Il sistema integrato dei trasporti nell'area del mediterraneo

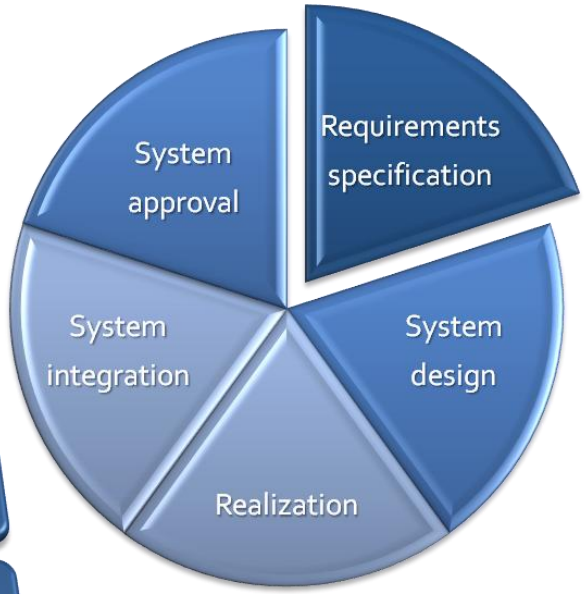
Le nuove frontiere dei sistemi di segnalamento: ACC-M e Telecontrollo

Bari, 23 Giugno 2011

IP-based Interlocking solutions

compliance with European Norms

- MEETS CUSTOMER NEEDS
- SUPPORTED BY A COMPLETE SET OF DESIGN TOOLS
- SUPPORTED BY A SET OF VERIFICATION & TESTING TOOLS
- INCLUDES V&V ACTIVITIES



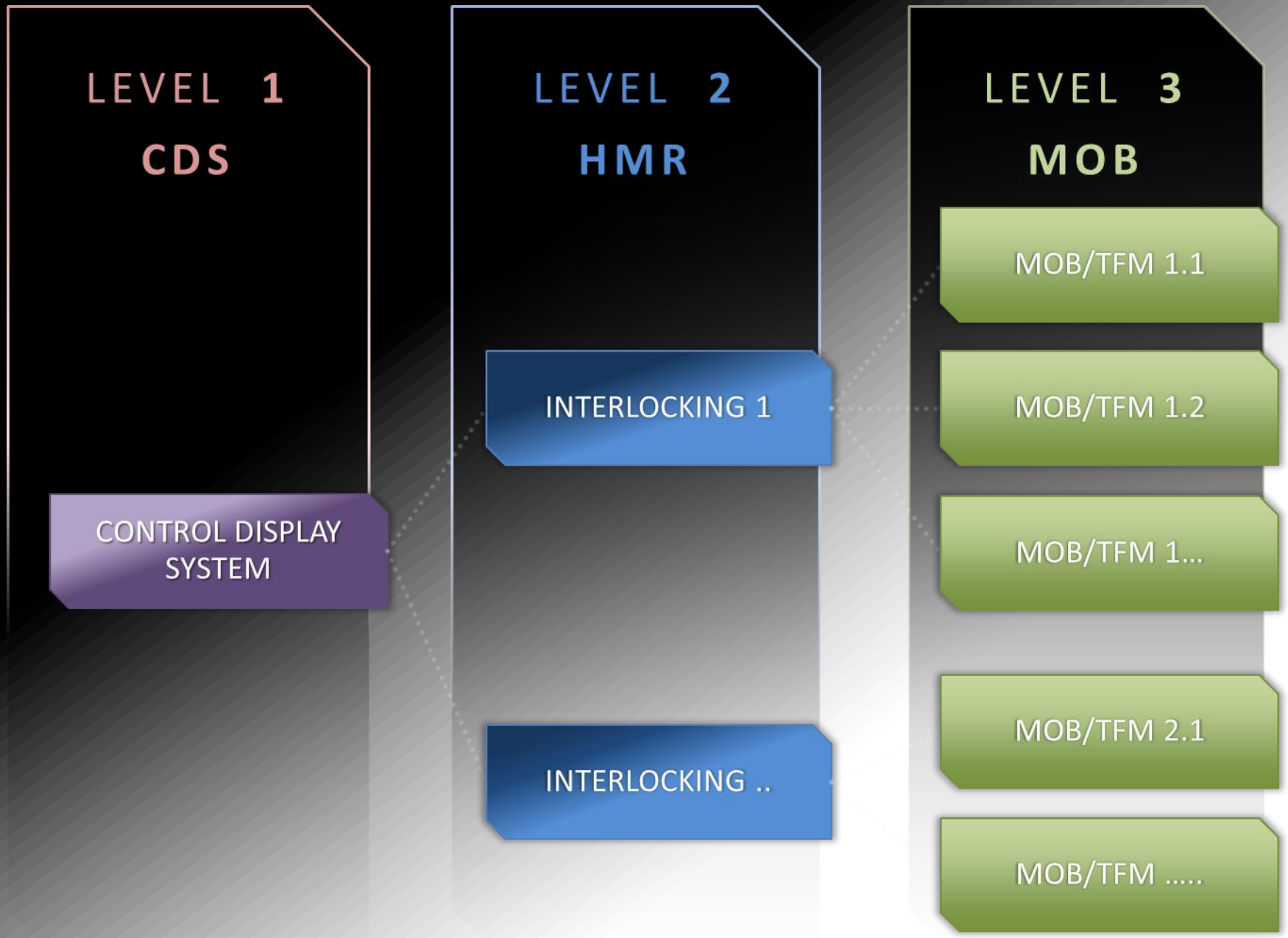
Industry standard platform

- Brick Design
- Obsolescence Protection
- Open Architecture
- High modularity

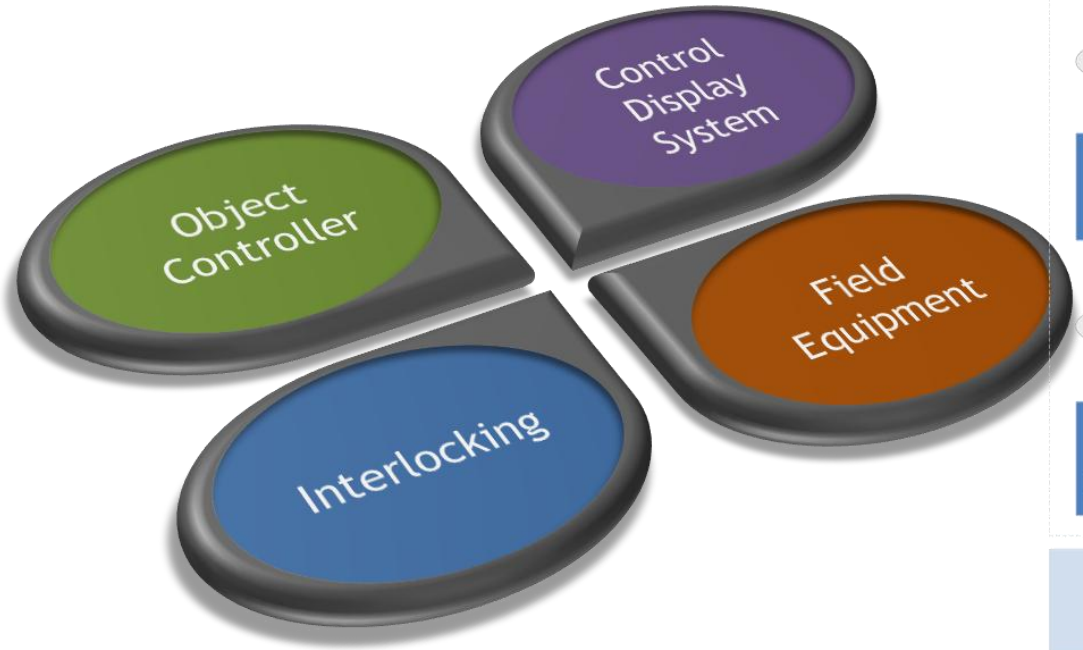
All ECM signalling solutions are based on industry standard platforms having a history of long-term reliability.

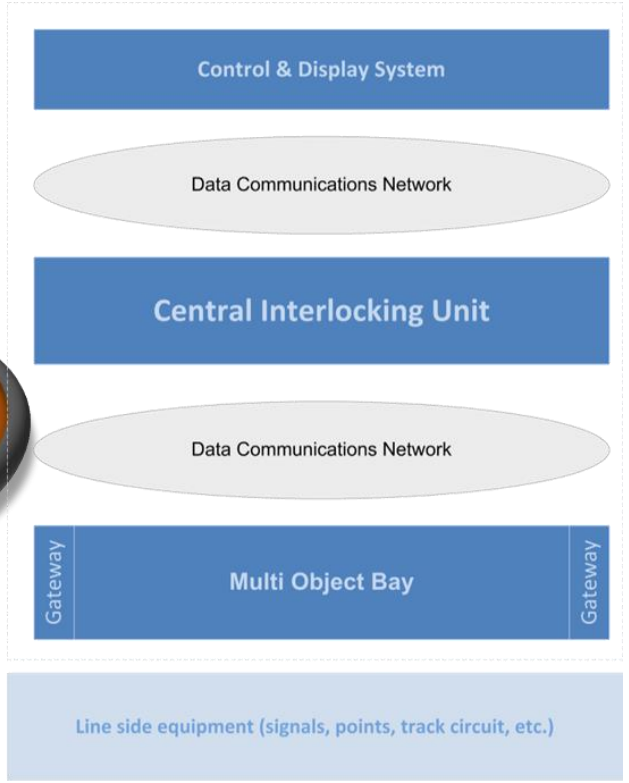
HMR9® interlocking system is safe, reliable, versatile and easy to use

Architecture: 3 levels

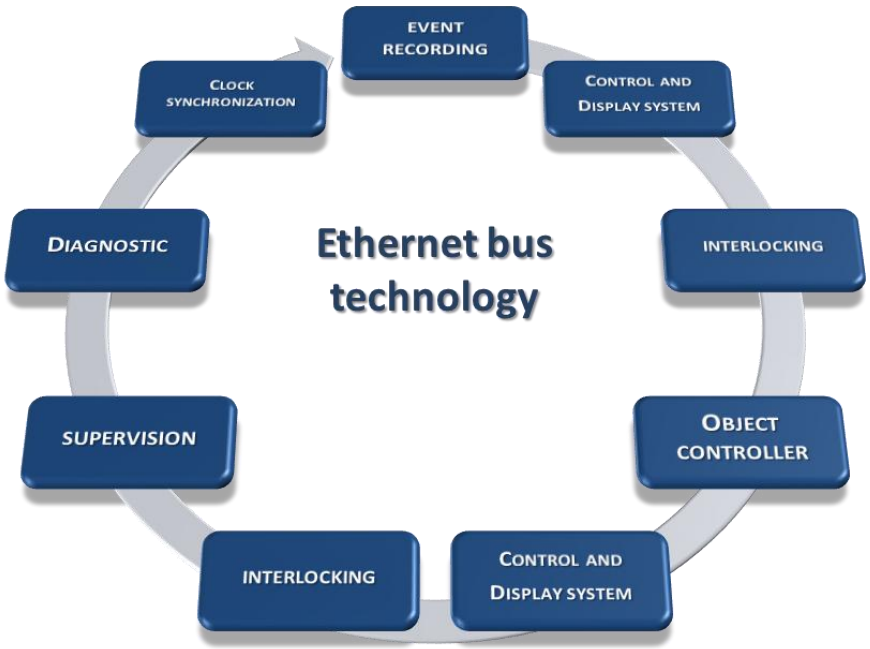


modular architecture





open Architecture



Interlocking unit

- "2oo2" Redundant safety architecture
- HW/SW diversity on demand
- Additional stand-by system

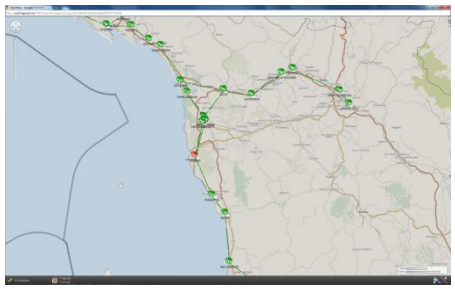
Control and display system

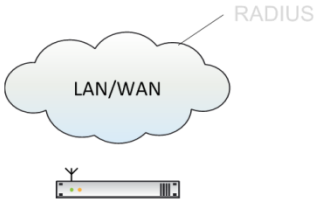
- SIL4 Display unit on demand
- LCD/TFT display unit technology

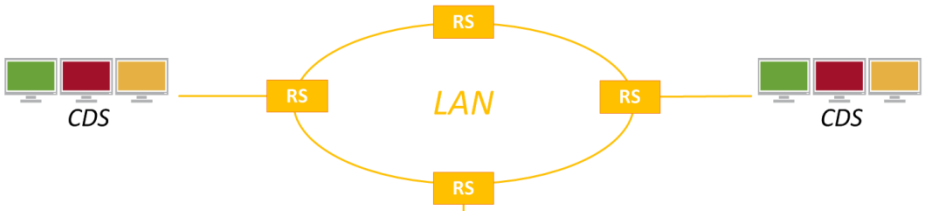
Object Controller

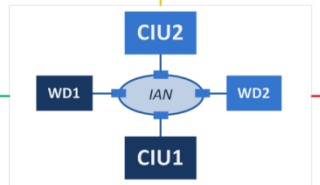
- SIL4 PLC (Customer programmable)
- Signal led and halogen lamps
- Track circuit
- Axle counter
- Eurobalise
- Transponder
- Point machine
- Level crossing

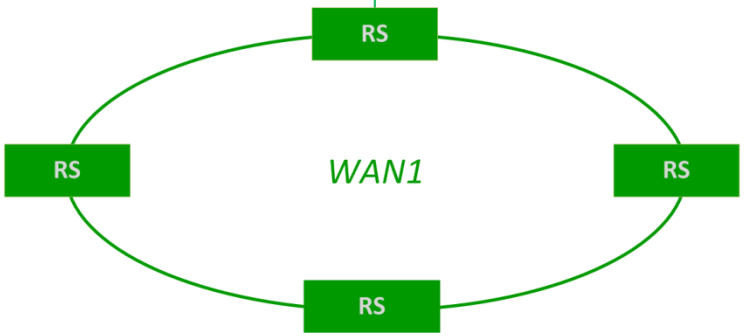
high modular redundant architecture: top view

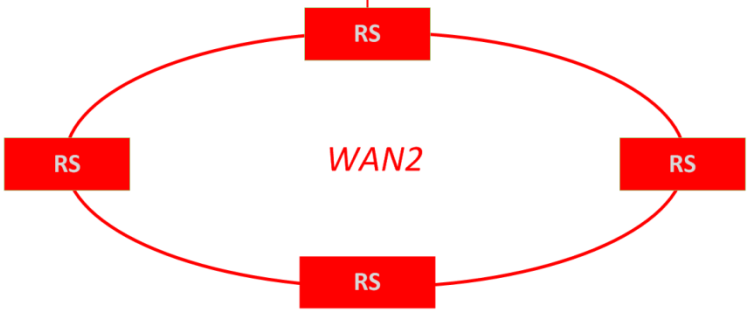




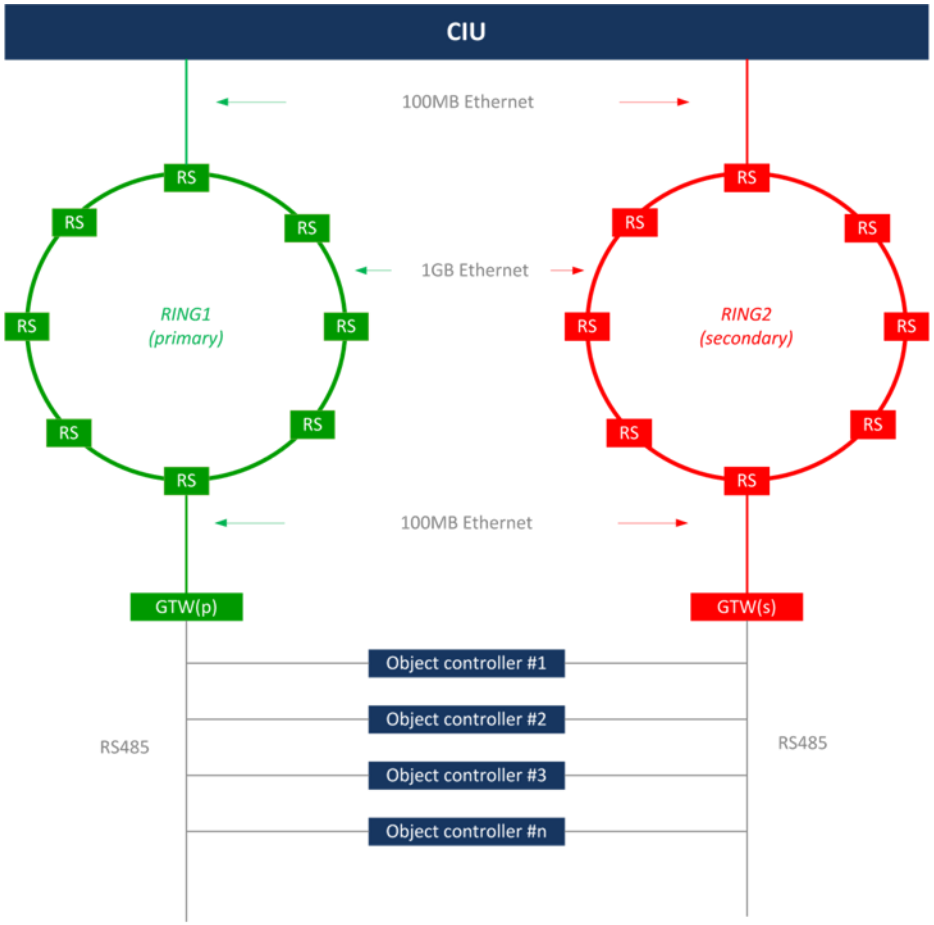








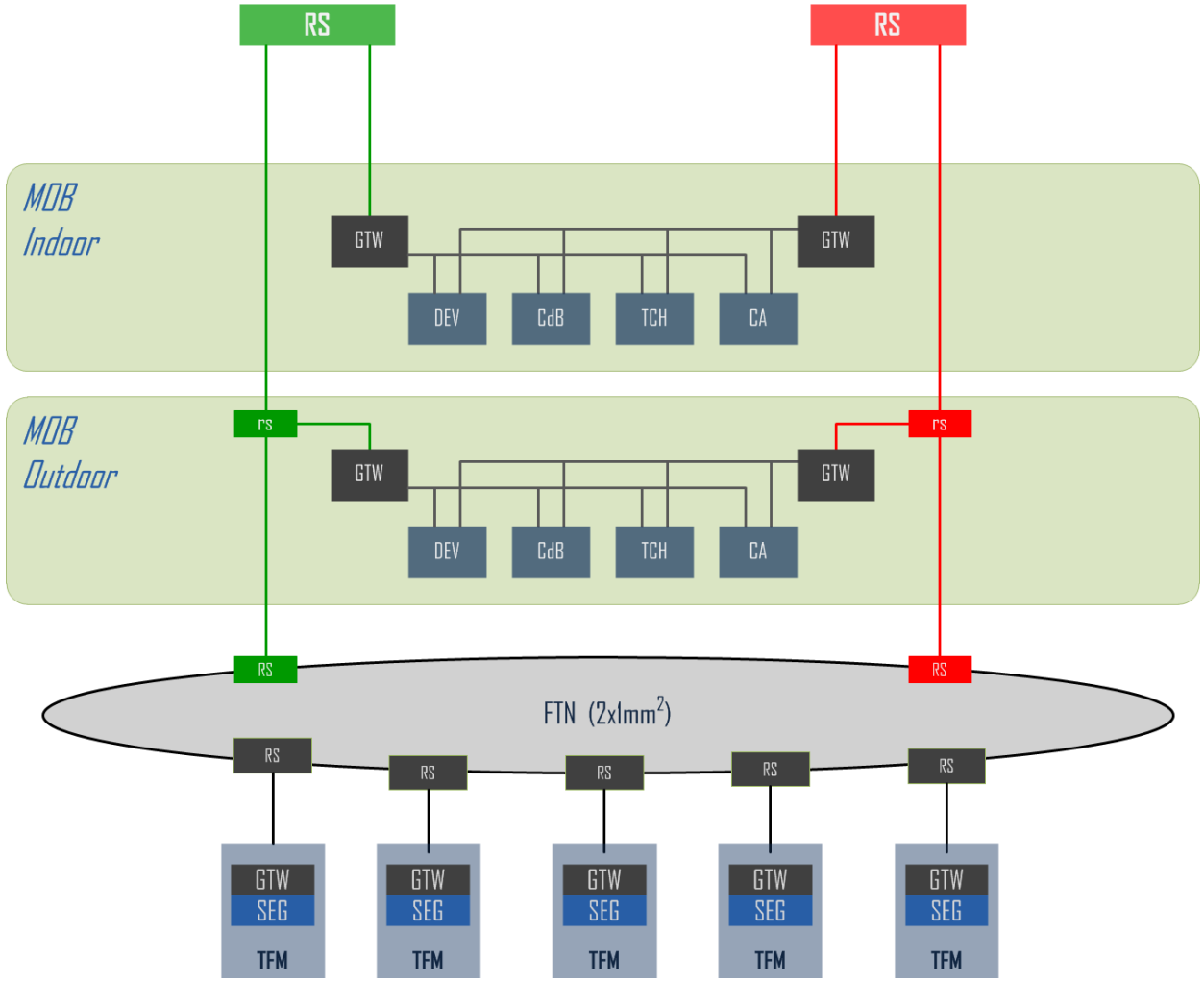
high modular redundant architecture: central view



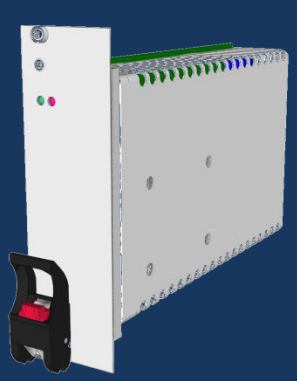
THE PERIPHERAL LOCATIONS ARE CONNECTED TO THE CENTRAL POST USING A DUPLICATED HIGH SPEED VITAL BACKBONE: FIBRE OPTIC, COPPER, OR ALLOCATED IN THE EXISTING SDH NETWORK.

THIS BACKBONE WILL ALLOW THE EXCHANGE OF VITAL TELEGRAMS CONTAINING CONTROLS TO AND FROM THE LINESIDE OBJECTS.

high modular redundant architecture: bottom view



Computer Based Interlocking



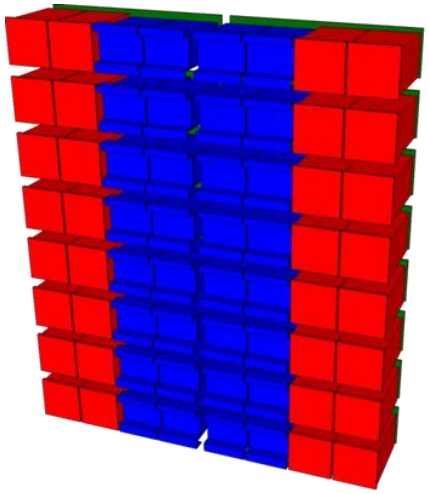
Power supply

CPU DualCore

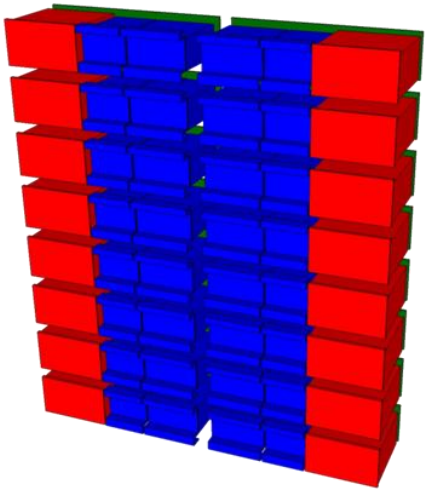
Ethernet Interface

Bespoke mechanical housing

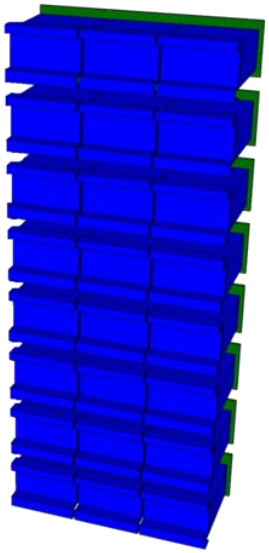
multi object bay capability



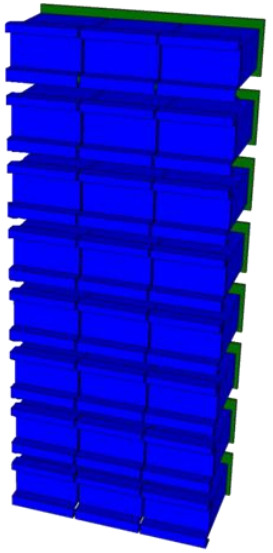
32 Track circuit



16 Point machine

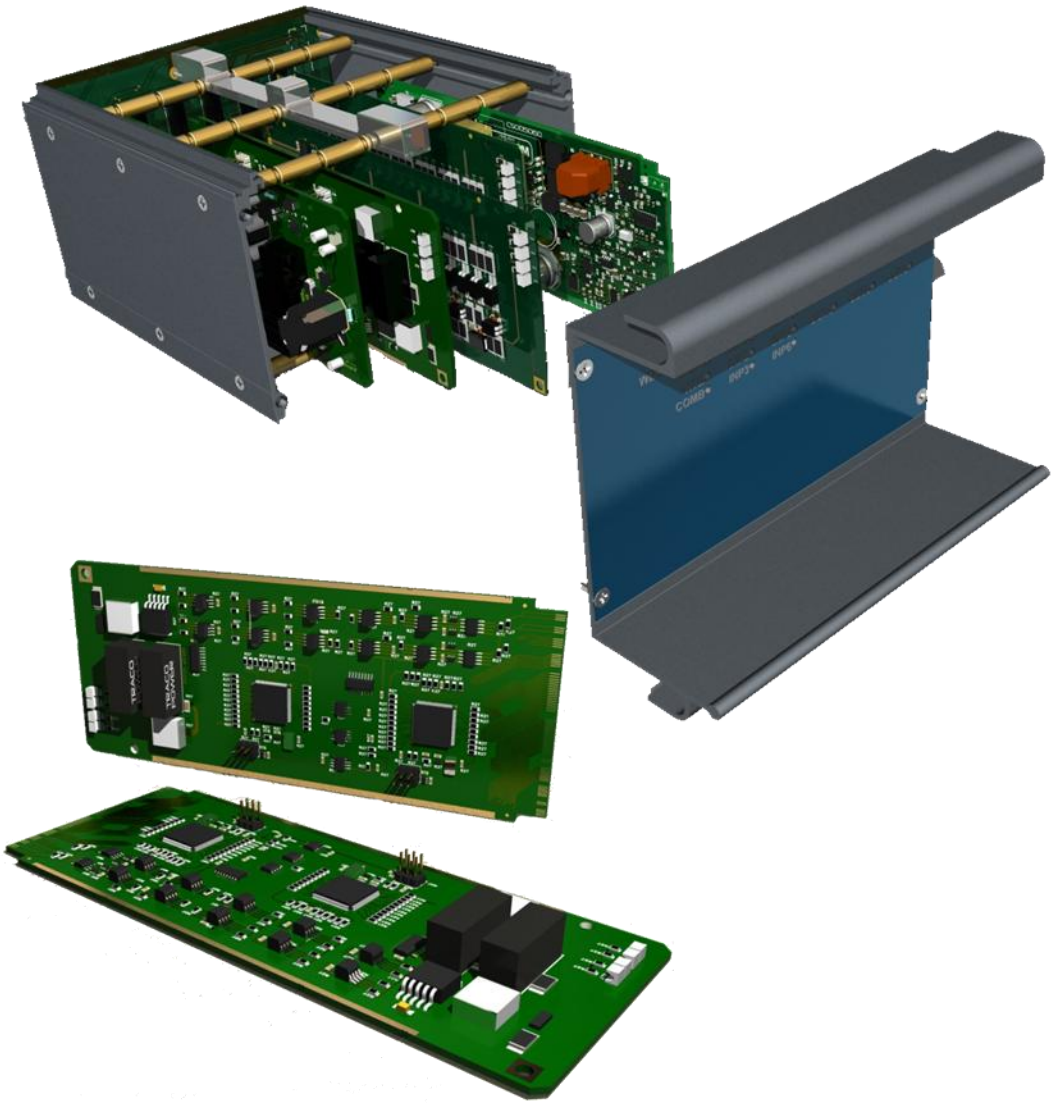


192 Vital input/output



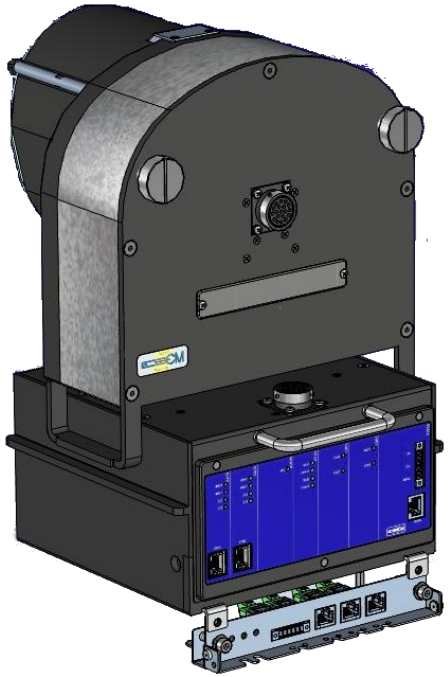
96 eurobalise

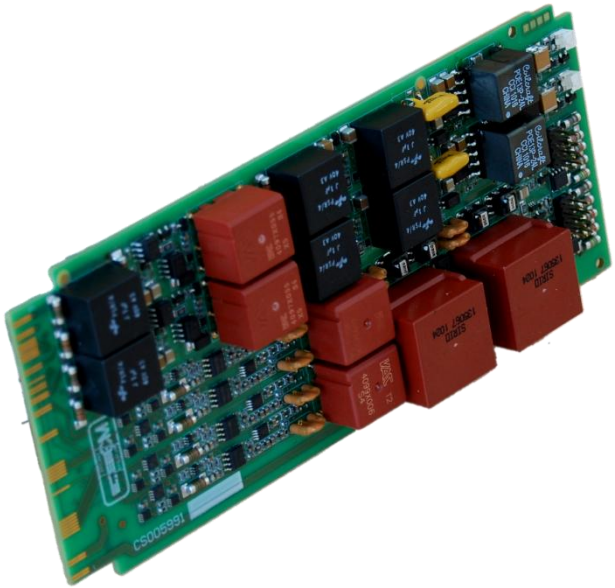
object controller pick'n'mix



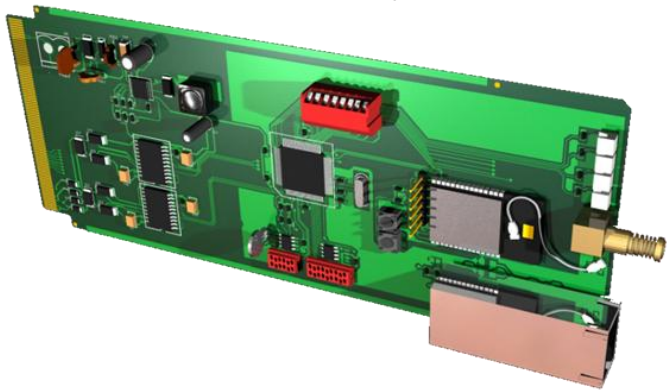
- Reduced dimensions & lightweight
- MTBF 300kh$_{rs}$ mil-hdbk-217f @25°c
- Operating temperature -40÷85°c
- "2002" SIL4 safety architecture
- Rated voltage 19÷60v$_{dc}$
- Robust construction
- Fanless technology
- Ethernet interface
- High modularity
- Easy to maintain
- RS-485 interface
- µTCA card size
- Line replaceable unit

trackside functional module TFM®





ethernet gateway



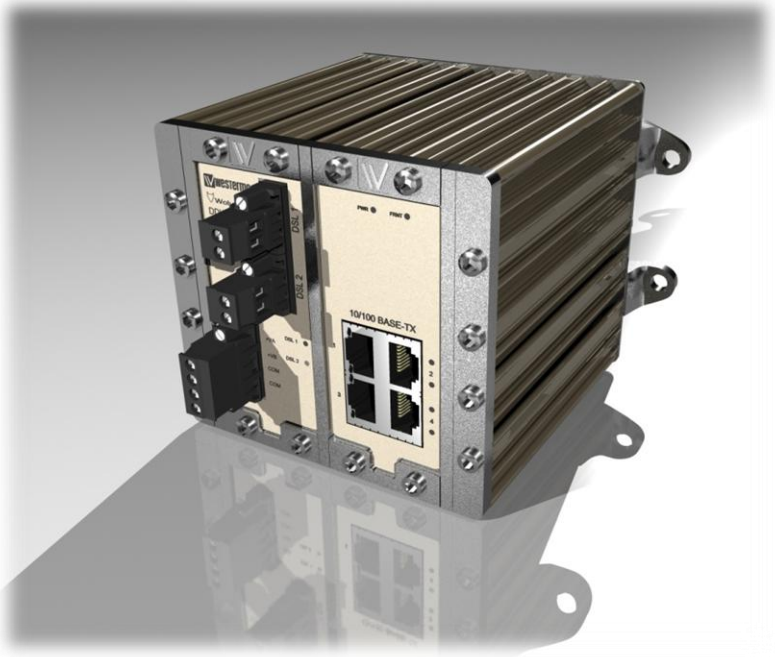
POWER	
Voltage	24 ÷ 72Vdc (polarity protected)
Current	120mA@48Vdc
Connection	RJ11

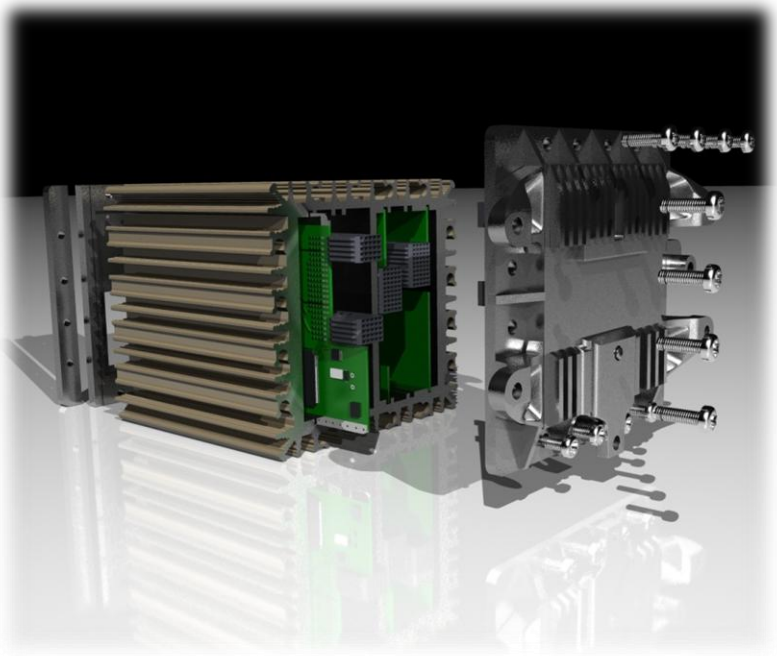
ENVIROMENTAL	
Enclosure	IP40/IP67
Temperature (storage)	-40 to +85 °C
Temperature (operating)	-40 to +85 °C
Altitude	2000m
EMC	EN 61000-6 industrial immunity
	EN 50081-2 industrial emission
CE Mark	Industrial European Conformity
Railroad	Approval for track side use (RFI IS402)
Vibration	IEC 255-21-1 Class 1
	IEC 255-21-2 Class 1

PHYSICAL DIMENSIONS	
Dimensions (W x H x D)	120 x 101 x 22 mm
Weight	0,2Kg

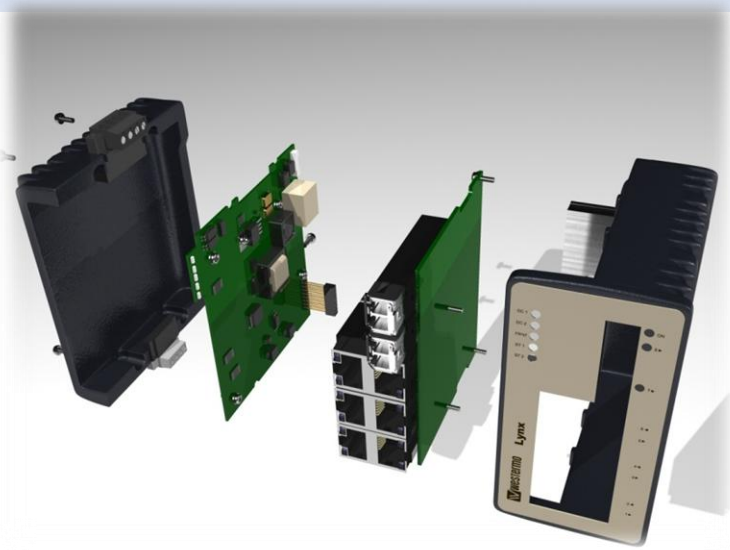
TECHNICAL CHARACTERISTICS	
Microcontroller	AT MEGA
Memory	2560Flash SPI 2/4 Mb
Ethernet protocol	SNMP, FTP, HTTP
Ethernet port	1 x 100Mb/s (RJ45)
Serial port	2 x RS485 500Kb/s (RJ45)
LED Indications	Ethernet/RS485 activity
Modem radio	Zigbee
Real Time Clock	Battery supplied
MTBF	400.000 h

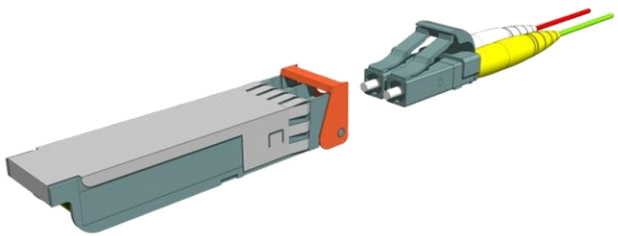
standard field ethernet switch using copper cables

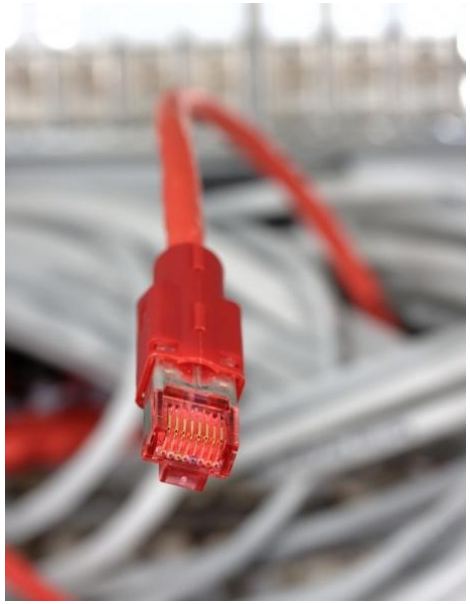




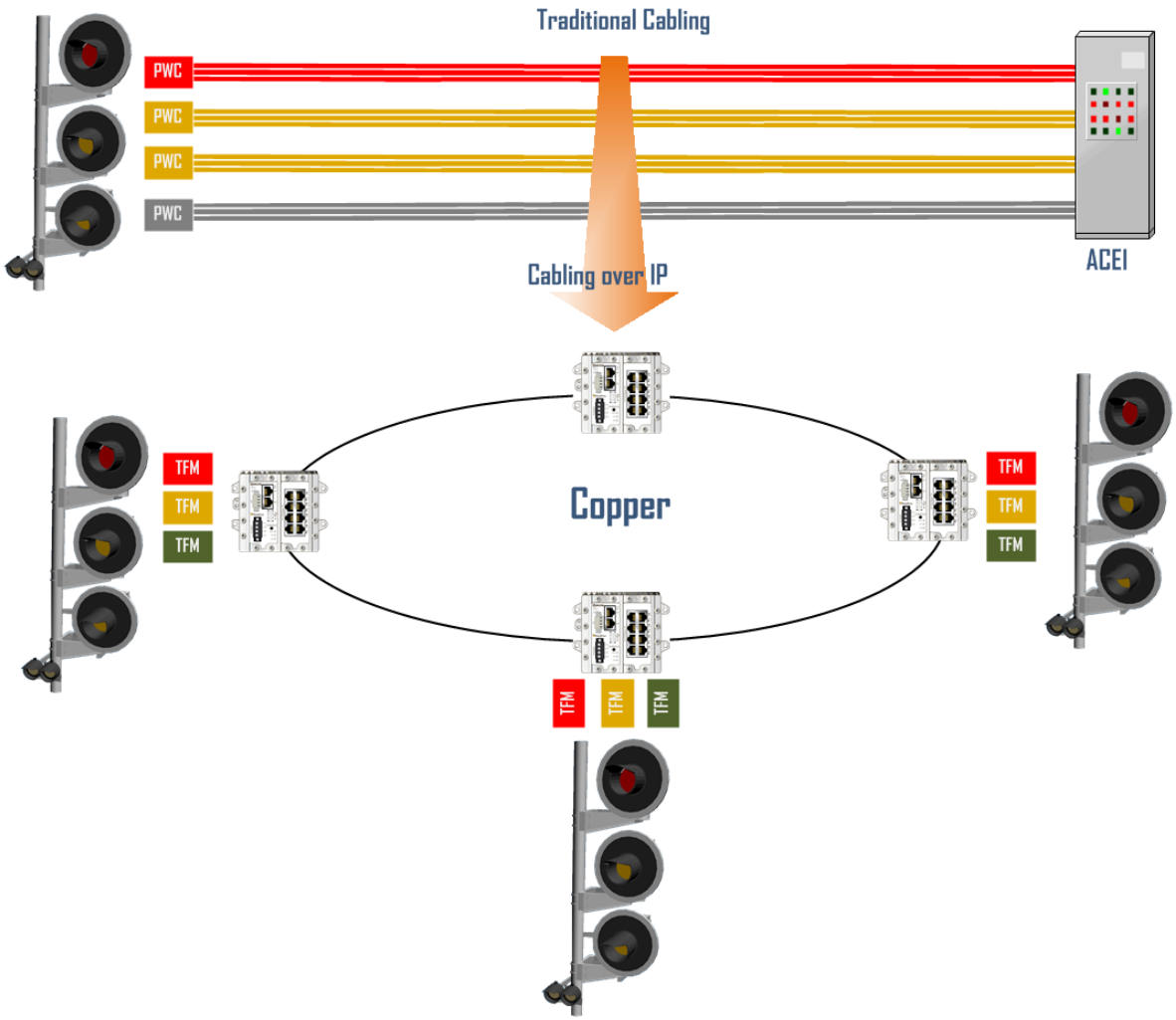
standard ethernet switch



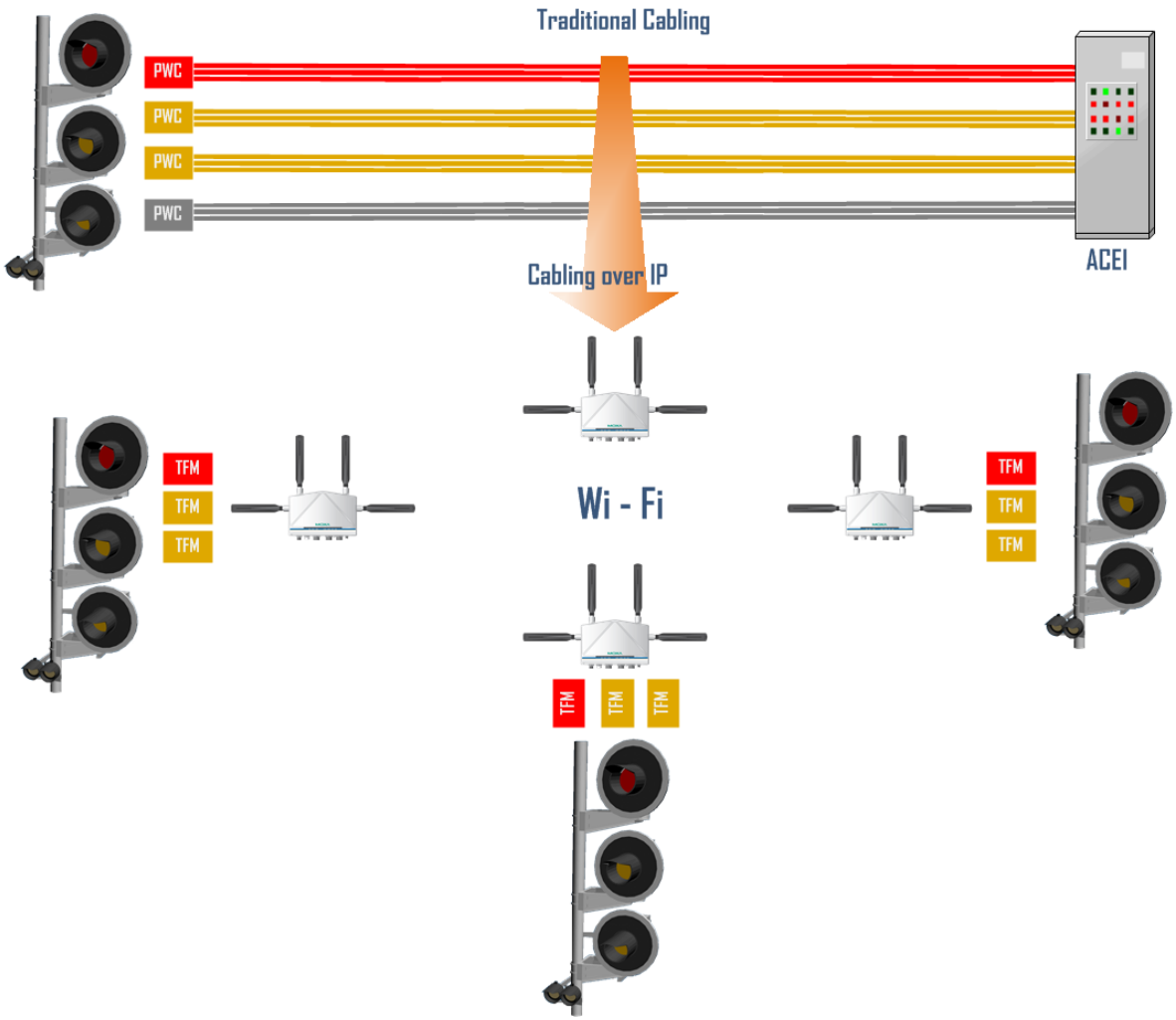




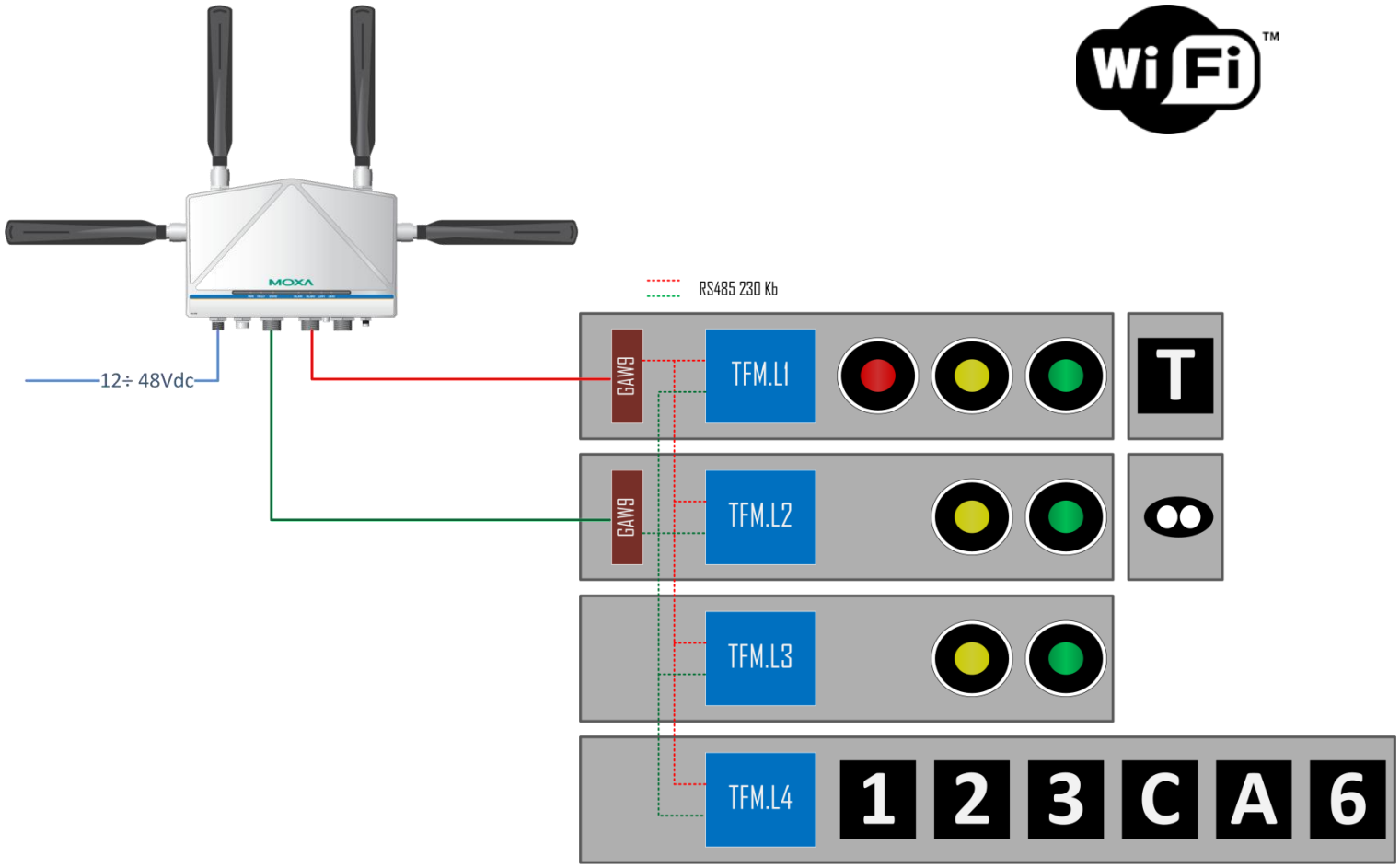
cabling over IP



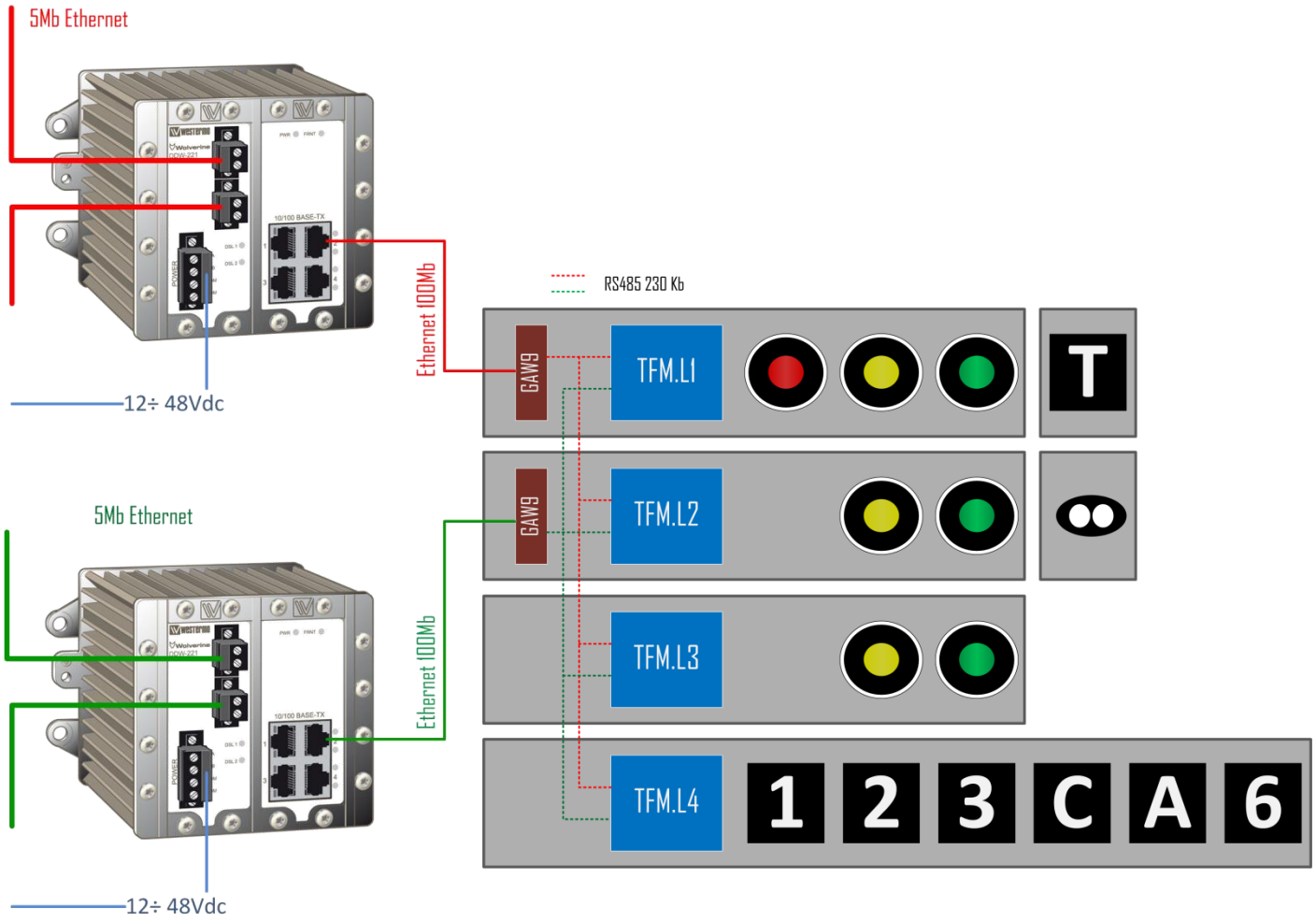
cabling over IP



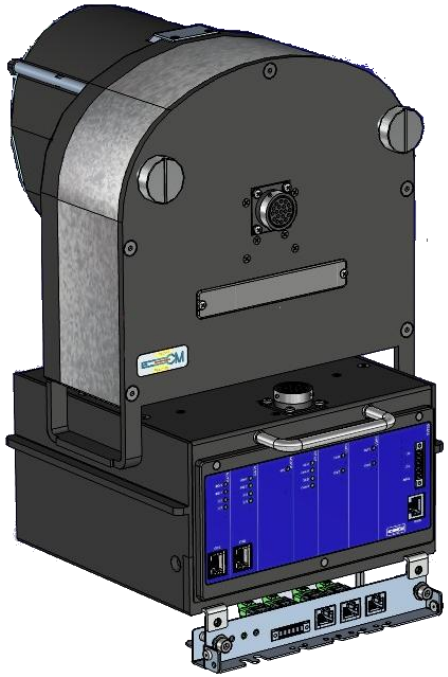
telecommunications go wireless

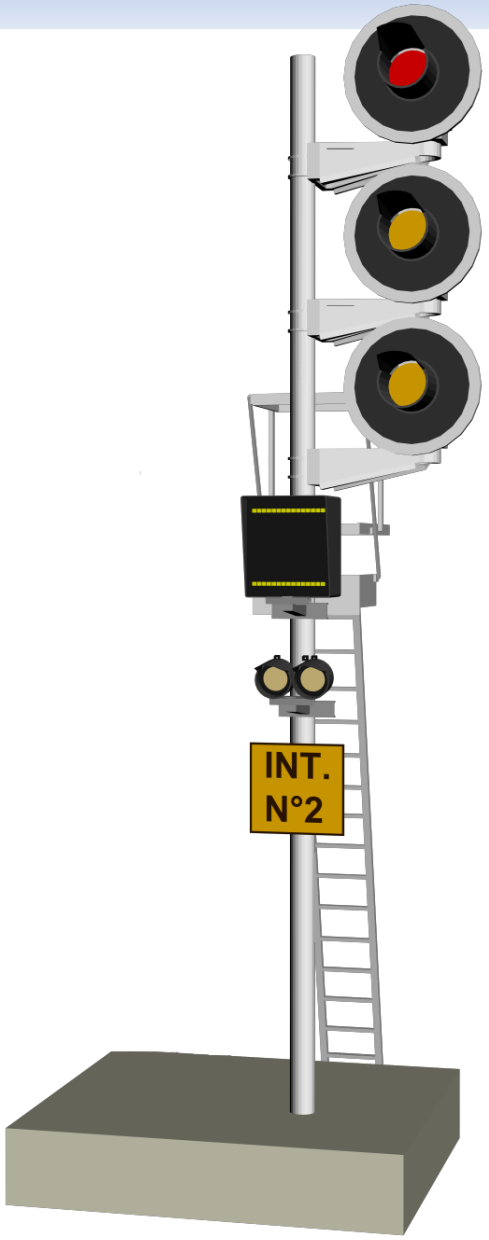


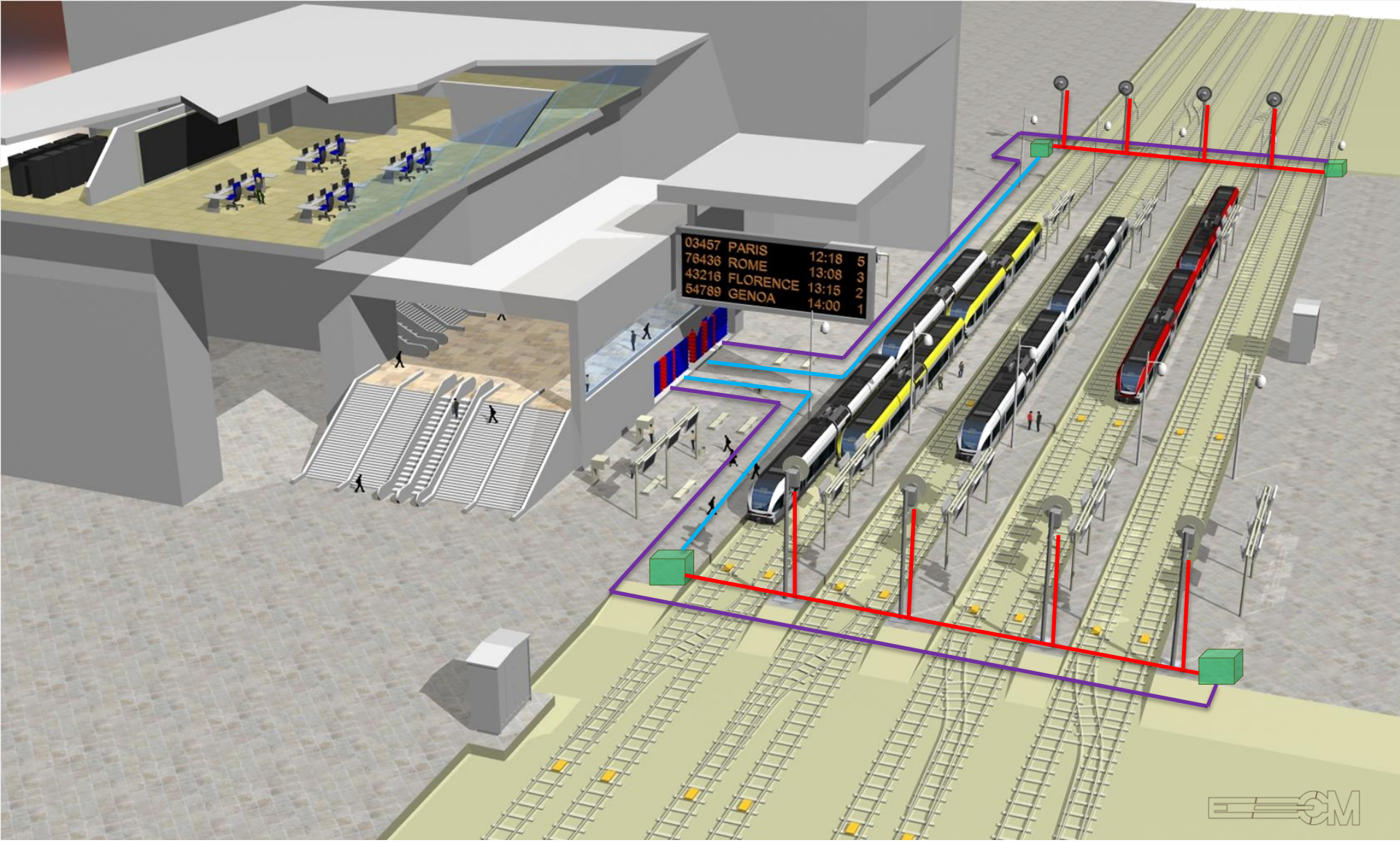
telecommunications go copper Ethernet



trackside functional module TFM®







AC/DC Converter and Ethernet switch

Main power supply and Ethernet link

Reserve power supply and Ethernet link

DC Supply voltage / Ethernet link

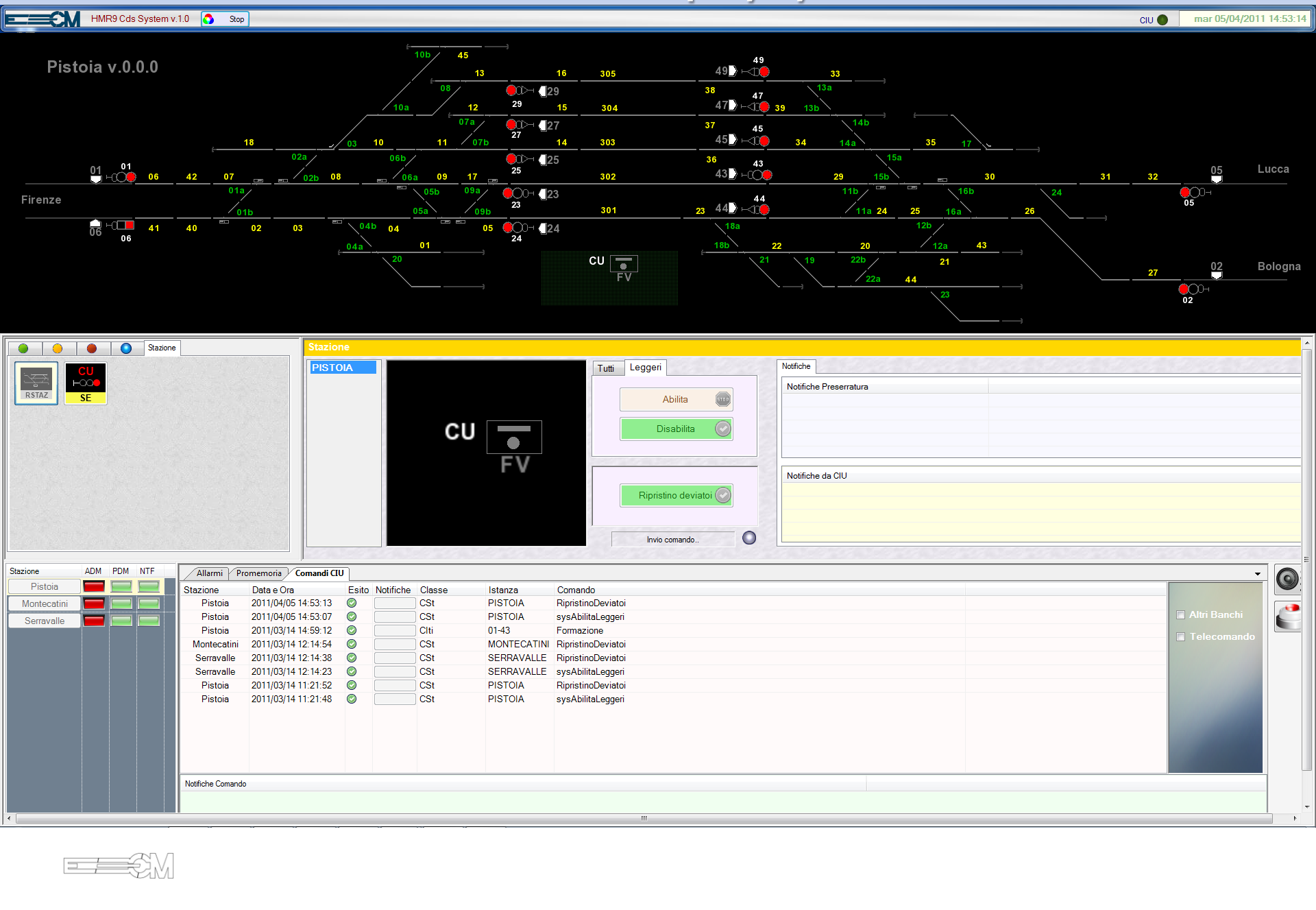
control and display system

web technology

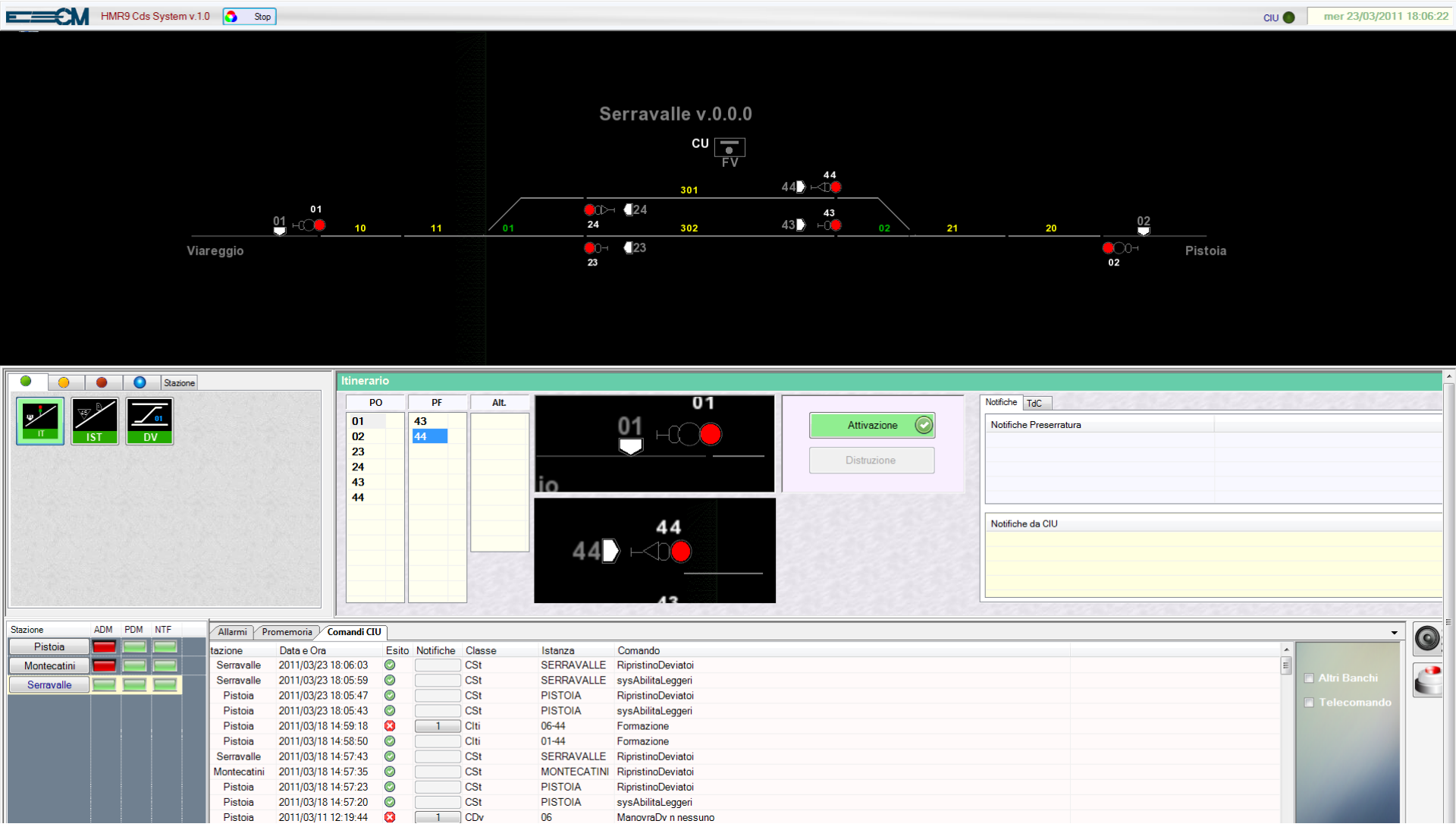
OpenGL

Clutter-free desk

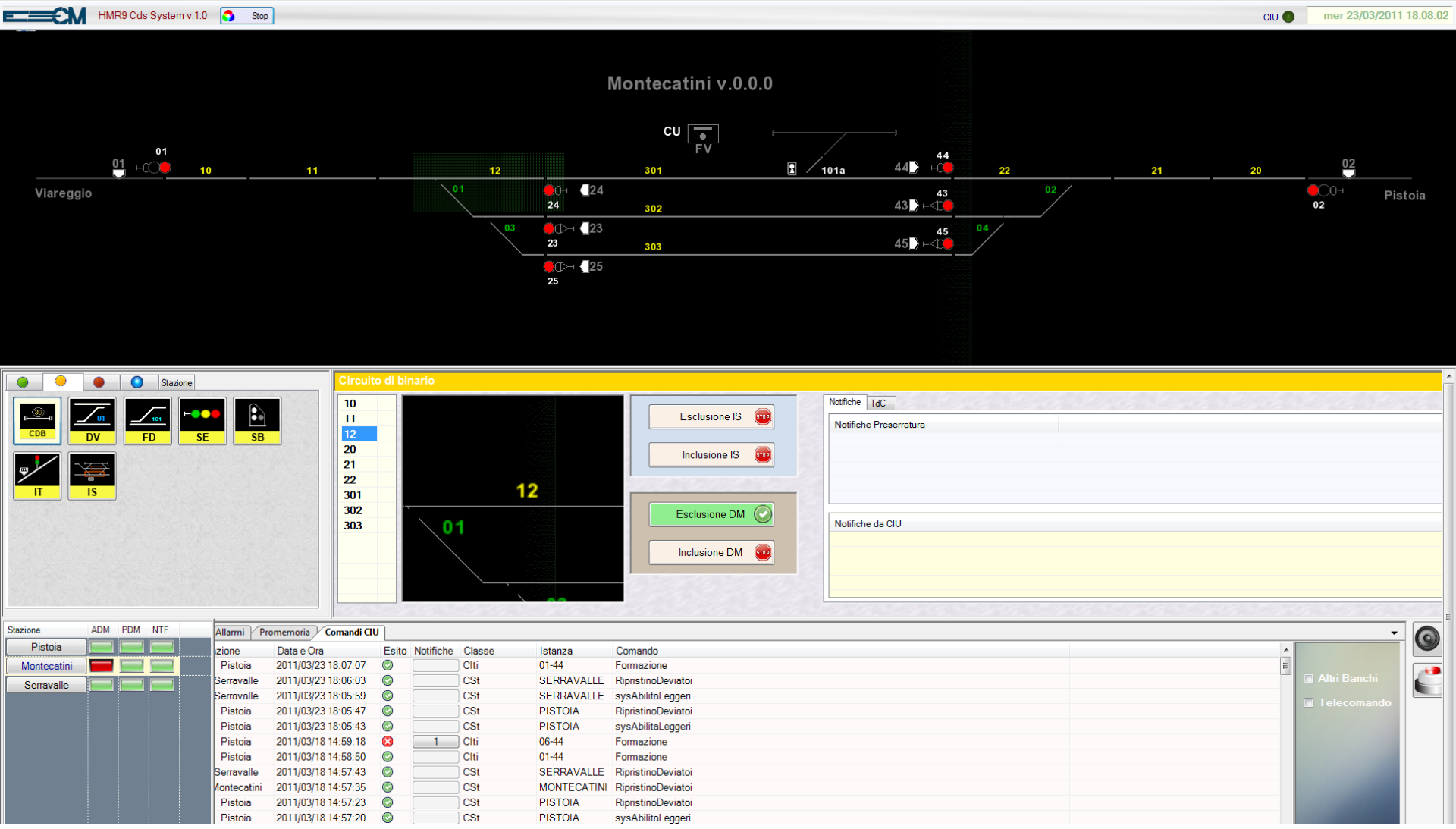
control and display system



control and display system



control and display system



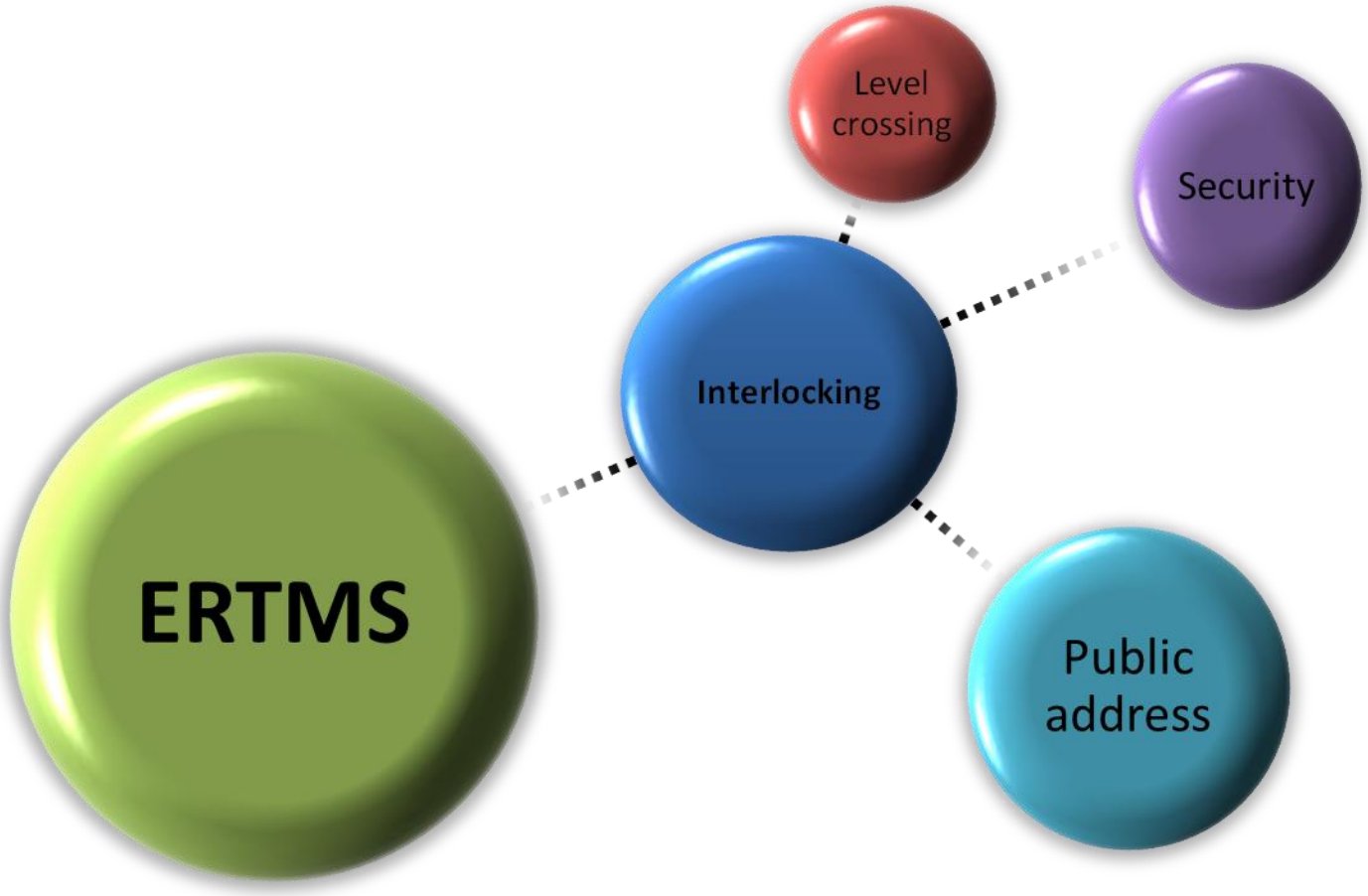
multi-station key features

THE MULTI-STATION IS A COMPUTER BASED INTERLOCKING SYSTEM CAPABLE OF CONTROLLING A RAILWAY SIGNALING SYSTEM FOR LARGE AND COMPLEX AREAS AND LONG AND THIN LINES.

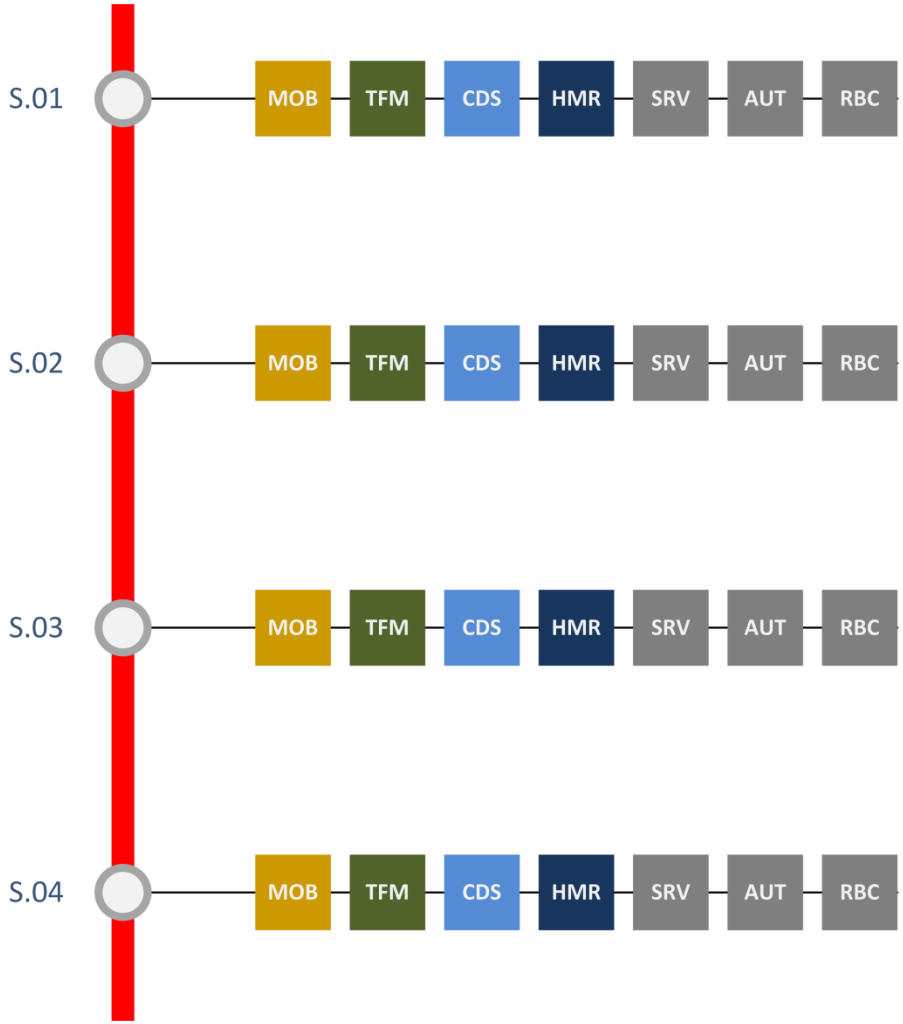
IT CAN BE COMMISSIONED AS A "ONE-OFF", OR CAN BE COMMISSIONED IN STAGES WITHOUT HAVING TO REPEAT PREVIOUS VERIFICATION AND TESTING ACTIVITIES.

THE SYSTEM IS COMPLETE WITH CONTROL AND DISPLAY SYSTEM FOR SIGNALER AND MAINTAINER, INTERFACE WITH PERIPHERAL TRACKSIDE EQUIPMENT AND EXTERNAL SYSTEMS

typical embedded system



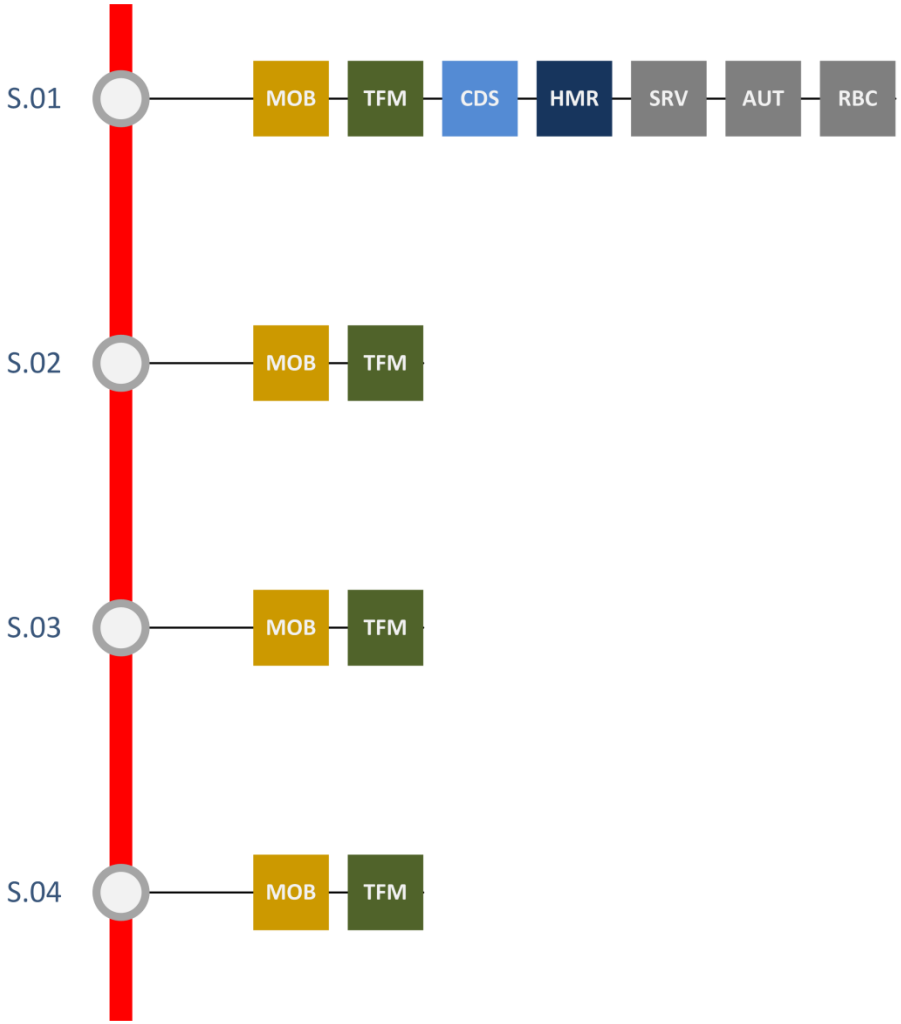
Single Station



LEGEND

- MOB — Multi Object Bay
- TFM — Track Functional Module
- CDS — Control Display System
- HMR — Interlocking
- SRV — Server / Event recorder
- AUT — Automation interface
- RBC — Radio Block Center interface

Multi Station



LEGEND

MOB	Multi Object Bay
TFM	Track Functional Module
CDS	Control Display System
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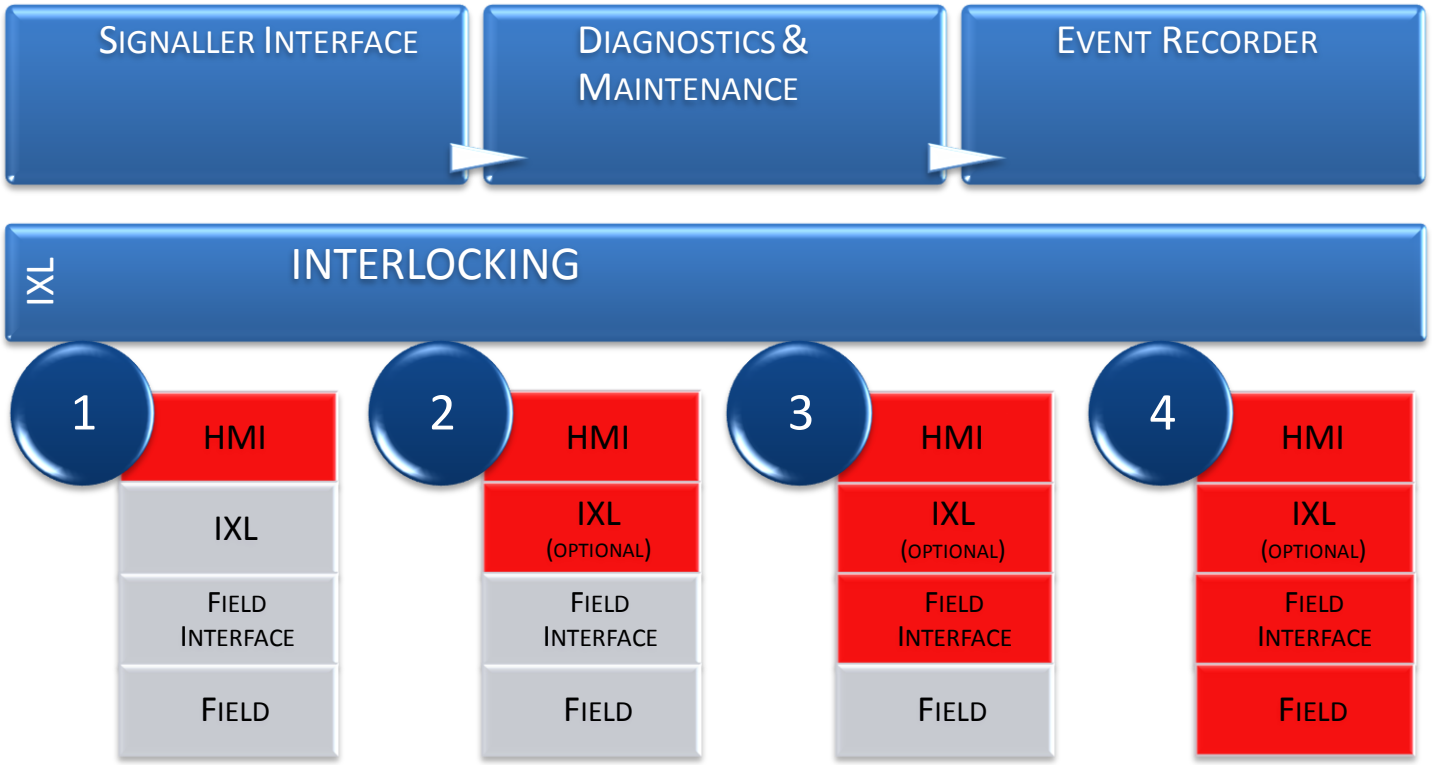
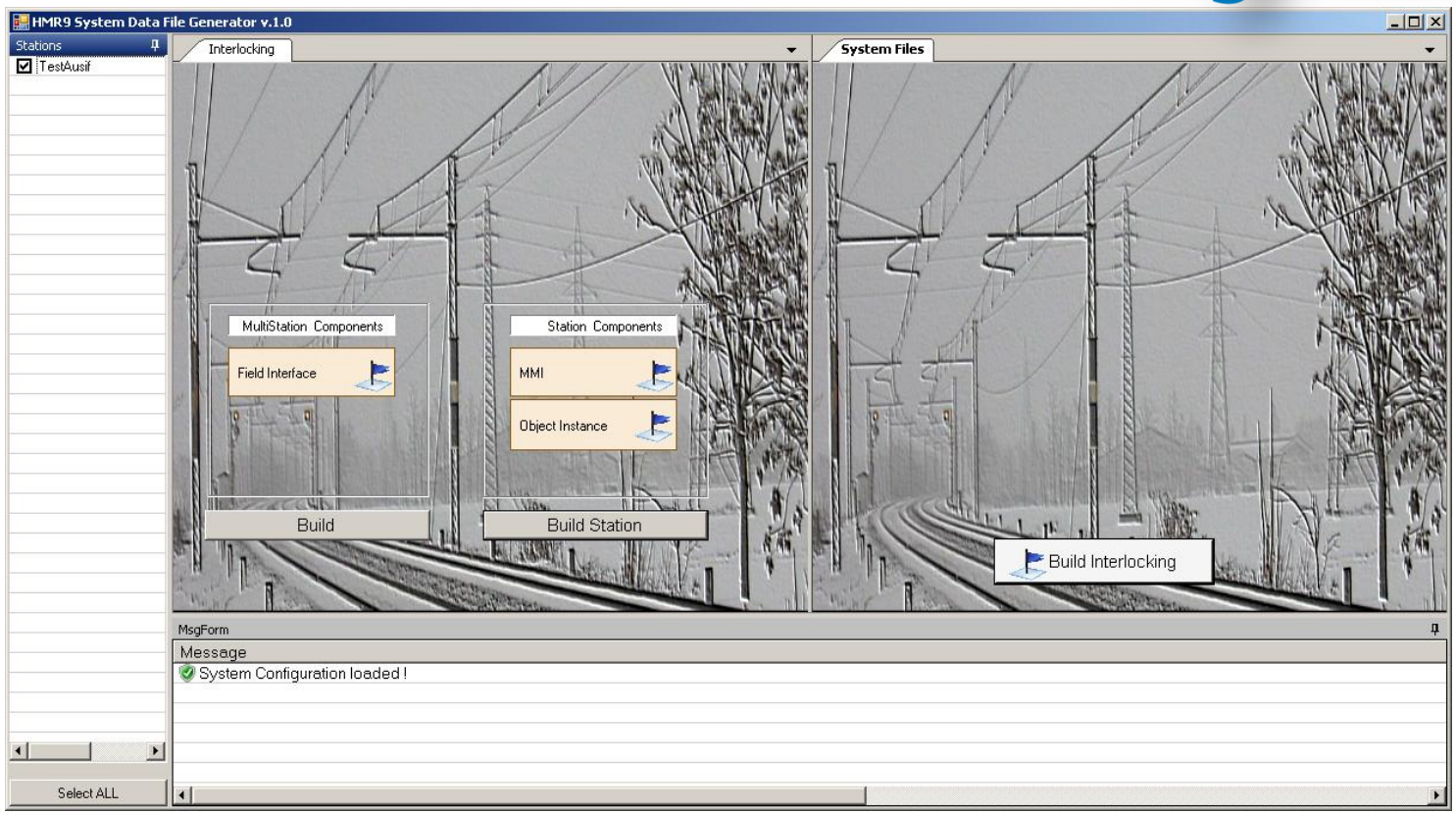
multi-station scalable approach

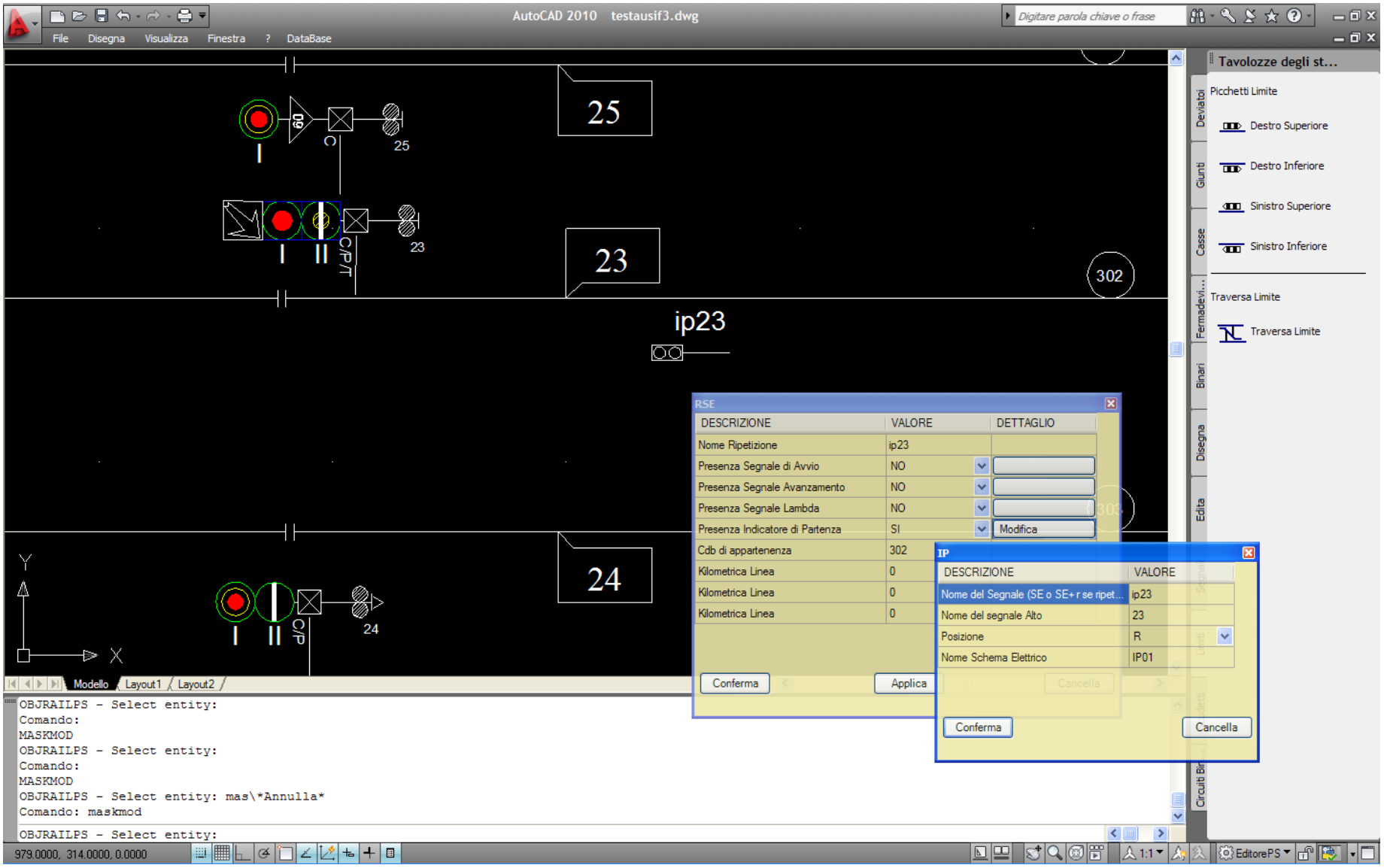


design tools

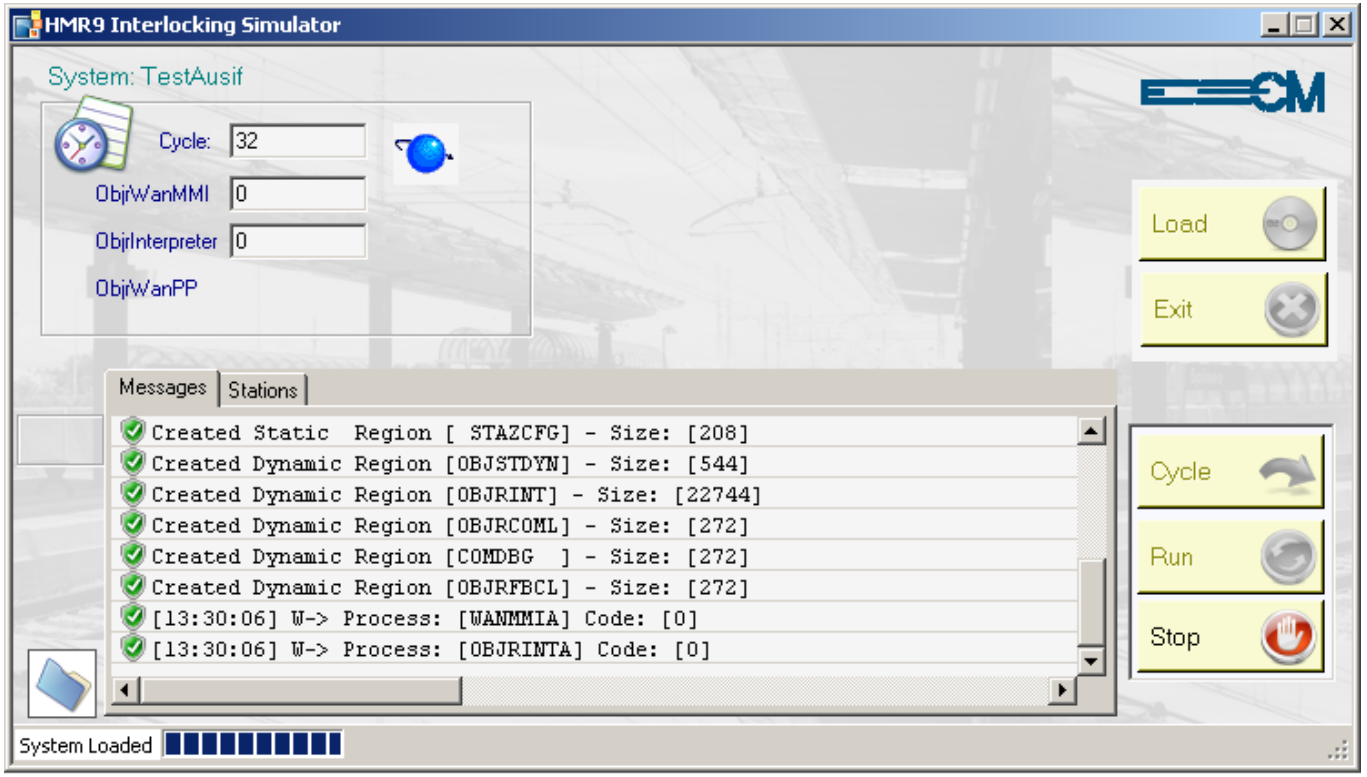
obRails®



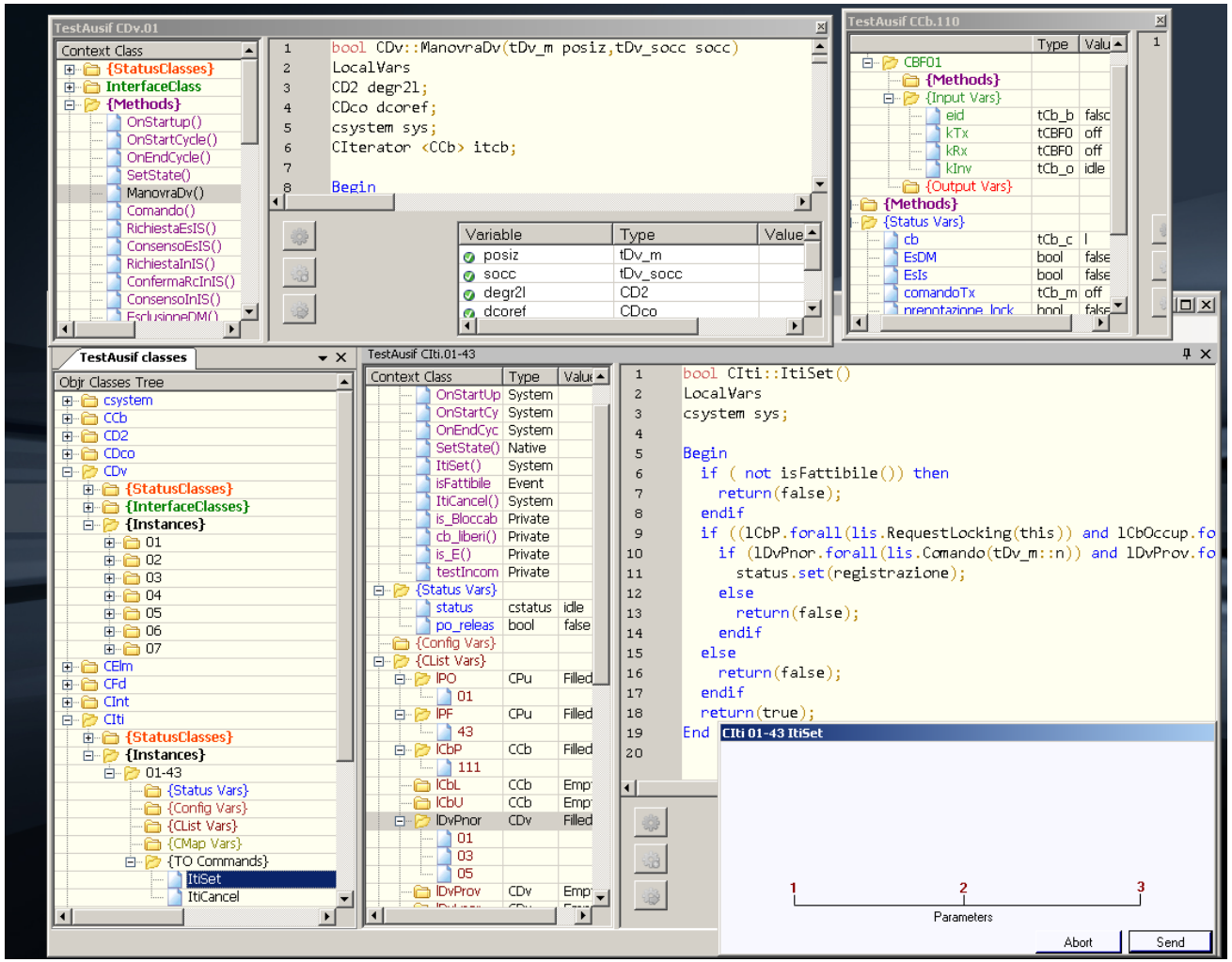
scheme plan editor



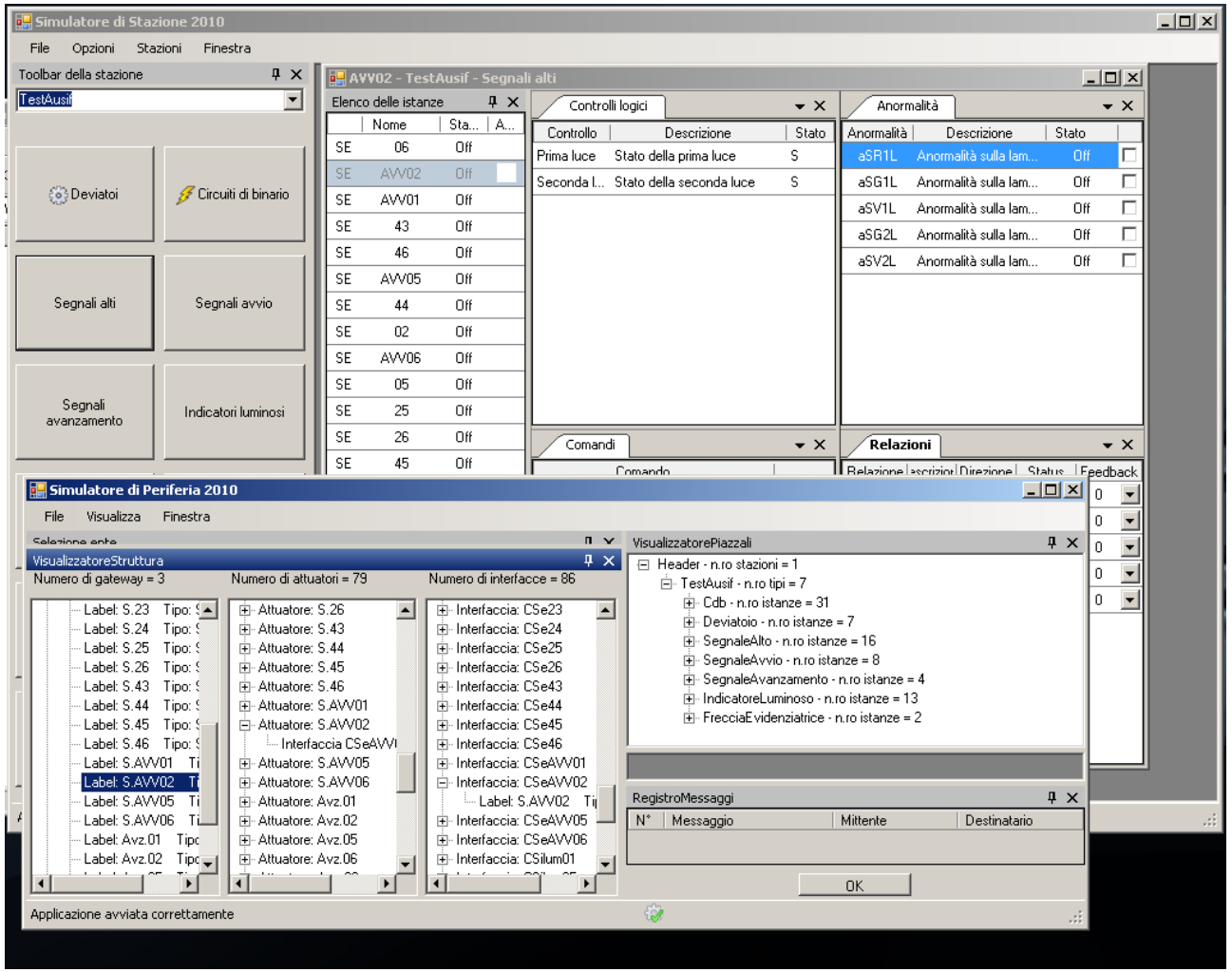
interlocking simulator



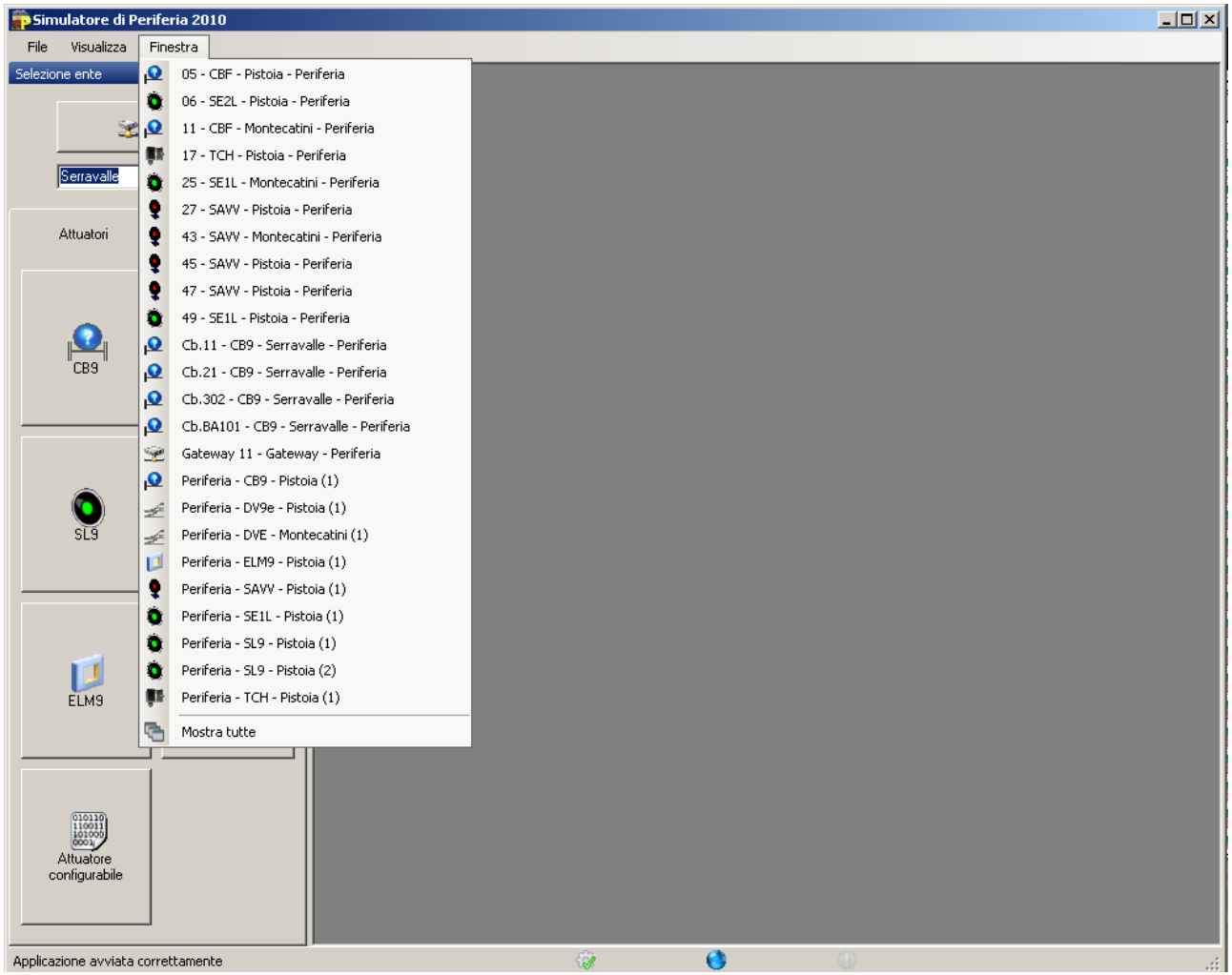
objrail debugger



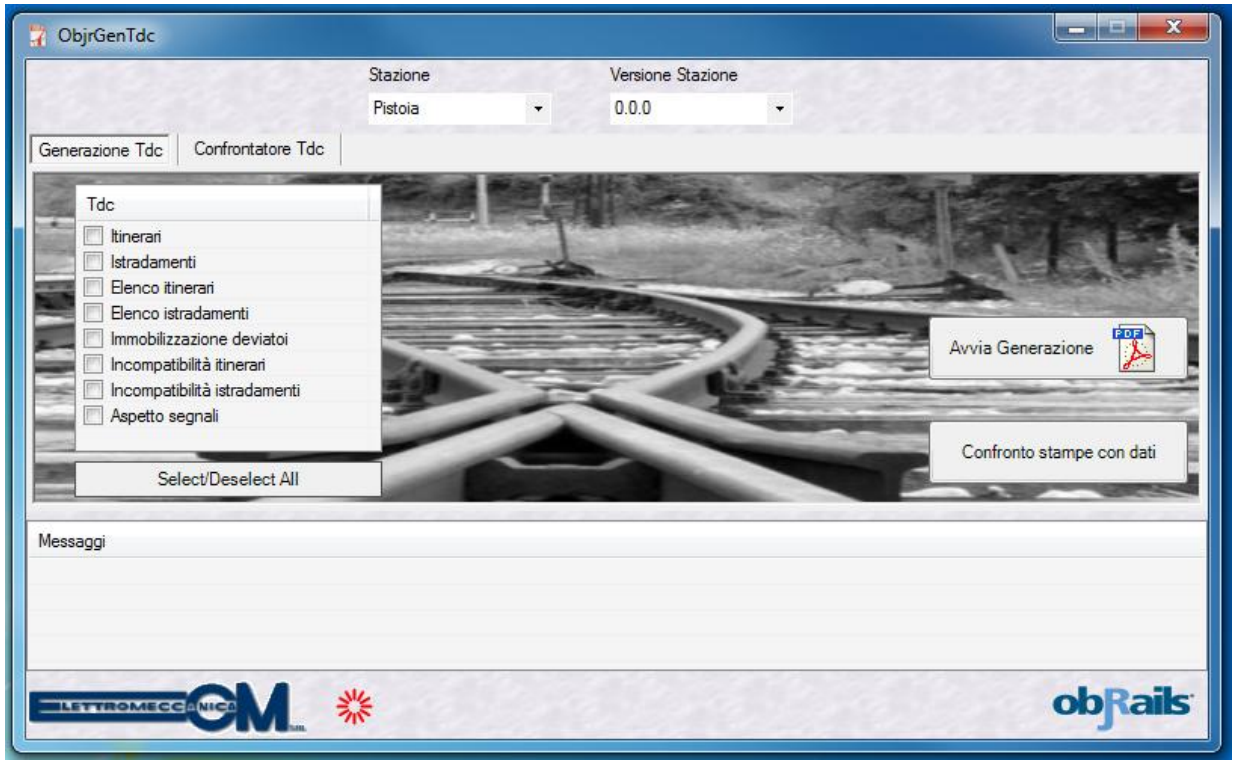
station simulator



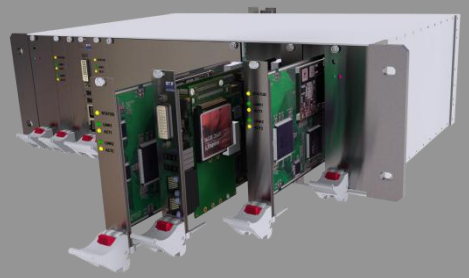
peripheral simulator

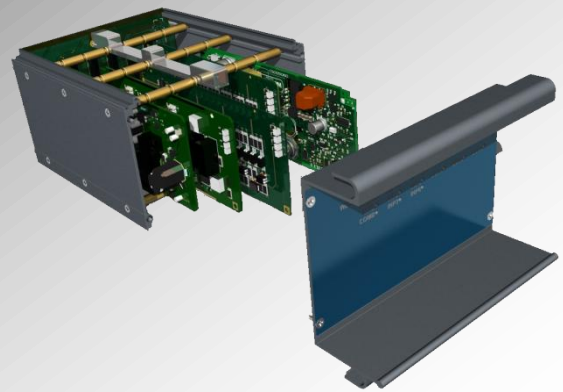


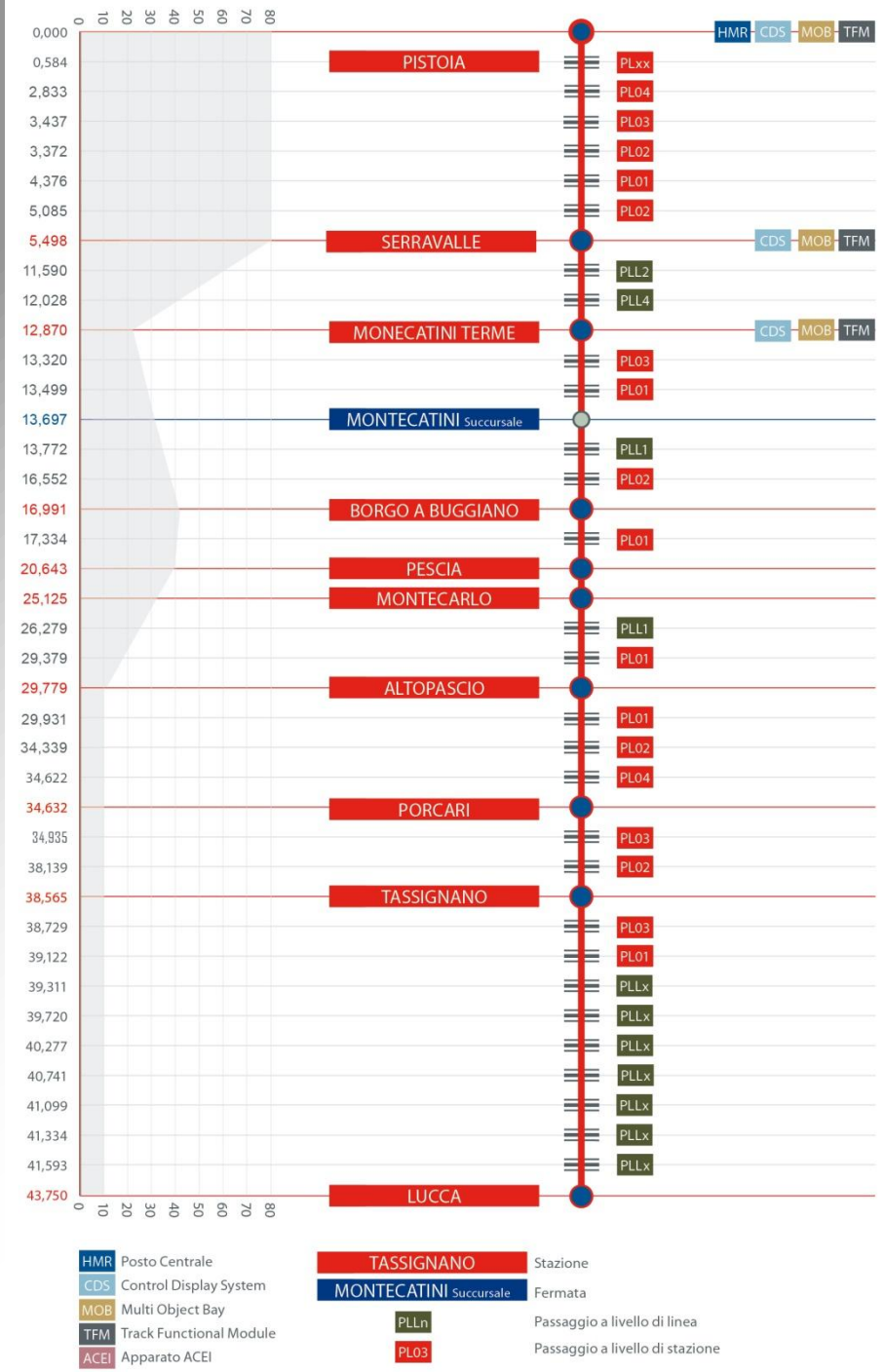
verification & testing tools

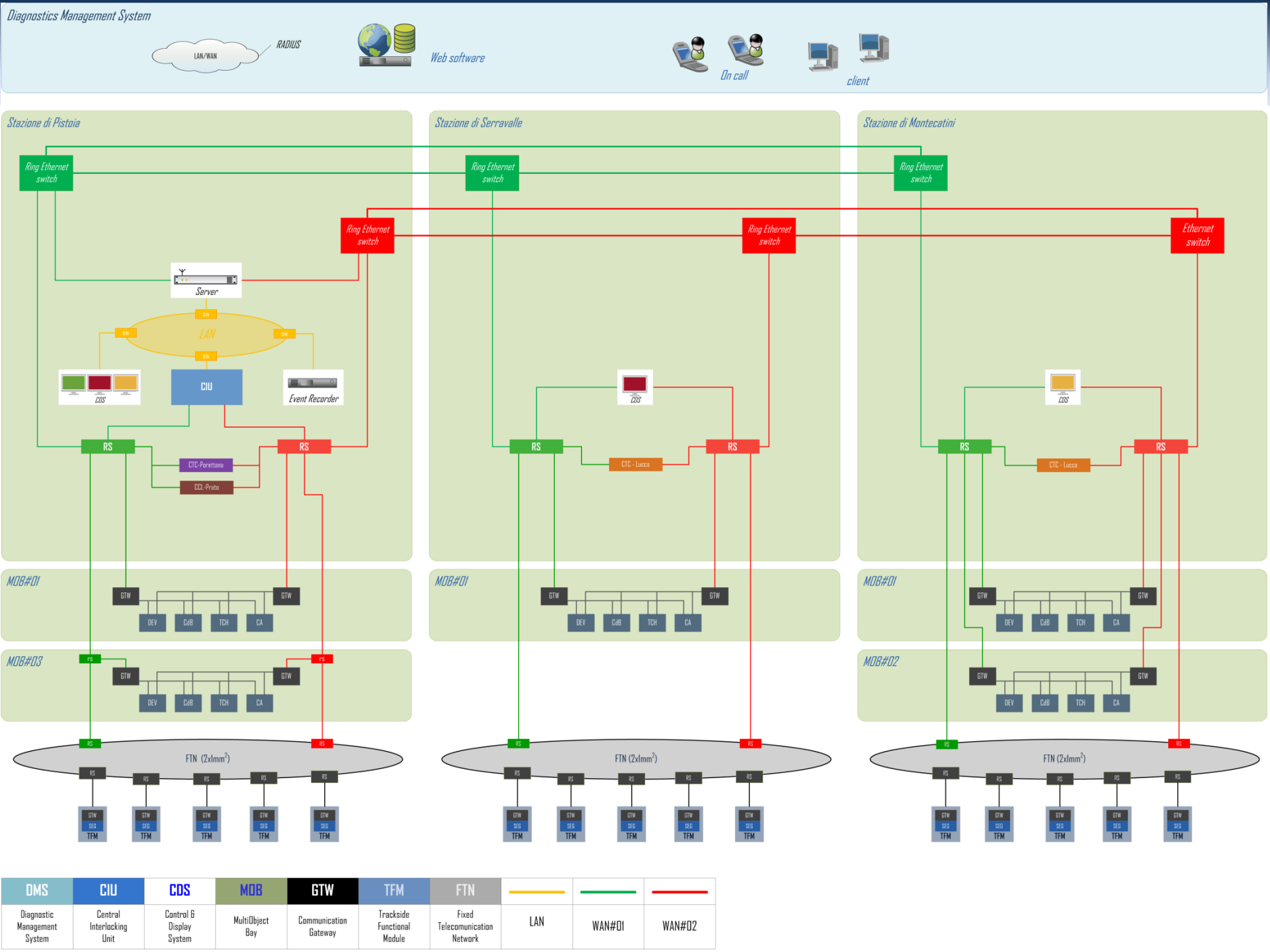


First application








Diagnostics Management System
LAN/WAN
RADIUS
Web software
On call
client
Stazione di Pistoia
Stazione di Serravalle
Stazione di Montecatini
Ring Ethernet switch
Ethernet switch
Server
LAN
CDS
CIU
Event Recorder
RS
CTC-Parettana
CCL-Prato
CTC - Lucca
MOB#01
MOB#03
MOB#02
GTW
DEV
CdB
TCH
CA
FTN (2x1mm²)
SEG
TFM
DMS
Diagnostic Management System
CIU
Central Interlocking Unit
CDS
Control & Display System
MOB
MultiObject Bay
GTW
Communication Gateway
TFM
Trackside Functional Module
FTN
Fixed Telecomunication Network
LAN
WAN#01
WAN#02

AUSIF

The very best in remote control for railway systems

What is special about AUSIF?

- **Centralised** information

- **Remote control** of geographically distributed equipment
- **Clear and precise presentation** of data (states and variations)

Performance data

10.000.000

number of database records managed

400.000

number of status variations per day

Performance data

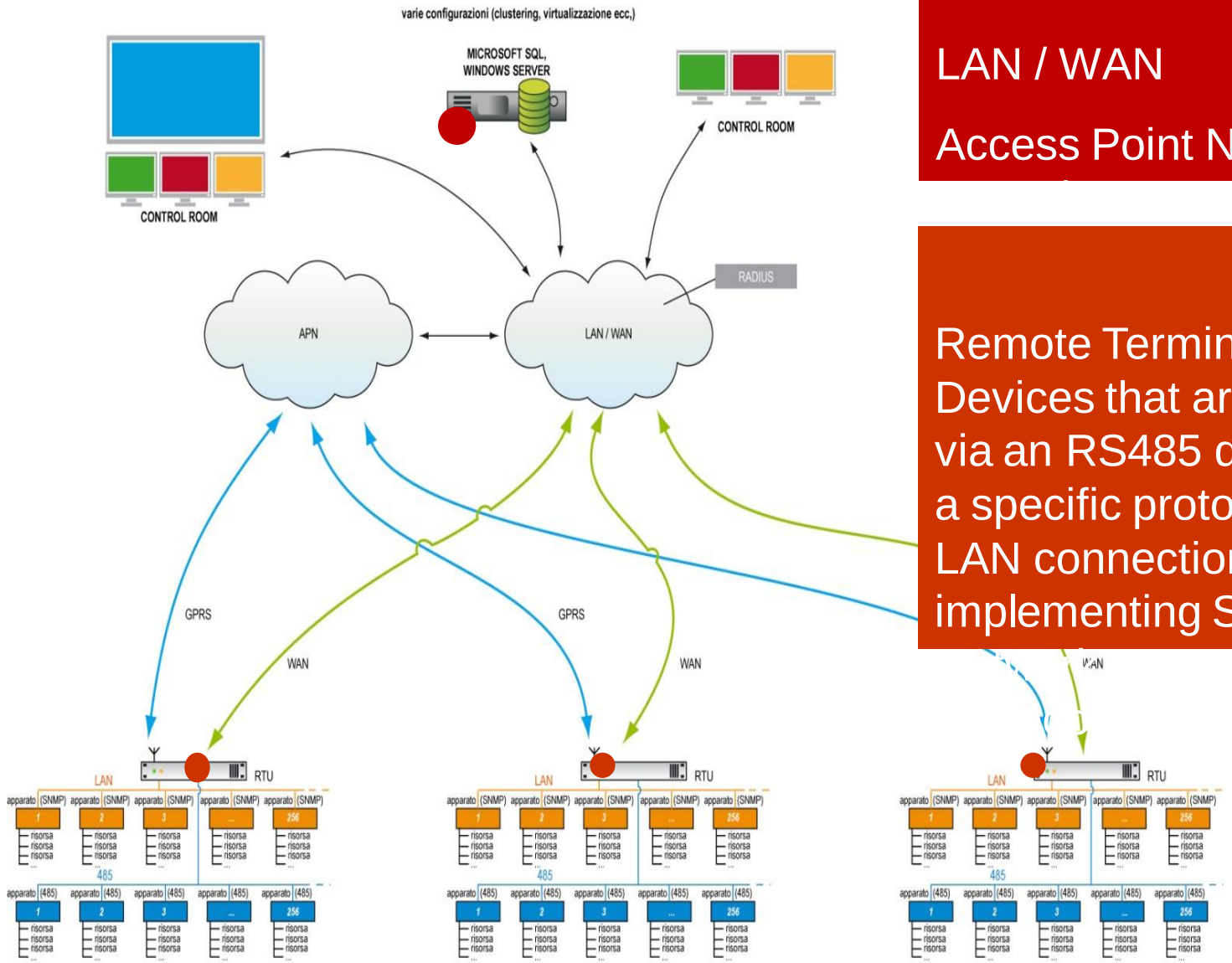
40.000

number of status variations per hour

3

seconds max. data acquisition time

AUSIF: System components



Web server (Windows Server + Microsoft SQL)

LAN / WAN

Access Point Name (GPRS,

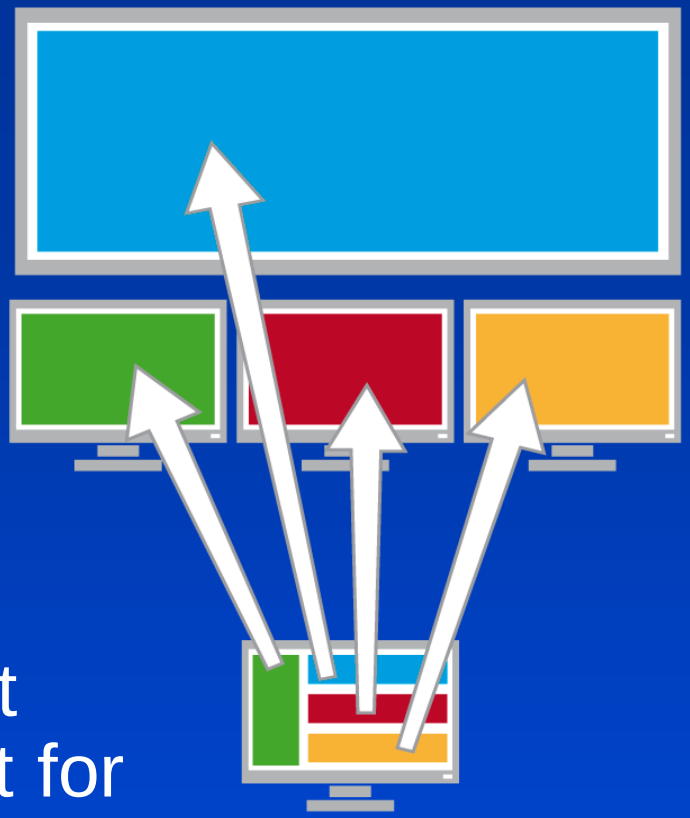
Remote Terminal Unit (RTU). Devices that are connected via an RS485 data link using a specific protocol and/or LAN connection implementing Simple

Key features

WEB technology

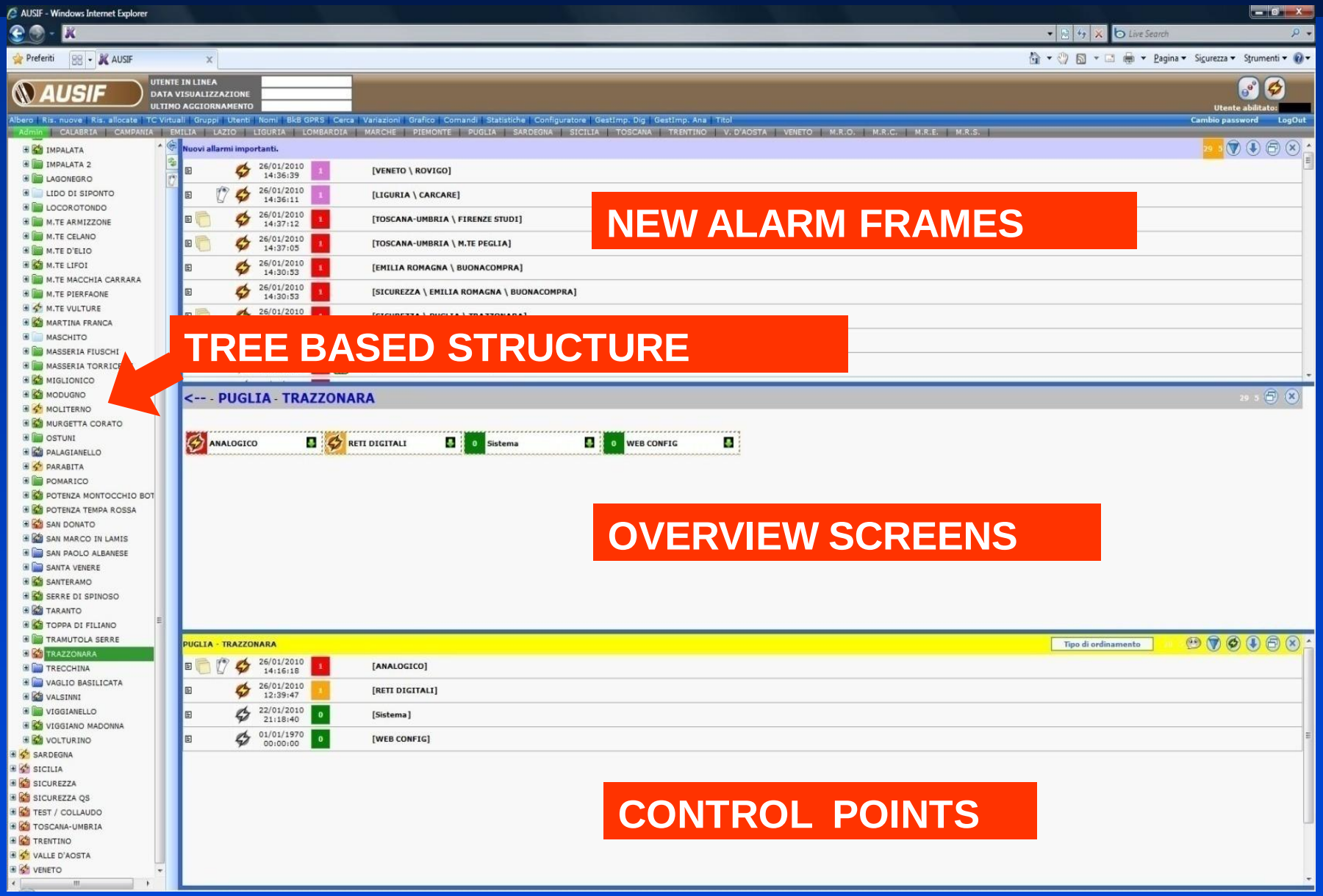
- Use of **multi-monitors**
- **Secure** transmission and data correctness
- **Strong point:** informs the user about device states and VARIATIONS providing a true and undisputable picture of the information displayed

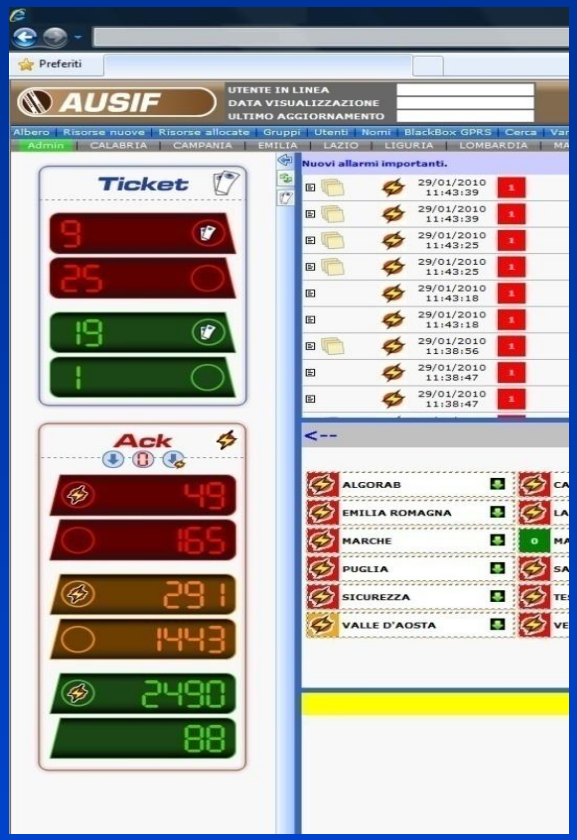
Multi-monitors



It is possible to send the information frames to different monitors (typical arrangement for a control room)

AUSIF: Screens

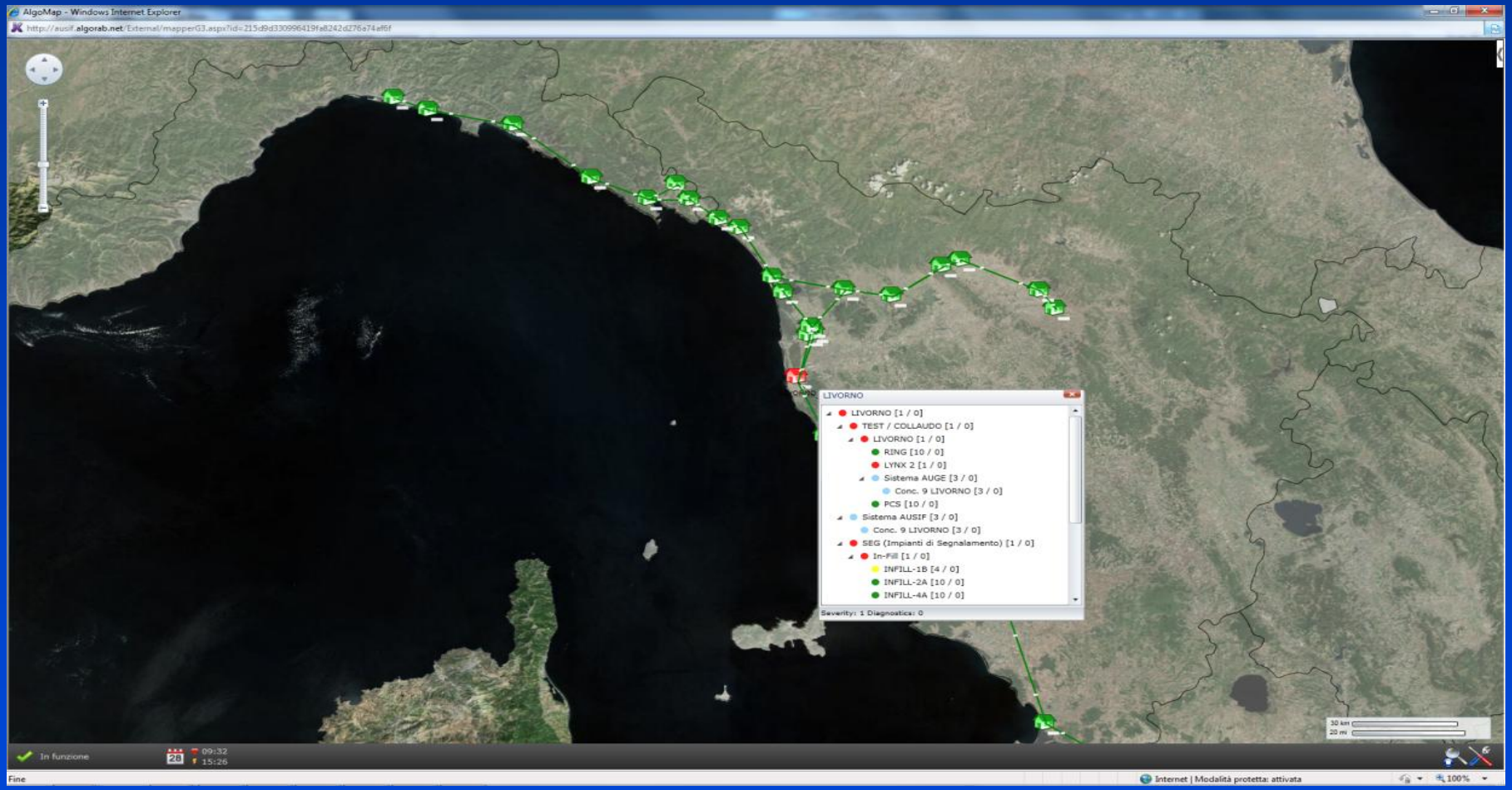


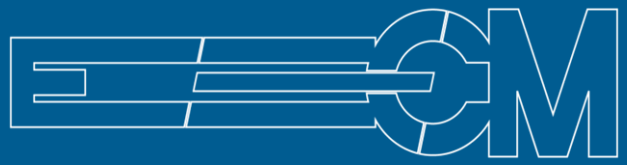


Counter dashboard

Alternative to the tree structure approach, offering a numerical summary of the entire situation

Geo module: AUSIFmap





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