

## ETCS in next generation

Thales solutions:

AlTrac 6413 L1 TSS

AlTrac 6481 L2 TSS


Altrac 6415 L1/2 OBS

24.05.2022, Kosice




# Part of a Global Technology Leader

Over **80,500**  
Employees 

**70**   
Countries  
Global presence

**1 bn €**   
Self-funded R&D\*

\* Does not include externally financed R&D

Sales in 2021   
**16.2 bn €**

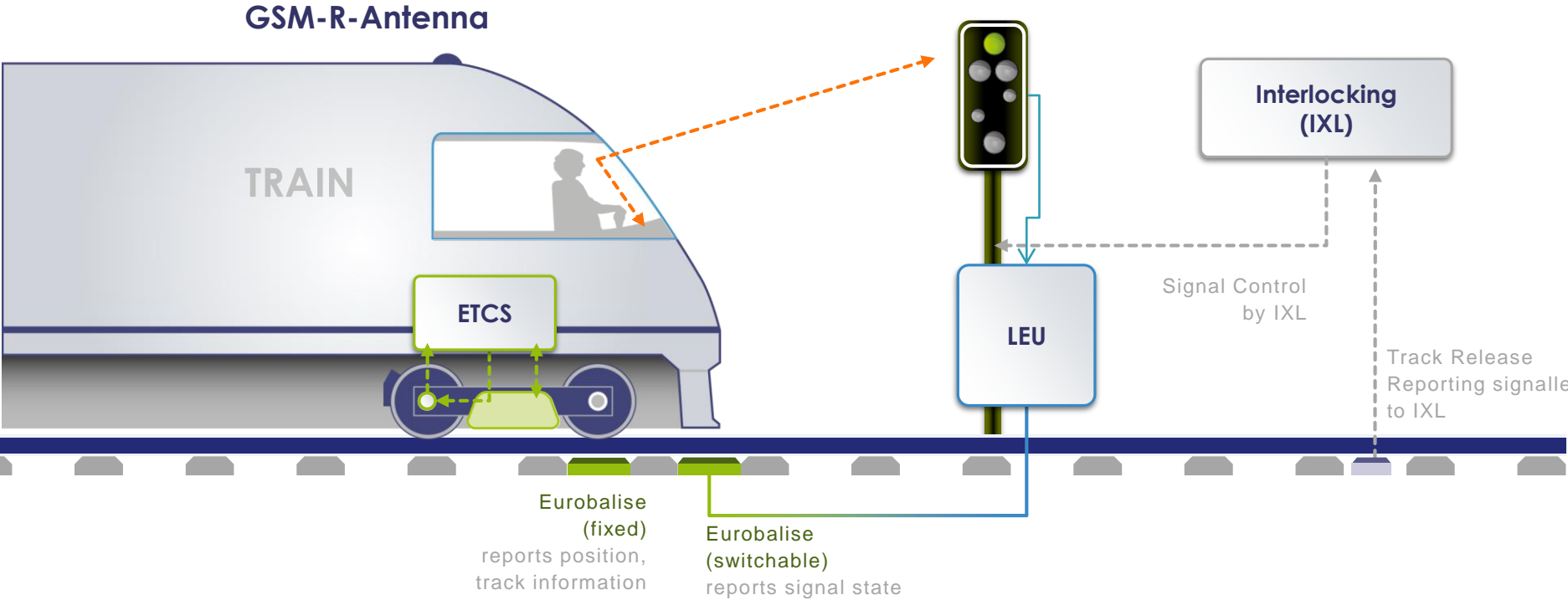
# ETCS challenges



- New requirements more and more complex
- NTR ... specific per country
- Interoperability not used as it was planned
- Technology expensive
- Financing EU and local
- Time schedule for retrofit vehicles
- To many local “specialties”
- Certification process too long
- ETCS as Fail safe too restrictive
- Train driver acceptance

# ETCS L1

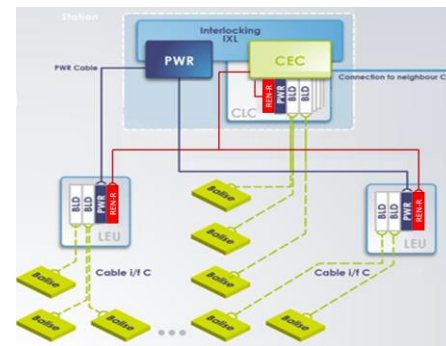
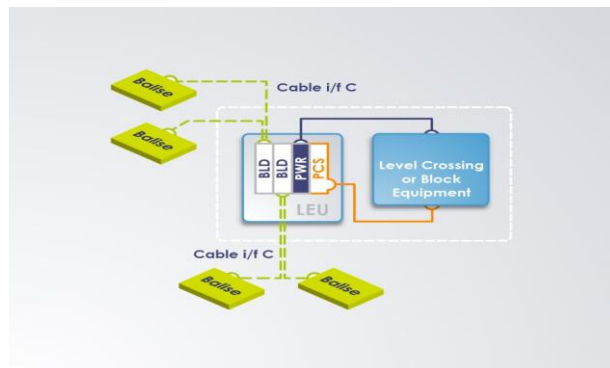
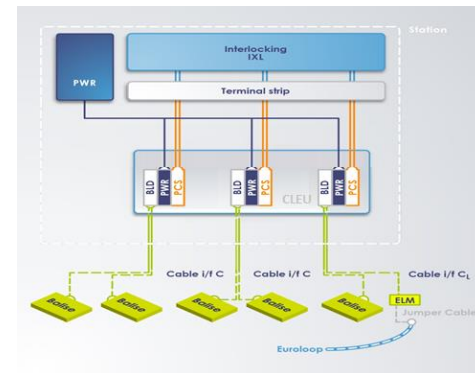
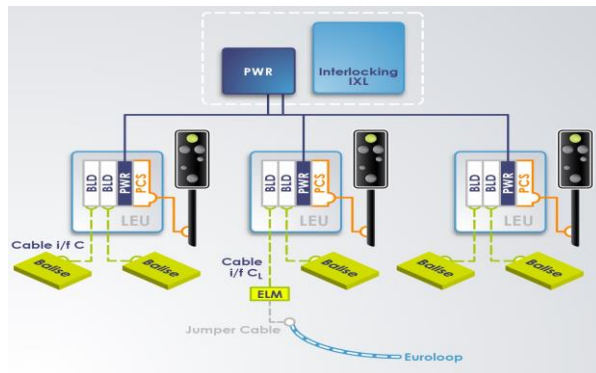
This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.



# Principals ETCS L1

## ETCS L1 TSS - 5 Solutions

- De-Centralized
- Station Centralized
- Centralized
- Special for Block
- Special for Level crossing



# ETCS L1 TSS: Decentralized Portfolio

## LEU Board

### Balise Driver (BD)

Up to 2 balises per BD  
Fully standard compliant → 2,5km balise cable standard (depending on the balise supplier)

### PAB Primary Adaptor Board

Up to 6 signal lamps  
High voltage / low current measurement

### SAB Secondary Adaptor Board

Up to 6 signal lamps  
High current / low voltage measurement

### RAB Relay Adaptor Board

Up to 6 relay contacts (signal)

### PIO Parallel IO Board

Up to 8 digital inputs or 4 safe inputs (antivalent)  
Up to 2 outputs (LEU status, or interconnection of LEUs)

### PSU/PDU Power Supply Unit/Power Distribution Unit



Case dimensions:

height = 600 mm

width = 435 mm

depth = 325 mm



# ETCS L1 TSS: Product Portfolio

## Current Portfolio

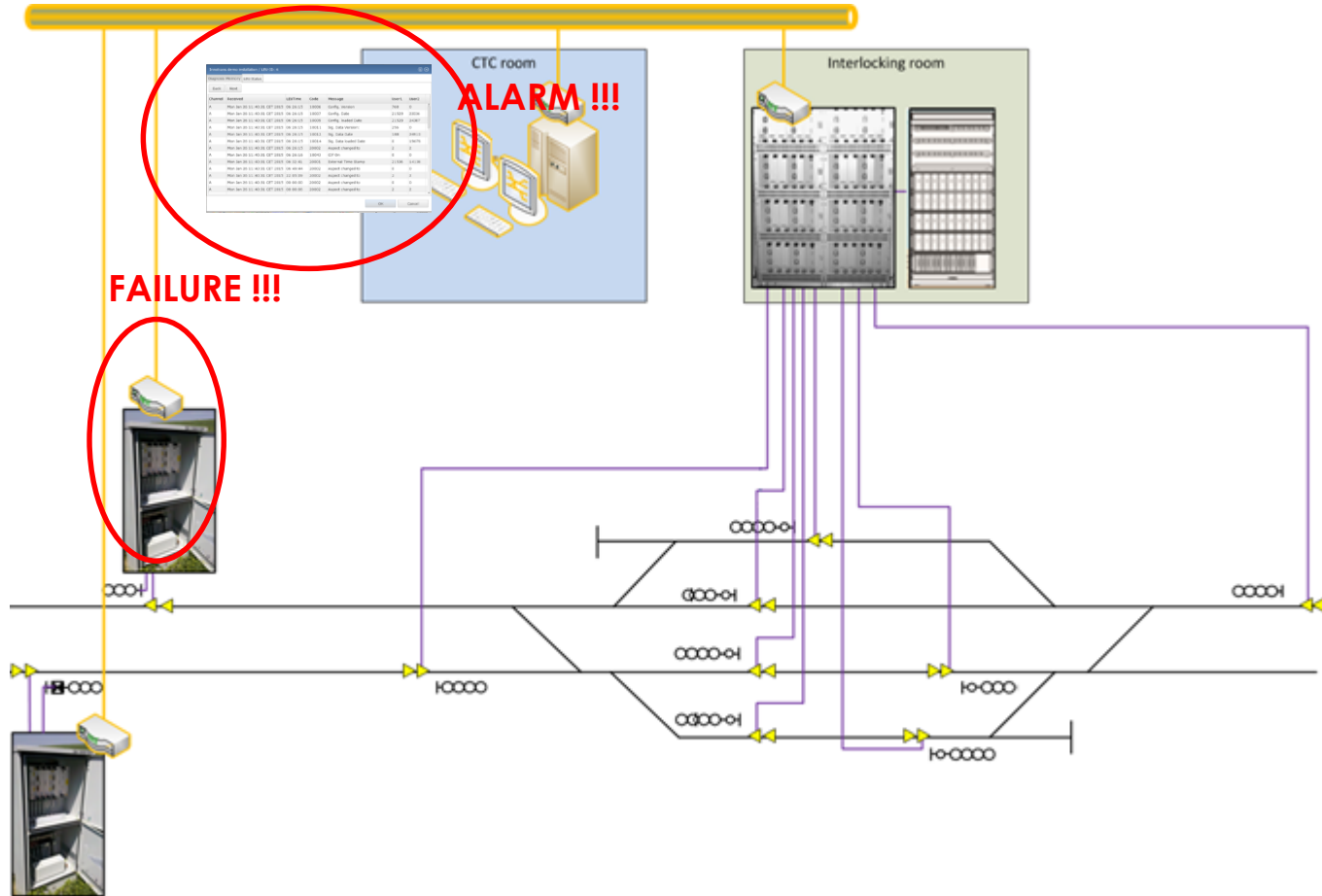
### ➤ Hardware

- Decentralized:
- Station Centralized ETCS L1+
- Centralized Lineside Controller
- Remote Equipment Network
- Data Preparation Tool
- LEU Tools (Maintenance, Installation)





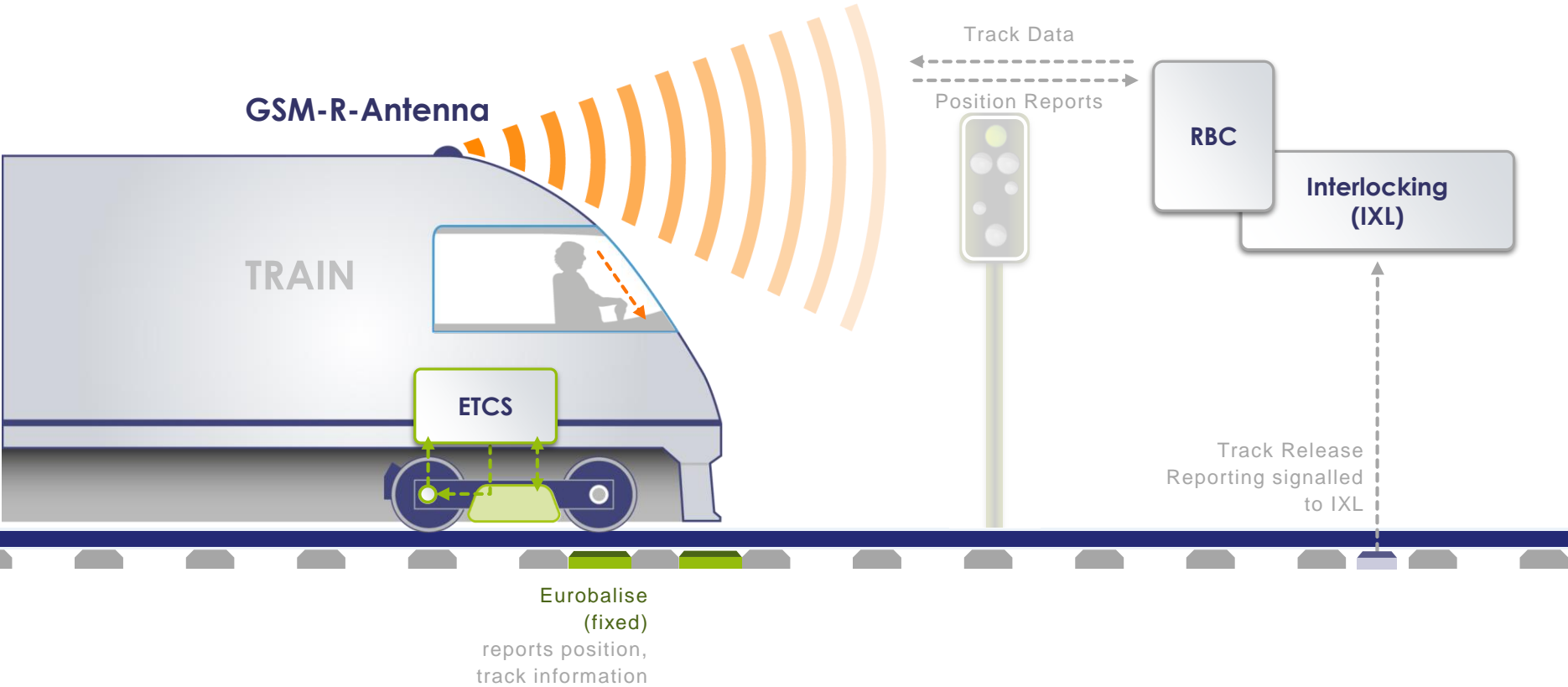
# ETCS L1 TSS: Remote services (TSR, LIC, Diagnosis)



This document may not be reproduced, modified, adapted, published, translated, in any way or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.

# ETCS L2

This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.





- **Newest generation**
- **Automatic train control center**
- **Communication RBC <-> OBS (train) over radio**
- **Protects against unauthorized movements**
- **Automatically stops trains if necessary**
- **Vital part of ERTMS/ETCS**
- **Continuous transmission of track description data and movement authorities to an ETCS onboard unit (OBU)**
- **Up to 10 Interlocking can be connected, supports SCI IXL-RBC**

# ETCS L2 TSS: Thales specific



## Large areas controlled by one RBC (1200-1500 field elements per area)

- for large stations or tracks
- Can help to shift a necessary RBC-RBC handover on a suitable location → flexible design of handover locations

## One RBC can have up to 4 neighbor RBC

## Large number of supervised trains (120); generation of 50 MA /sec for 50 different trains

## 120 s / 90 s headway (depends on velocity and number of trains)

## Powerful possession management capabilities

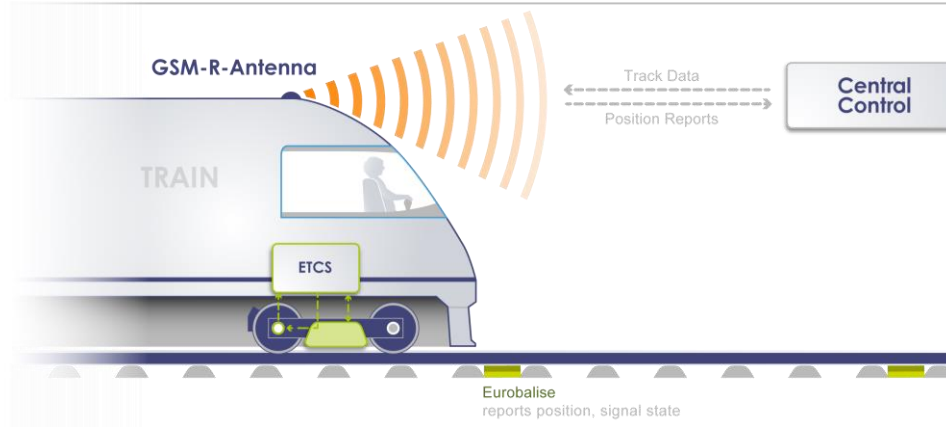


## High availability ; preventive free maintenance

### Under development:

- Cluster RBC for (nearly) for zero down time availability and geo-redundancy (hot redundancy)
- Dynamical update of engineering data:
  - powerful construction level management
  - online topology changes
  - Powerful migration capabilities (change ETCS Level 2 border into NRBC border a.s.o.)

# ETCS L3 TSS: Thales specific

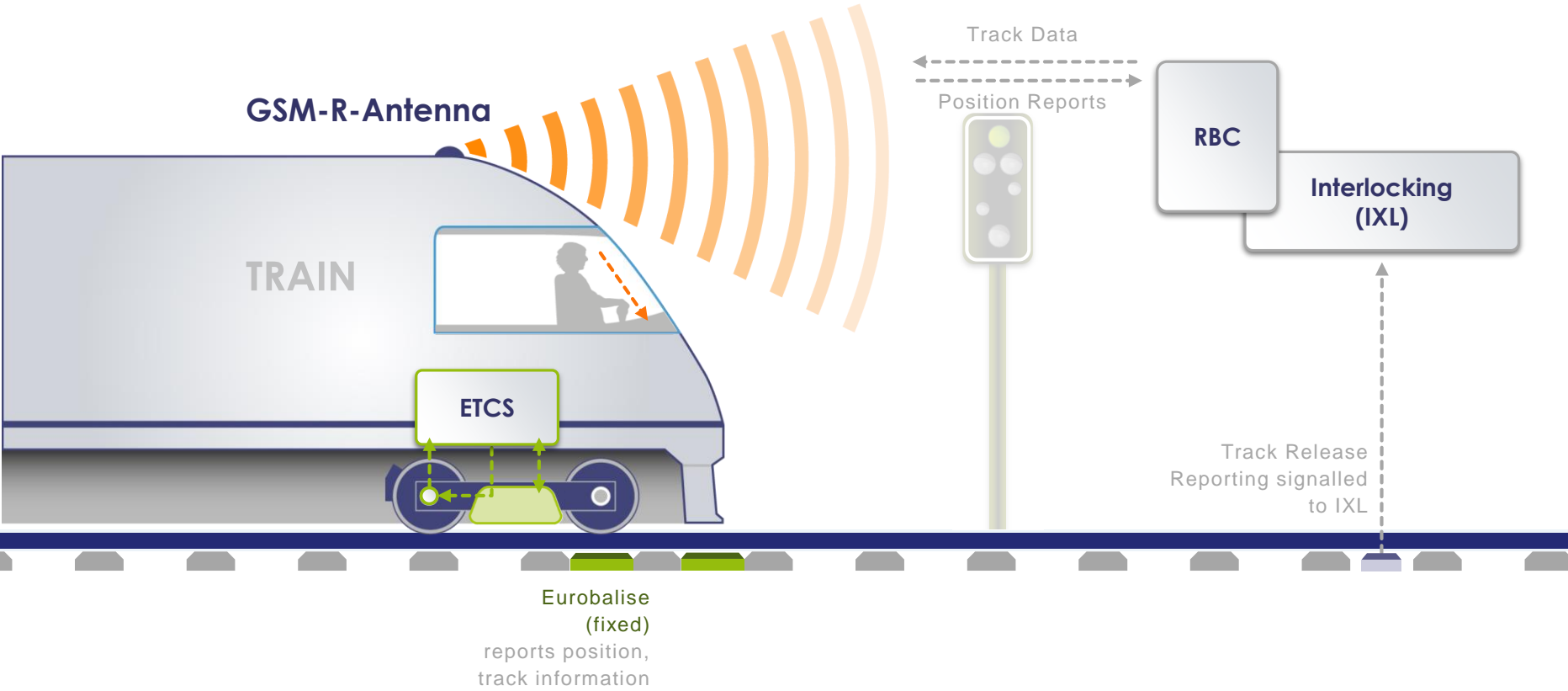


## Virtual fixed block (ETCS Level 3)

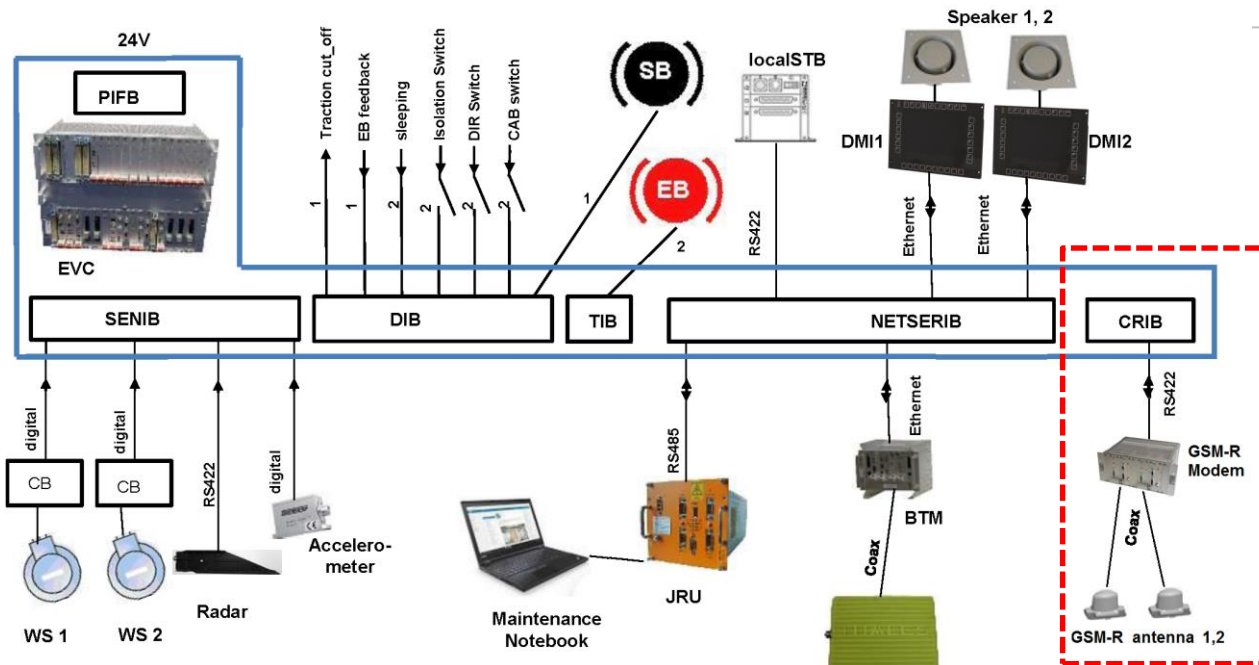
- Easy migration concept to shift from ETCS L2 to ETCS L3 virtual fixed block (together with Thales IXL)
- Based on Hybrid Level 3 concept of EUG
- Track can operate as pure Level 2 or with L3 virtual blocks (Scenario in Europe: day traffic with L3 equipped Trains, night traffic freight trains without Level3 Equipment)

# ETCS L2 - OBS

This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.

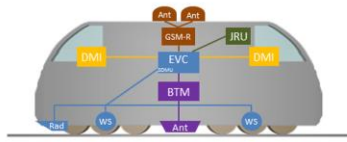


# ETCS L1/2 OBS Overview – Loco with 2 Cabs



**GSM-R is needed for L2 operation  
(Not included in pure L1 solution)**

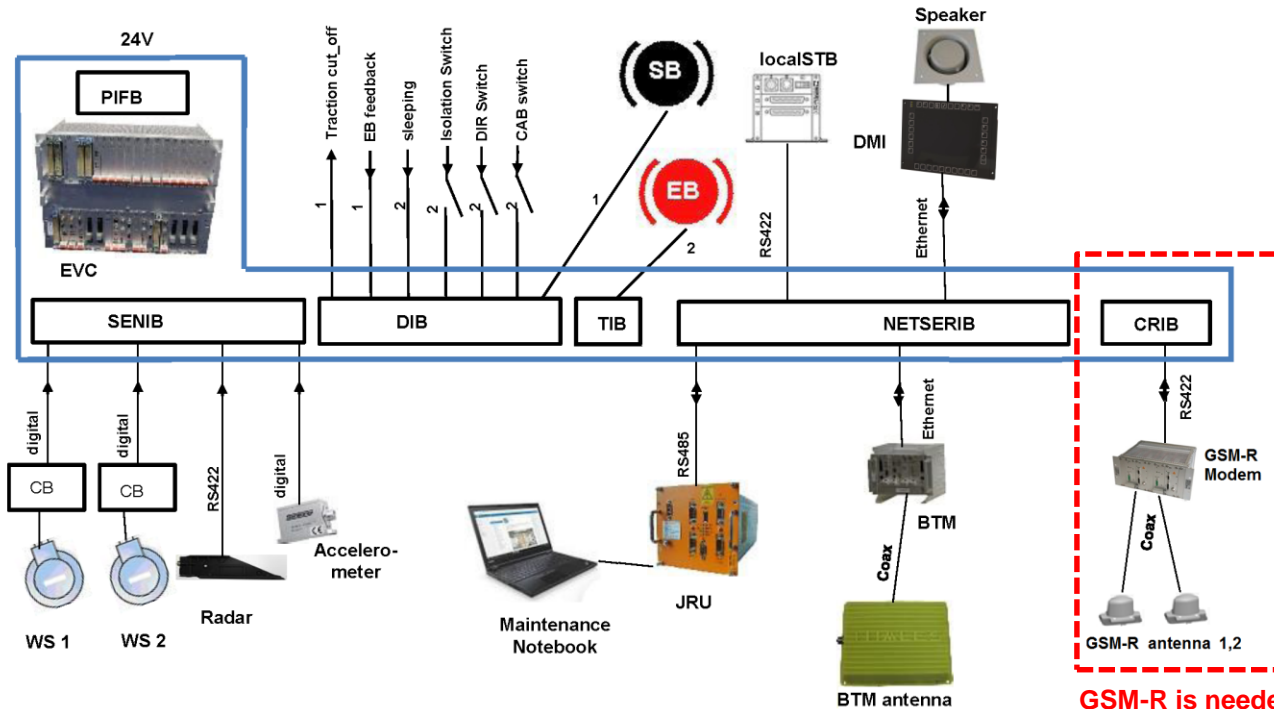
CB	connection box
SENIB	Sensor Interface board
PIFB	Power input Filter Board
SB	Service Brake
EB	Emergency Brake
TIB	Train Interface Board
CRIB	Crypto Radio Interface Board
NETSERIB	Network Interface Board
DIB	Digital Interface Board



OPEN

This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.

# ETCS L1/2 OBS Overview – Splittable Trainset / Loco with single Cab



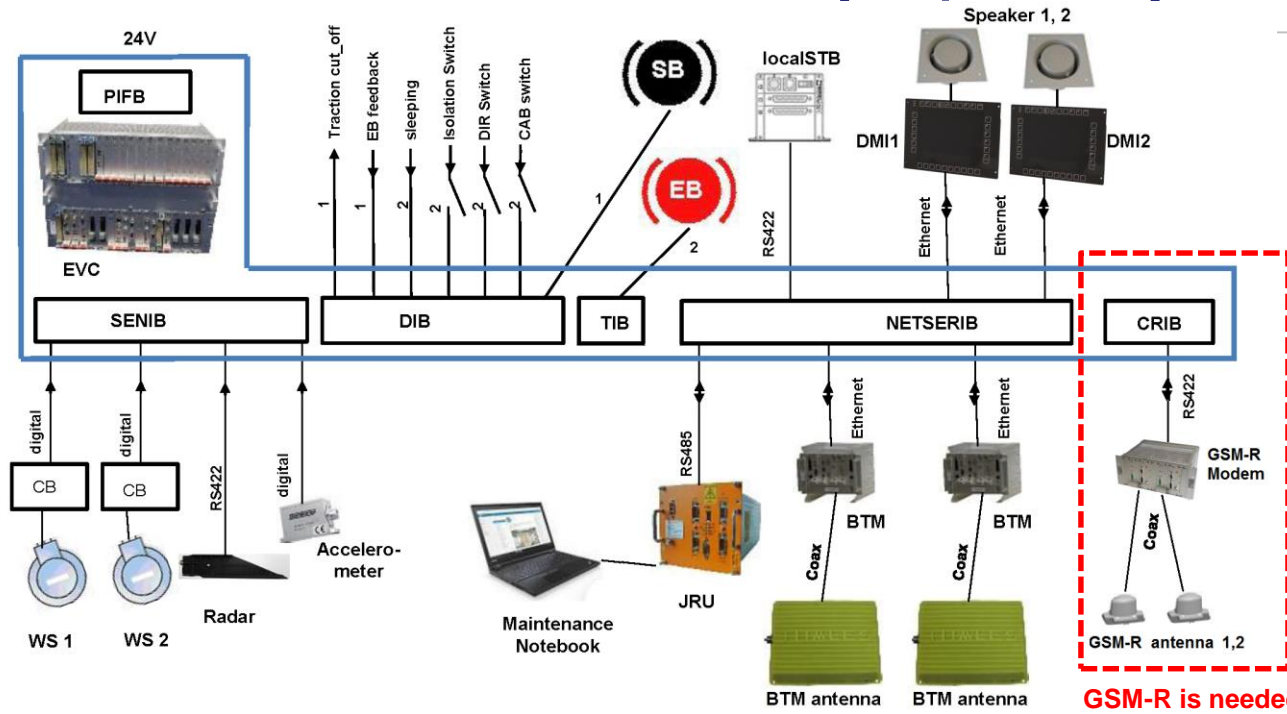
**GSM-R is needed for L2 operation  
(Not included in pure L1 solution)**

CB	connection box
SENIB	Sensor Interface board
PIFB	Power input Filter Board
SB	Service Brake
EB	Emergency Brake
TIB	Train Interface Board
CRIB	Crypto Radio Interface Board
NETSERIB	Network Interface Board
DIB	Digital Interface Board



OPEN

# ETCS L1/2 OBS Overview – Fixed Trainset (unsplittable)



**GSM-R is needed for L2 operation (Not included in pure L1 solution)**

CB	connection box
SENIB	Sensor Interface board
PIFB	Power input Filter Board
SB	Service Brake
EB	Emergency Brake
TIB	Train Interface Board
CRIB	Crypto Radio Interface Board
NETSERIB	Network Interface Board
DIB	Digital Interface Board



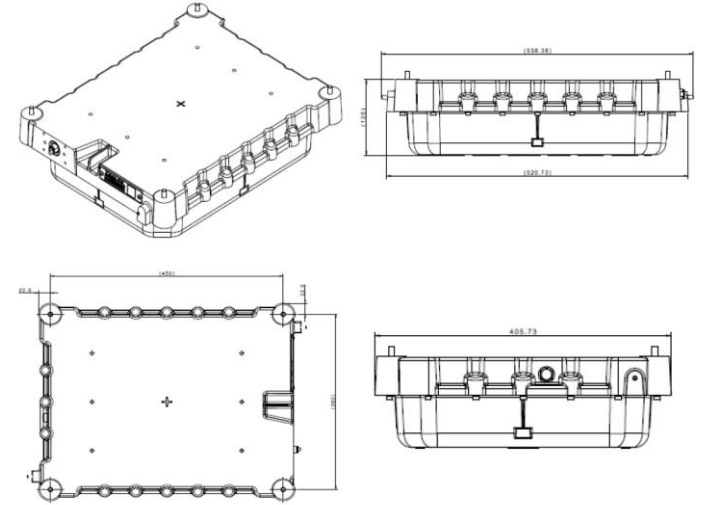
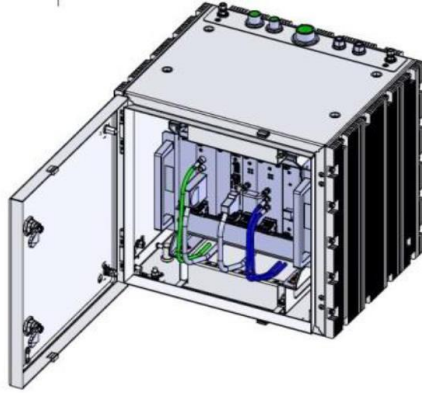
OPEN

This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.

# ETCS L1/2 OBS / Seperate components / f.e. BTM + Antenna

## 5.1.2.2 Balise Transmission Module (BTM)

The Balise Transmission Module (BTM) with cabinet is installed within the EVC Rack.



Mechanical characteristics BTM electronic rack with cabinet

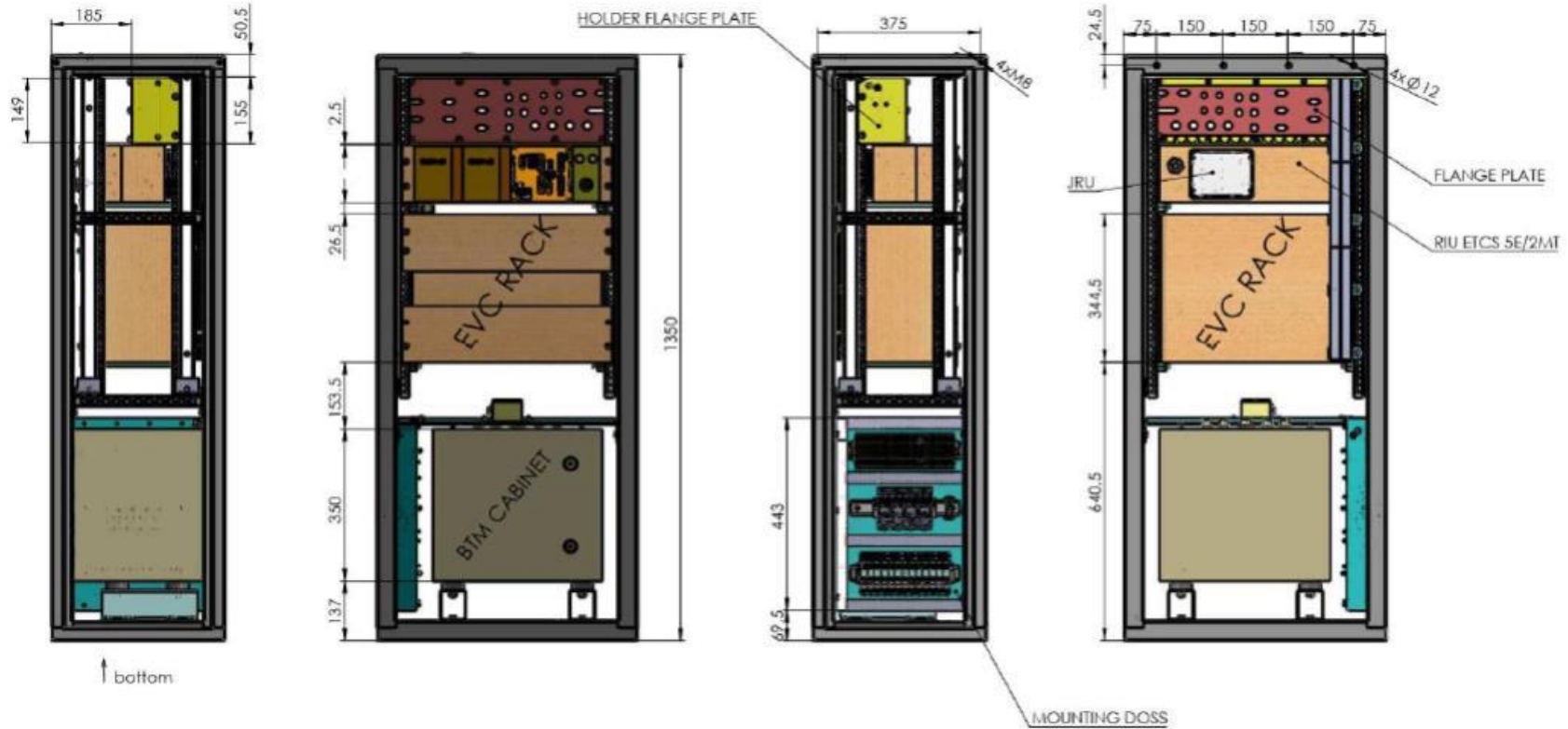
Width	271.16 mm
Height	242 mm
Depth	248.5 mm
Weight	21 kg
Protection Class	IP65

Mechanical characteristics

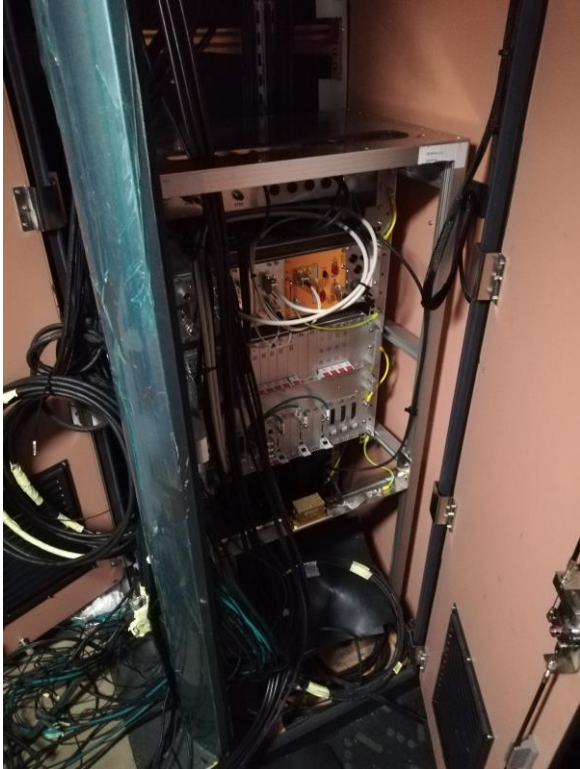
Width	496 mm
Height	125 mm
Depth	406 mm
Weight	10 kg
Protection Class	IP67

# ETCS L1/2 OBS Centralized Rack (EVC, BTM, JRU, Relays and Connectors)

This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.



# Centralized Rack – Leo Express example



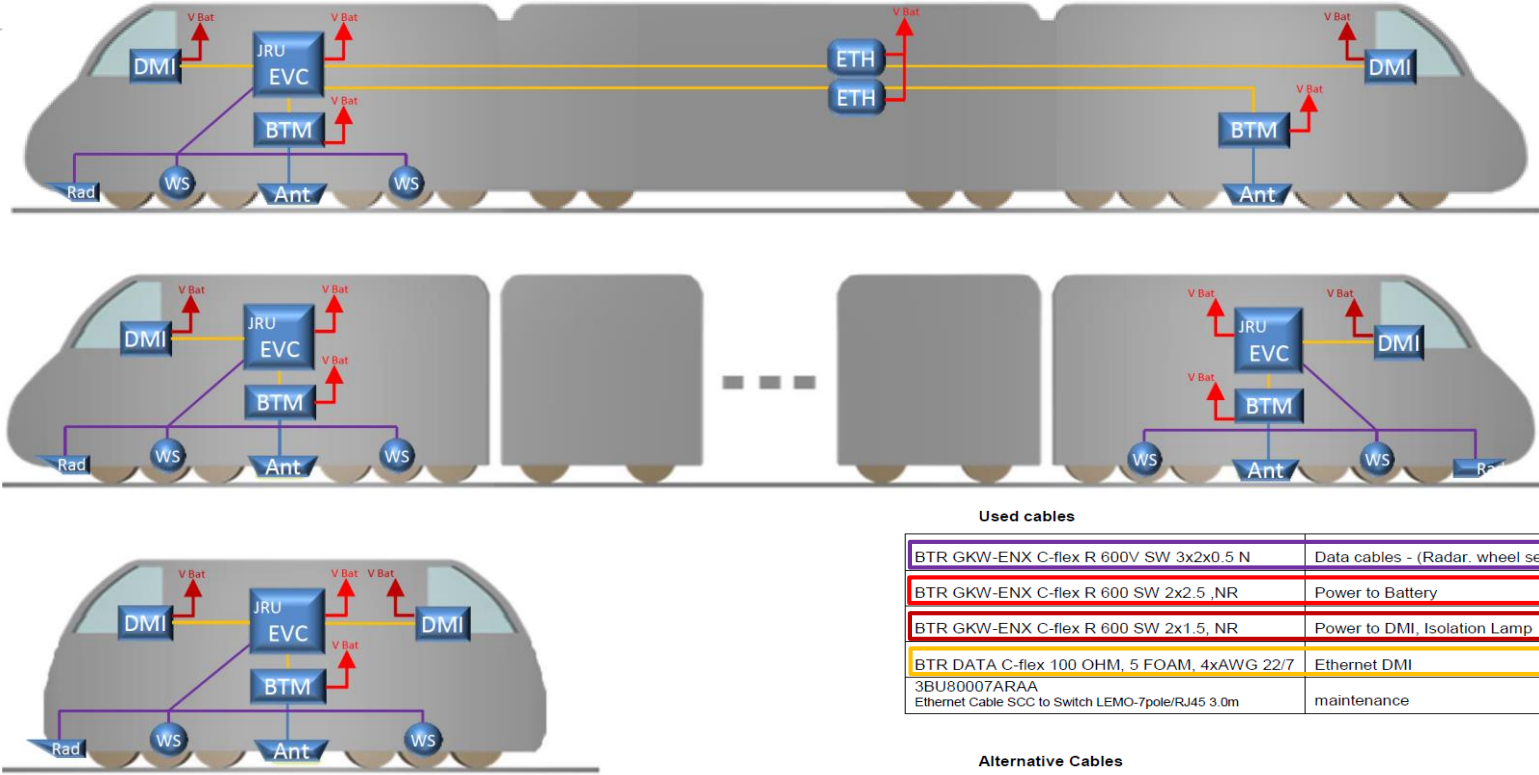
This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.

# Centralized Rack – Redline Thailand example

This document may not be reproduced, modified, adapted, published, translated, in any way, in whole or in part or disclosed to a third party without the prior written consent of Thales - © Thales 2017 All rights reserved.



# Used Cables (EMU, DMU and Loco)



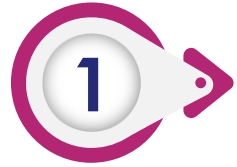
Used cables

BTR GKW-ENX C-flex R 600V SW 3x2x0.5 N	Data cables - (Radar, wheel sensors, valves)
BTR GKW-ENX C-flex R 600 SW 2x2.5 ,NR	Power to Battery
BTR GKW-ENX C-flex R 600 SW 2x1.5, NR	Power to DMI, Isolation Lamp
BTR DATA C-flex 100 OHM, 5 FOAM, 4xAWG 22/7	Ethernet DMI
3BU80007ARAA Ethernet Cable SCC to Switch LEMO-7pole/RJ45 3.0m	maintenance

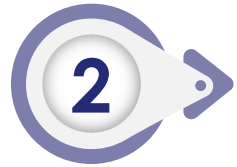
Alternative Cables

BTR GKW-ENX C-flex R 600 SW 2x2.5, NR	Power to DMI
BTR GKW-ENX C-flex R 600V SW 3x2x0.5 N	Isolation Lamp (LED 20mA)
BTR DATA C-flex 100 OHM, 5 FOAM, 4xAWG 22/7	
BTR GKW-ENX C-flex R 600 SW 2x2.5 , NR	

\* Connectors and relay/connection boxes are not shown in this cabling overview



Full portfolio for ETCS L1, L2 and L3 and conformity to TSI



Worldwide competence and reference



Many specific and “addons” (f.e. Automatic train control)

Many thanks for your attention

