

THALES

# Helping our customers master every decisive moment

Zagreb, 02.10.2019



Over **80,000**  
employees 

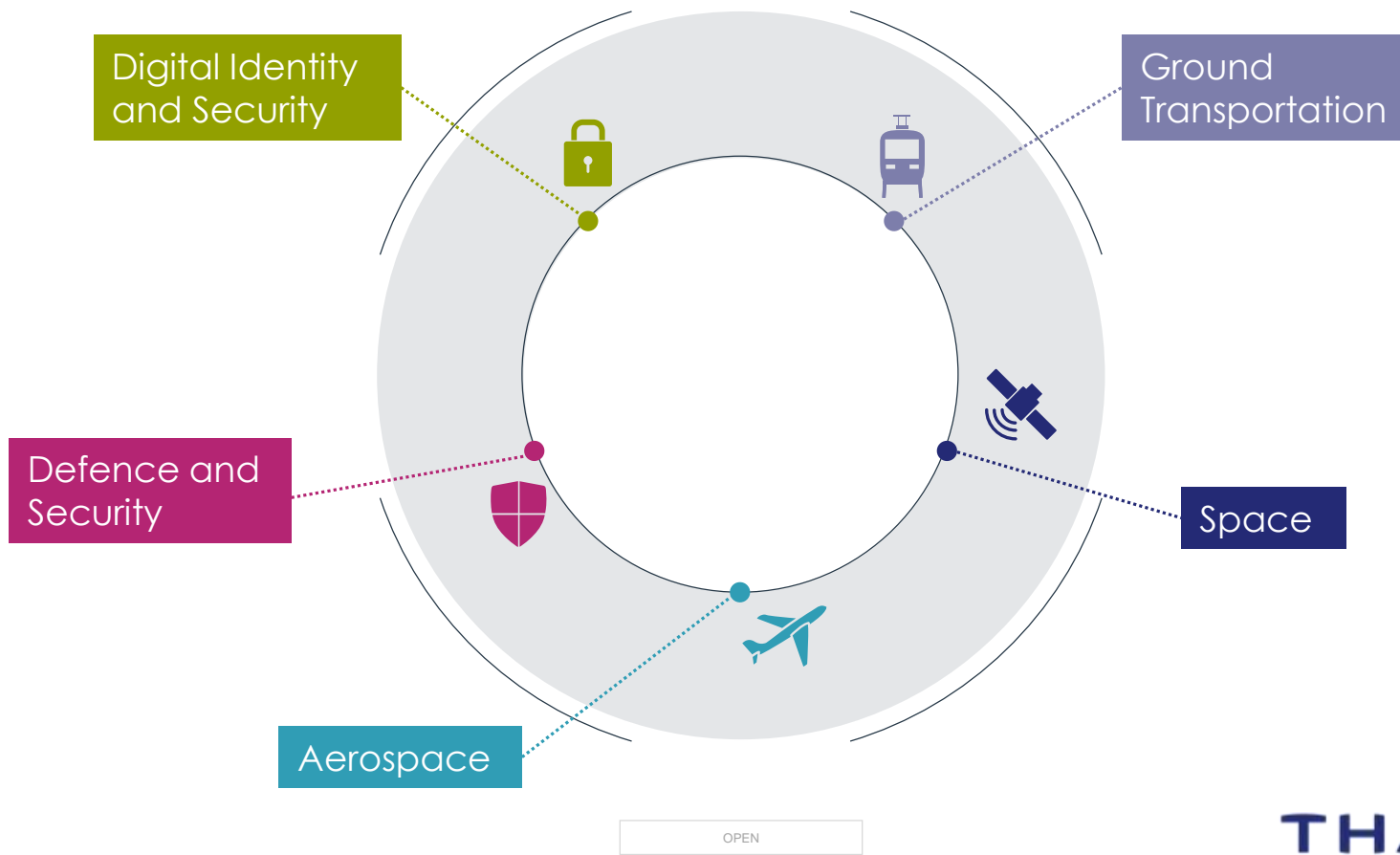
**68**   
Countries  
Global presence

**1 bn €**   
Self-funded R&D\*

\* Does not include externally financed R&D

Sales in 2018   
**19 bn €**

# From the Bottom of the Oceans... to the Depths of Space & Cyberspace



## Altrac 6413 ETCS L1 news

Extension of existing portfolio



# ETCS L1 decentralized

## decentralized ETCS L1 solution

### > advantages:

- Interlocking type independent
- Low cost

### > disadvantage:

- No diagnosis
- Tricky TSR handling
- Information only from one signal



# Centralized solution for relais interlocking

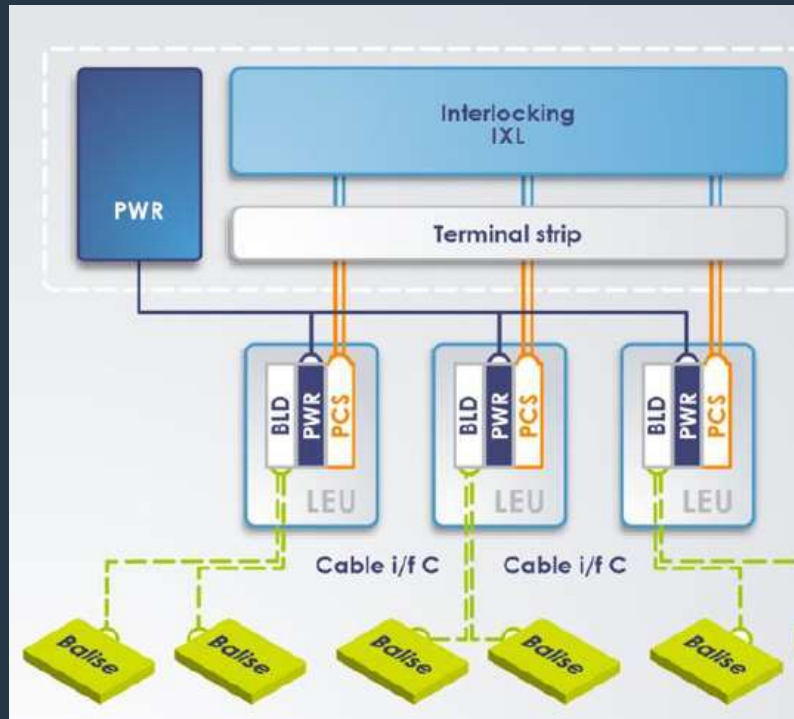
## Centralized ETCS L1 solution

### > Advantages:

- Centralized in interlocking room
- Interlocking type independent
- Combined information from signals and points

### > Disadvante:

- Long balise cables



# Centralized solution for electronic interlockings

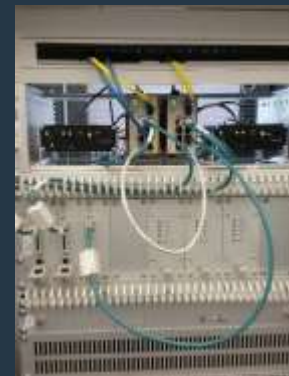
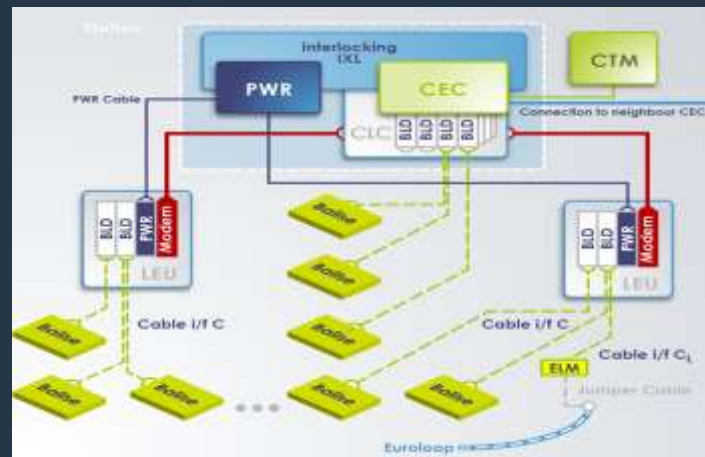
## Centralized ETCS L1 solution

### > Advantages:

- Centralized in interlocking room
- Combined information from signals and points
- higher operative performance
- TSR handling

### > Disadvantages:

- Long balise cables
- High interlocking adaptation costs



# ETCS L1 vs. ETCS L2

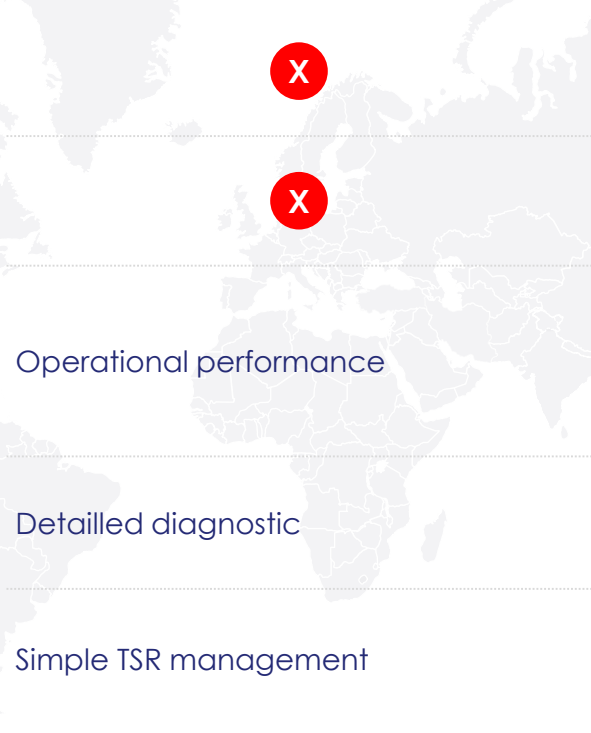
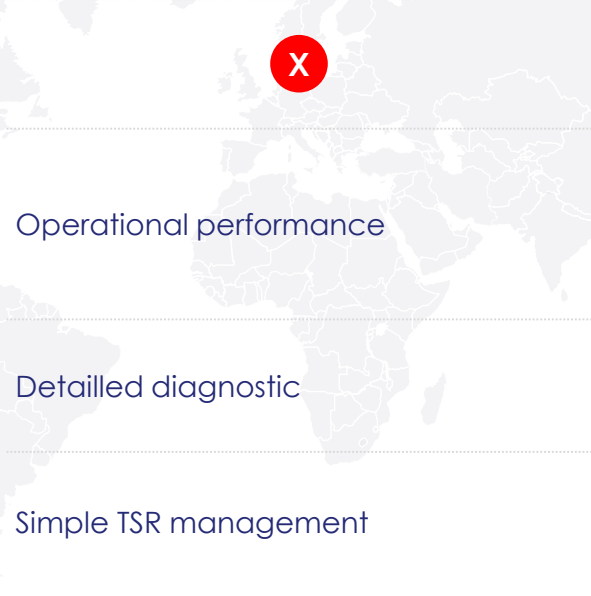



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ETCS L1	ETCS L2	Description
Interlocking type independent	X	No interlocking modification needed; works also with relays and mechanical interlockings
No radio network needed	X	
X	Operational performance	ETCS L1 only has the information from one light signal while ETCS L2 can set rout dependent MAs
X	Detailed diagnosis	No central diagnostic of decentralized LEUs
X	Simple TSR management	TSRs only possible when using additional TSR balises or total change of the data preparation



# ETCS L1 vs. ETCS L2

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ETCS L1	ETCS L2	Description
Interlocking type independent	 X	No interlocking modification needed; works also with release and mechanical interlockings
No radio network needed	 X	
 Operational performance	Operational performance	Improvement of the operational performance, headway improvement, Multi section MA's, routdependent MA's
 detailed diagnostic	Detailed diagnostic	Centralized diagnostic
 Simple TSR management	Simple TSR management	Centralized realtime TSR management