



LEU COUPLING



REMOTE TEMPORARY
SPEED RESTRICTIONS



Thank you

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