

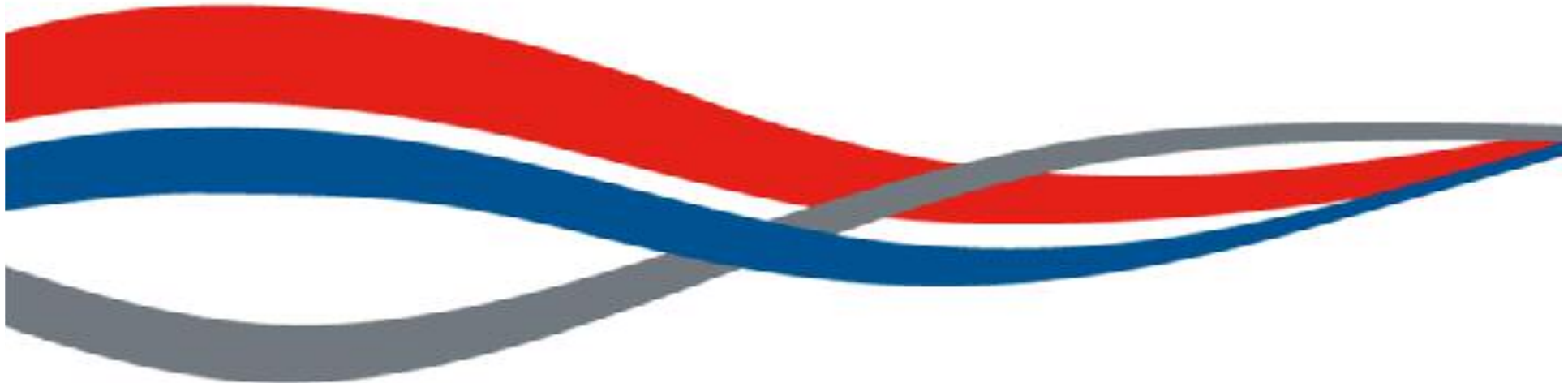
# *Evolution of Train Control System*

*IRSE Seminar 26<sup>th</sup> October 2010*

*New Delhi*

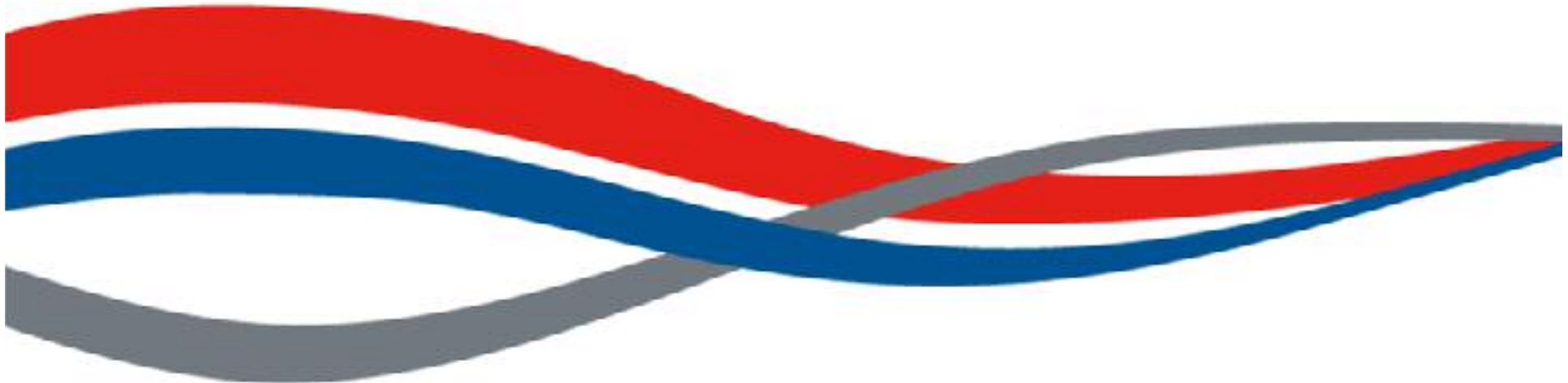
*Francesco Inzirillo*

*Bijoy Das*



# Goal of Presentation

- **Overview of Ansaldo STS**
- **Ansaldo STS: ERTMS**
- **Ansaldo STS: CTC/TMS**
- **Ansaldo STS: CBTC**



# Overview of Ansaldo STS

Ansaldo STS Worldwide Presence

- ✦ 4 200 Employees
- ✦ Present in 28 countries



3  
★ Headquarters

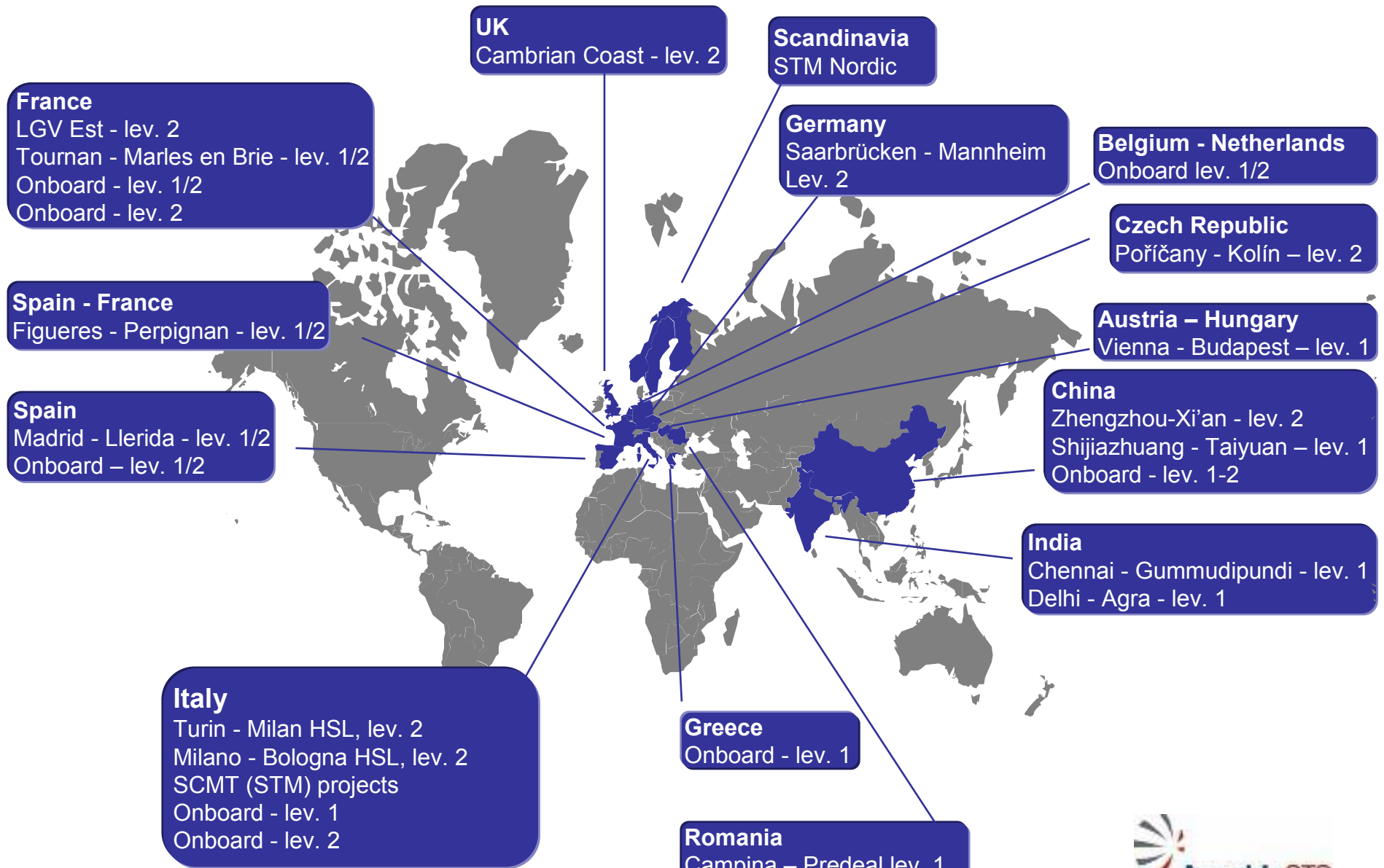
● Regional leader company

● Offices

● Factory



# Ansaldo STS: ERTMS



# Ansaldo STS: ERTMS

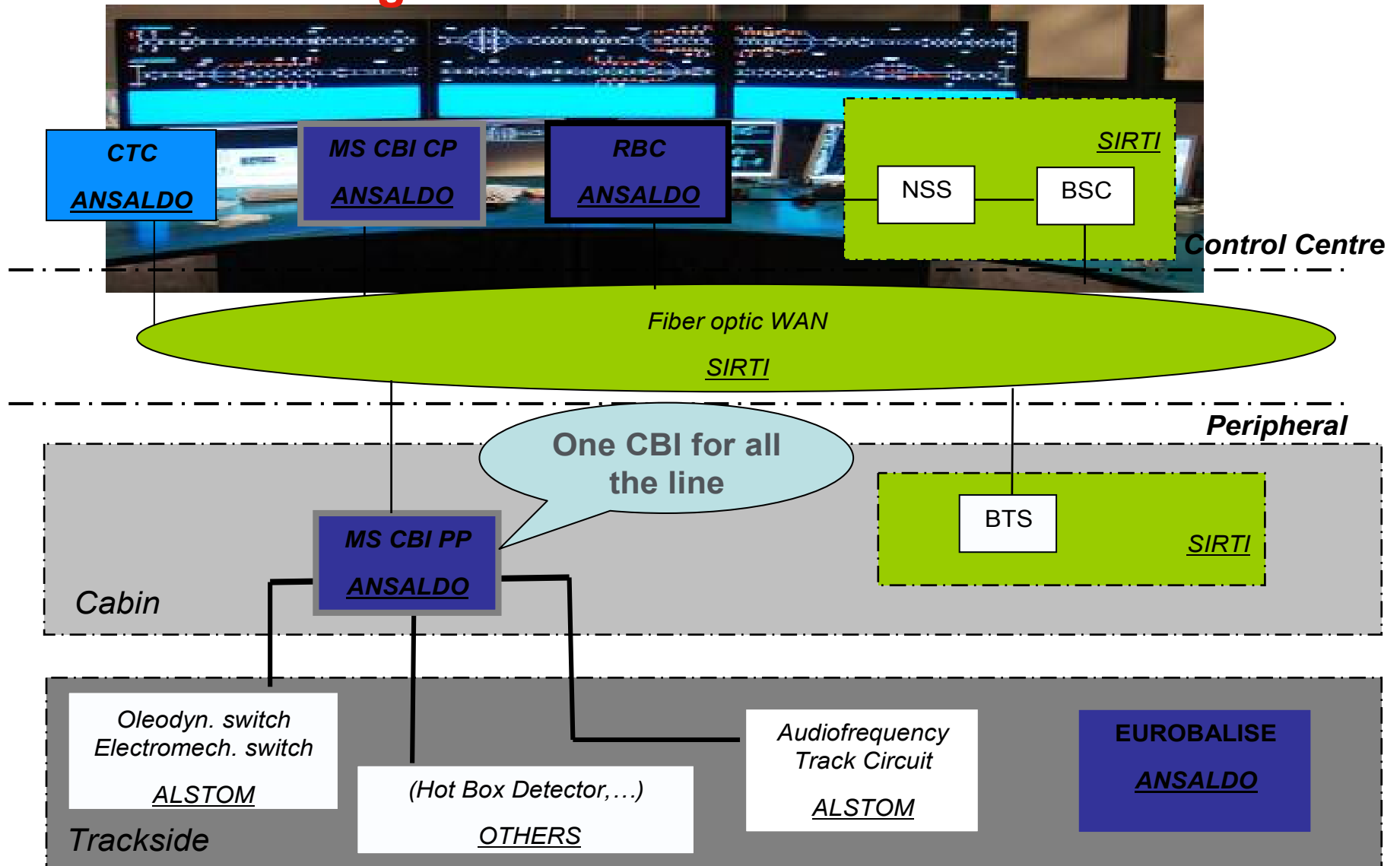
- Ansaldo STS has been actively involved in the ERTMS segment in Europe, India, Korea, and Libya.
- The ERTMS applications delivered by Ansaldo STS include ERTMS level 2 based high speed lines with no optical signals, to applications which have been interfaced with existing ATP systems in operation, to applications involving national functions as in CTCS in China and TPWS in India.

# Ansaldo STS: ERTMS

## Highlight from ASTS

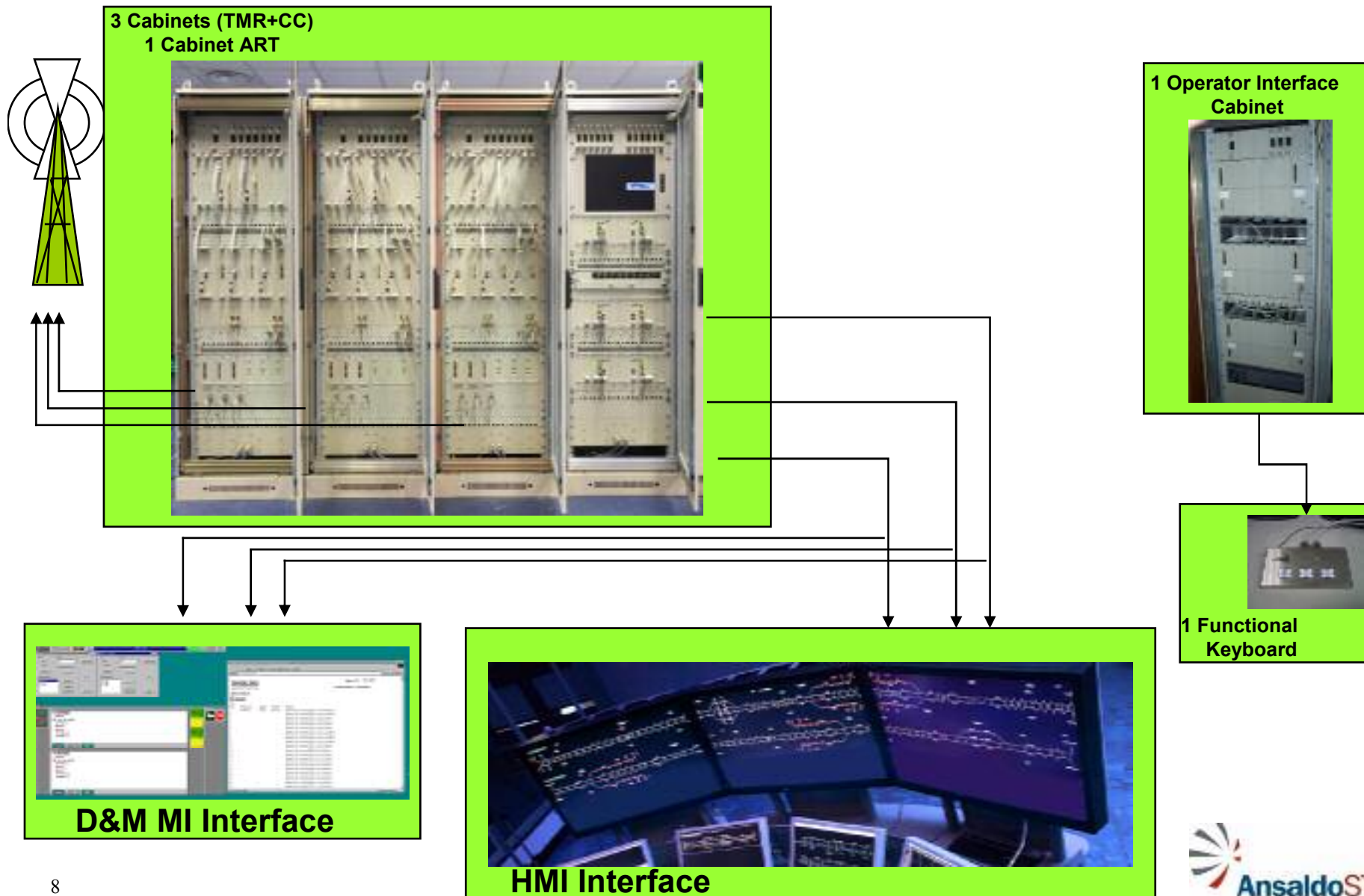
- ERTMS/ETCS Level 1 and Level 2
- No light signals for Level 2 - Fixed signals along the line and in the stations
- 350 km/h max speed
- Headway 2.5 min
- Solution with centralised CBI or distributed CBI
- System integrated with TVM or SCMT
- System interfaced with STM (KVB, LZB/PZB, ZUB)
- STM according to the standard FFFIS STM
- Provides MMI interface for LZB/PZB, TBL, TBL2 and ATB

# HSL Milano-Bologna – Detailed Architecture



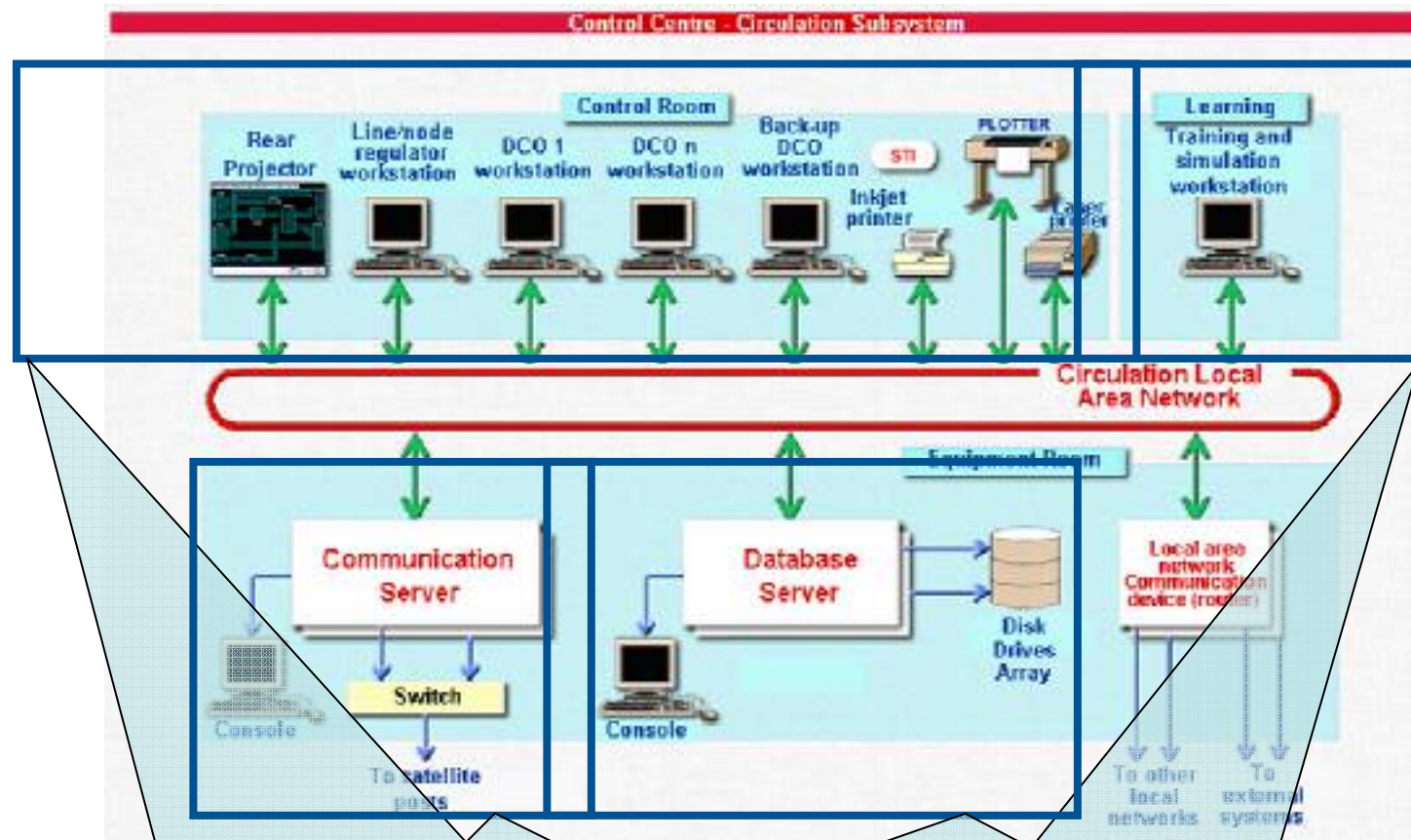
# Ansaldo STS: ERTMS

## RBC Product – (Example of 3 RBC Milano-Bologna)



# Ansaldo STS: ERTMS

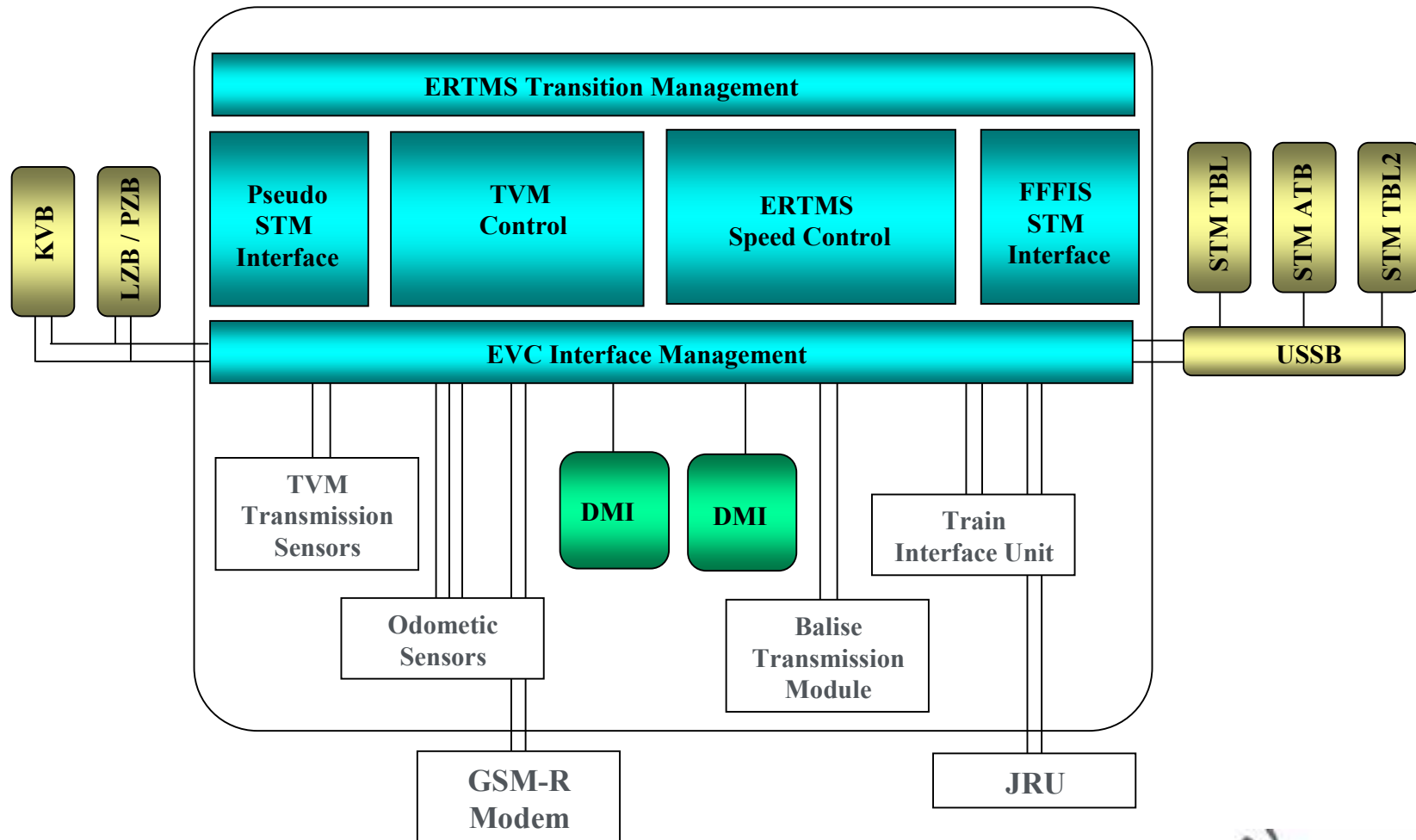
## TMS Control Centre Hardware Architecture



Control Room provides Training and simulation workstation with Operator's Projector. Communication Servers in redundant configuration need for your daily activity.

# Ansaldo STS: ERTMS

## EVC Structure and Interfaces



# Ansaldo STS: CTC/TMS

ASTS has vast experience in CTC system base on two architectures

- MICROLOK
- ACC/SCC

MICROLOK is a simple solution for small/simple stations and useful for big station too.

ACC/SCC is a new architecture for managing big stations and contains integrated functions

# Ansaldo STS: CTC/TMS Proven Experience



Parma-La Spezia (Piza)

Commissioned 2004



Empoli-Siena (Siena)

Commissioned 2005



Caserta-Foggia (Naples)

Commissioned 2006



Bivio-Rosales (Cantu)

Commissioned 2007



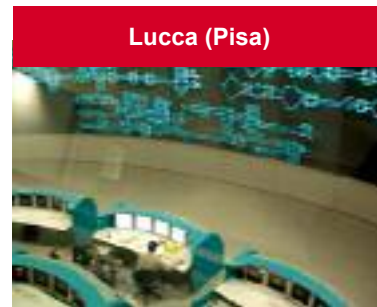
Arezzo (Arezzo)

Commissioned 2009



Borgomanero (Turin)

Commissioned 2009



Lucca (Pisa)

Commissioning 2010



Battipaglia-Potenza (Naples)

Commissioning 2010



Tunis Banlieau (Tunis)

Commissioning 2010



Ghaziabad-Kanpur (India)

Commissioning 2010



Mersin-Toprakkale (Turkey, Adana) (Turkey, Keyseri)

Commissioning 2010 & 2011



Ras Ajdir-Tripoli-Sirth (Tripoli)

Commissioning 2012

# Ansaldo STS: CTC/TMS SCC application Proven Experience



Commissioned 2002



Commissioned 2002



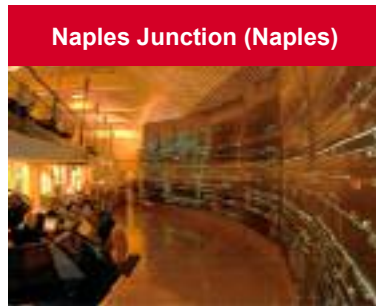
Commissioned 2002



Commissioned 2003



Commissioned 2003



Commissioned 2003



Commissioned 2004



Commissioned 2005



Commissioned 2005



Commissioned 2005



Commissioned 2005



Commissioned 2005

# Ansaldo STS: CTC/TMS

## Customer Requirements

In the evolution of the CTC the generic requirements that are requested from customers for main line are the following:

- a system which has minimal reliance on trackside and other field based infrastructure;
- reducing dependency on Maintenance Staff in Stations;
- Centralised Safe working system with central post performing the IXL, MA & CTC functions;
- no of partial train detection systems in the line;
- limited Radio coverage;

# Ansaldo STS: CTC/TMS

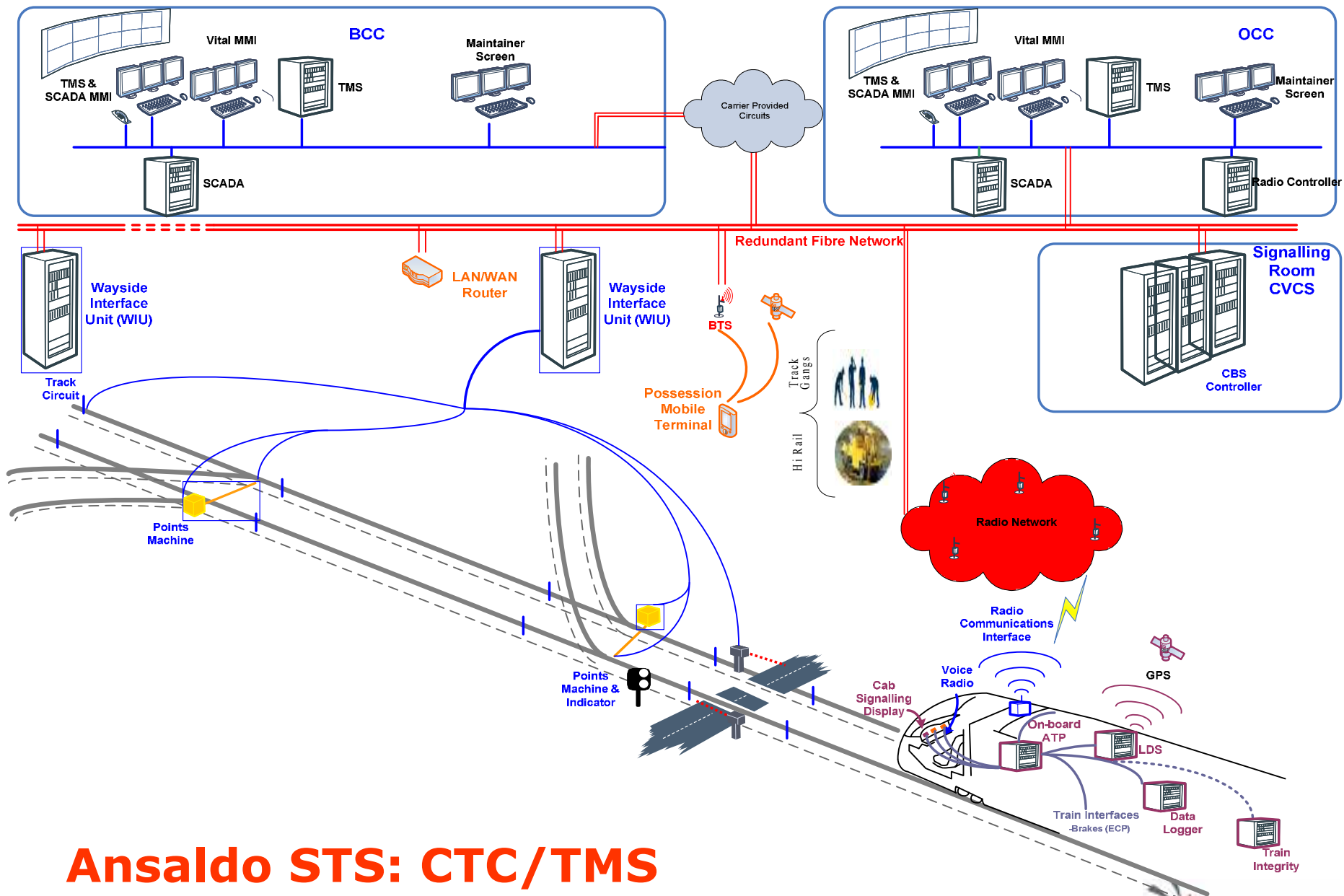
## Customer Requirements cont.

- communication between the central post & field devices by radio or by cable, if present;
- use of radio system other than GSM-R;
- interoperability between Low/Medium density lines and high density lines;
- fall-back by Rules and Regulations;
- reduction in O&M costs;
- a system which uses open systems architecture to provide for flexible alternatives for the sourcing of components and systems;

# Ansaldo STS: CTC/TMS

There has been increasing need for an integrated solution for heavy haul freight railway and mixed passenger/freight railway. The main functional requirements for such systems are:

- Train Supervision system.
- Automatic Train Protection for speed and limit of authority enforcement.
- Mobile possession terminal for work zone protection.
- Automatic Train Operation, if needed for some main line operations, both passenger and Freight.
- Automatic route settings.
- Train movement graphs.
- GPS based location system in order to minimise the number of field devices like balises etc.



# Ansaldo STS: CTC/TMS

# Ansaldo STS: CBTC

- CBTC is the radio based train control architecture for Mass Transit. It is a continuous and automatic train control system carried out adopting modular and interchangeable architecture both for on board and wayside subsystems
- CBTC, thanks to the high-capacity, bidirectional radio train-to-wayside data communications is able to implement advanced Automatic Train Protection (ATP) functions as well as Automatic Train Operation (ATO), achieving high-resolution train location determination and allowing very high performance virtual block functions.
- The architecture implemented by Ansaldo STS meets the features and requirements complying with IEEE1474 can be either centralised or distributed meeting all the required RAMS targets for SIL4.

# Ansaldo STS: CBTC

