

Modern axle counters - Customized and reliable solutions

Manfred Sommergruber | Technical Sales Manager



Agenda

- **Train Detection Systems: Challenges**
- **Modern solutions / features with axle counters (FAdC)**
 - Intelligent functions
 - Flexible architecture
 - Redundancy
 - Modern open communication
- **Customized Applications**
- **References**

Challenges

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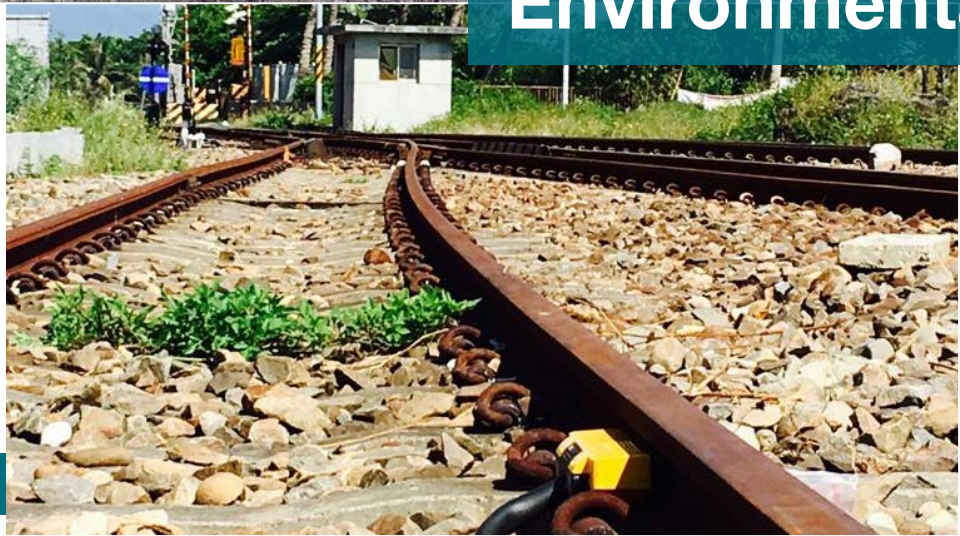
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Challenges – external / electrical conditions

- TD is the backbone of railway signaling - harsh railway environment
- Climate change → flooding / thunderstorms / etc.
- Traction currents – electrification → electrical disturbances
- Unavoidable external disturbances → Maintenance, vandalism
- Different interfaces to different systems
- Maximum track availability & reliability needed
- Changing railway environment → growing demands
- Cost efficient



Environmental conditions



Modern solutions / features

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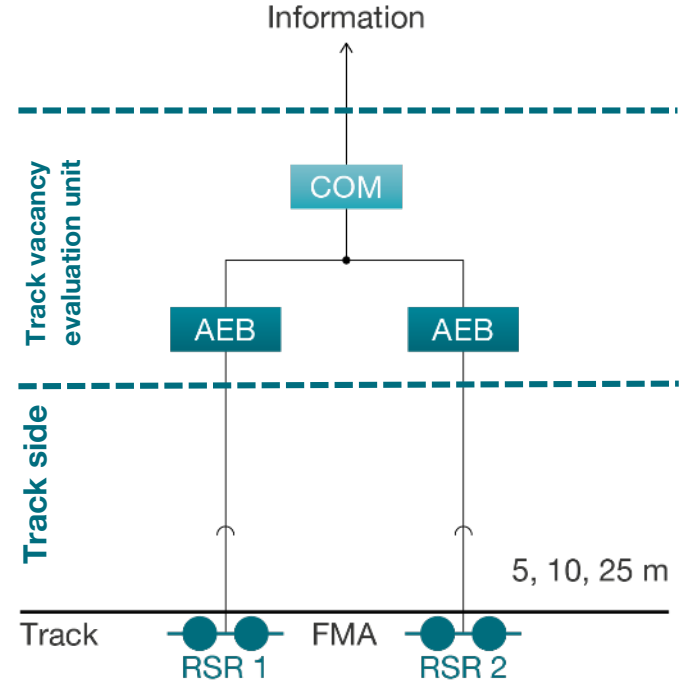
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Solutions / Features – Modern architecture

No electronics at track side!

- No direct exposure to the environment
- No direct exposure to external disturbances
- No direct contact to the public



Frauscher architecture compliant to EN50617-2 and TRA specification.

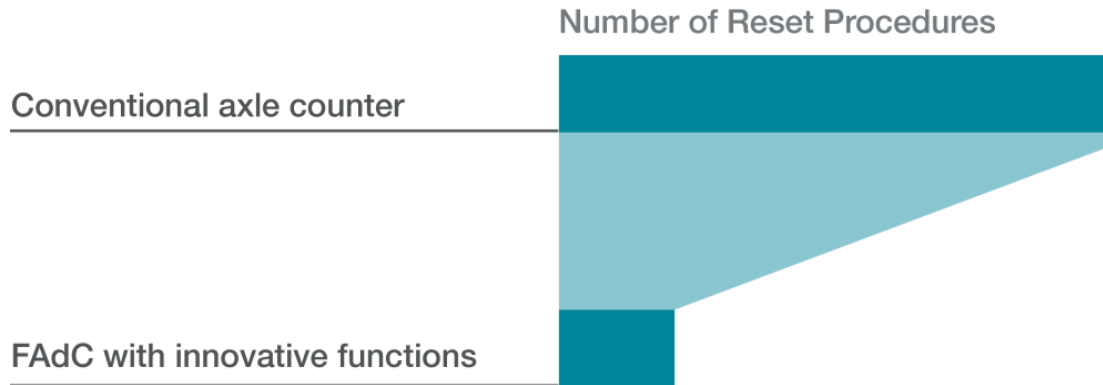
Solutions / Features – Modern wheel sensor

- Clamped on rail
- No drilling needed
- No complex requirement on cabling and laying
- No recalibration of wheel sensor needed
- IP68
- SIL4 fallen off detection

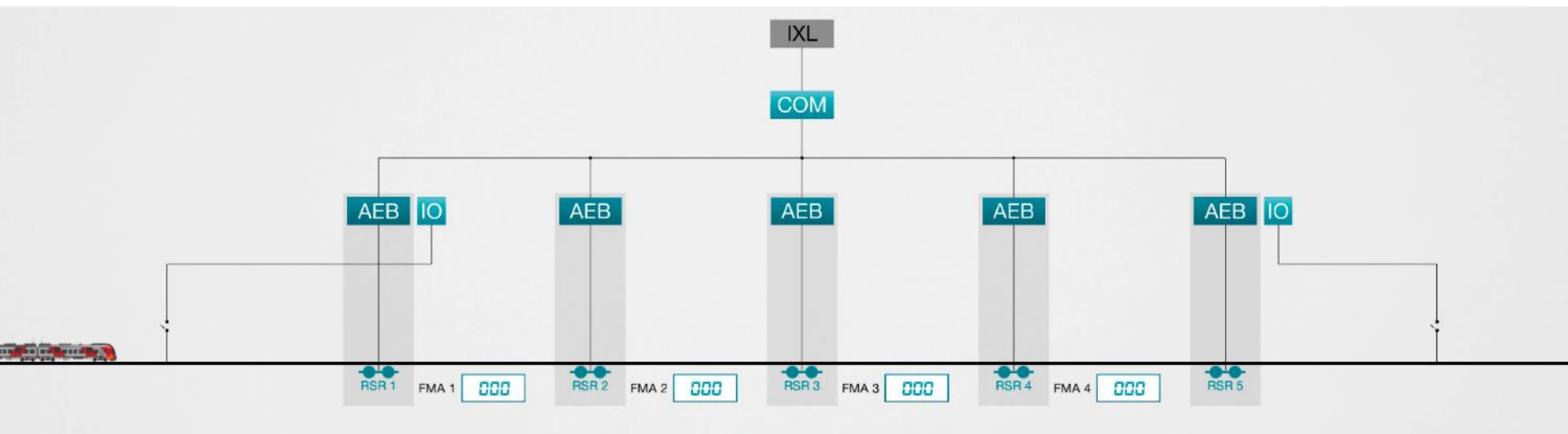


Features – Safe intelligent differentiation

- Suppression of faults → **Counting Head Control (CHC)**
- Automated fault correction → **Supervisor Track Section (STS)**



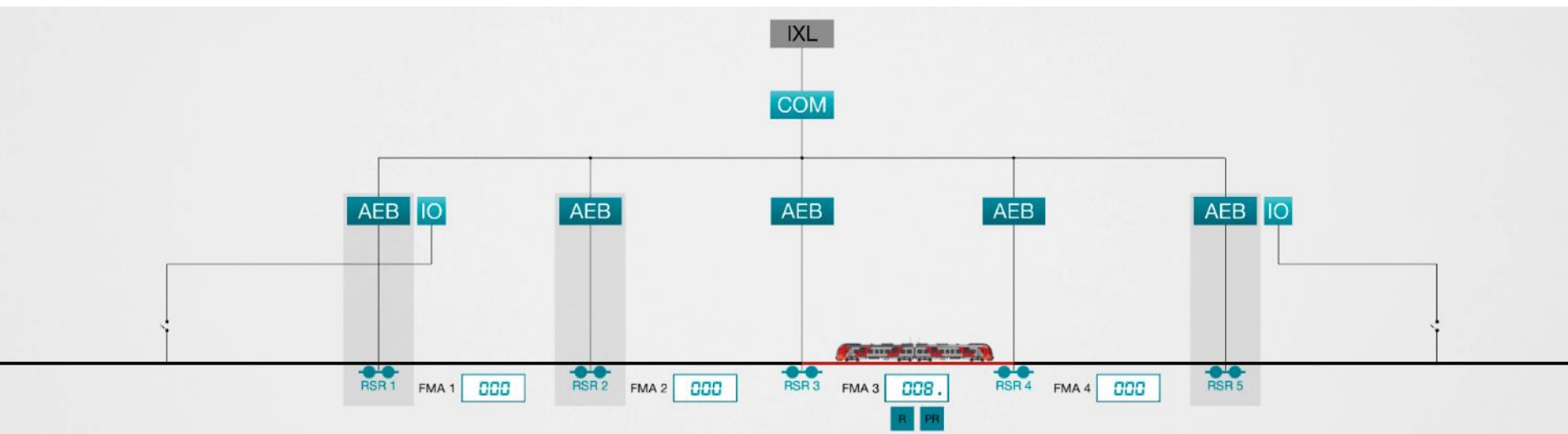
Solutions / Features - CHC



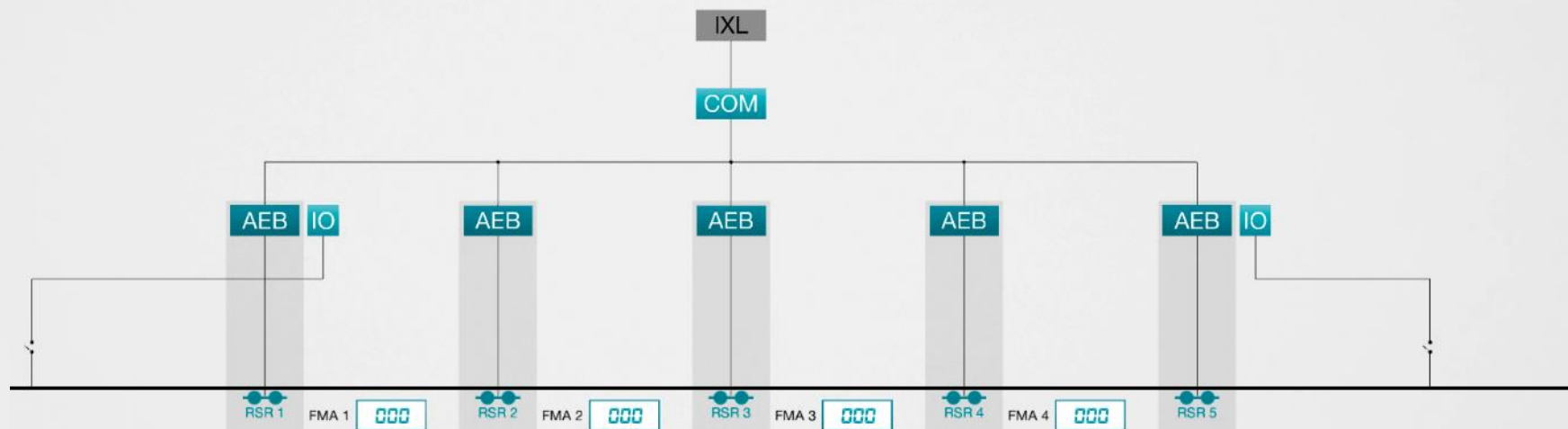
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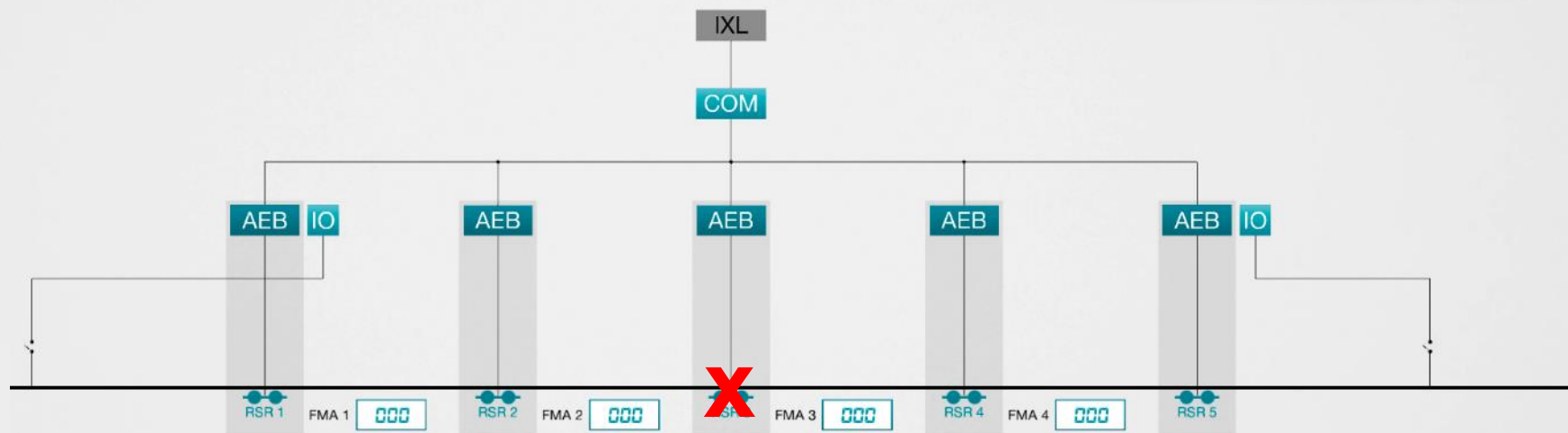
Solutions / Features - CHC



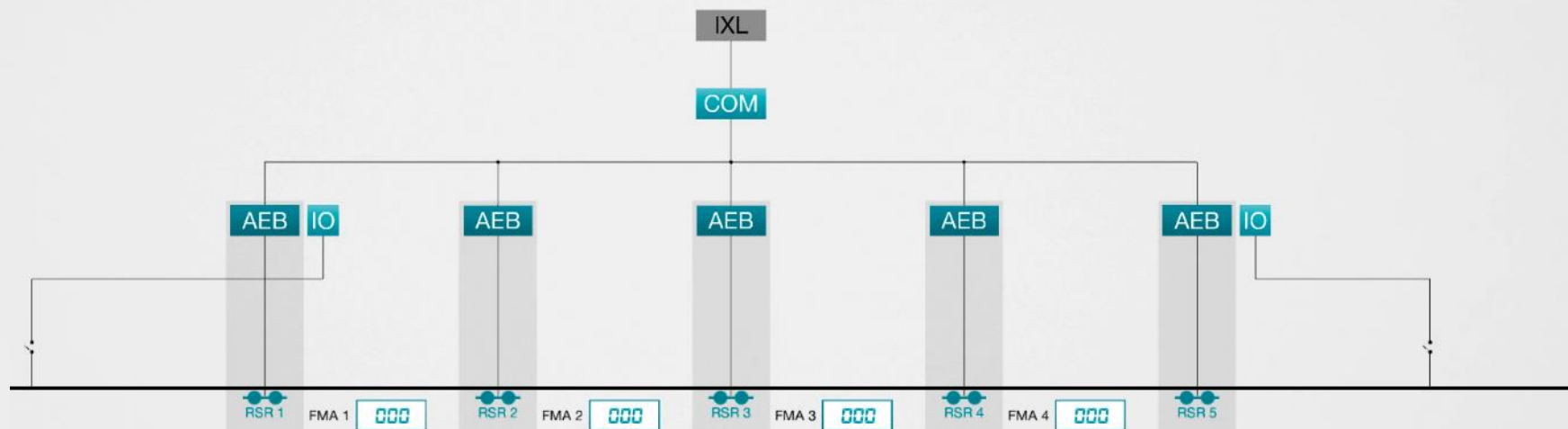
Solutions / Features - CHC



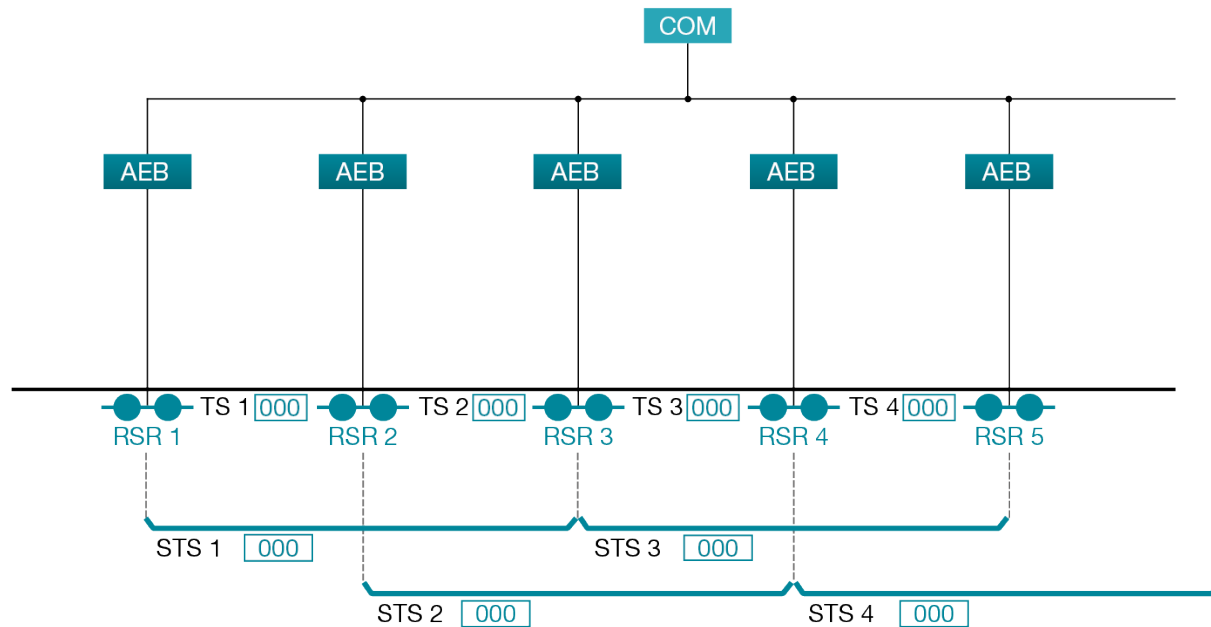
Solutions / Features - CHC



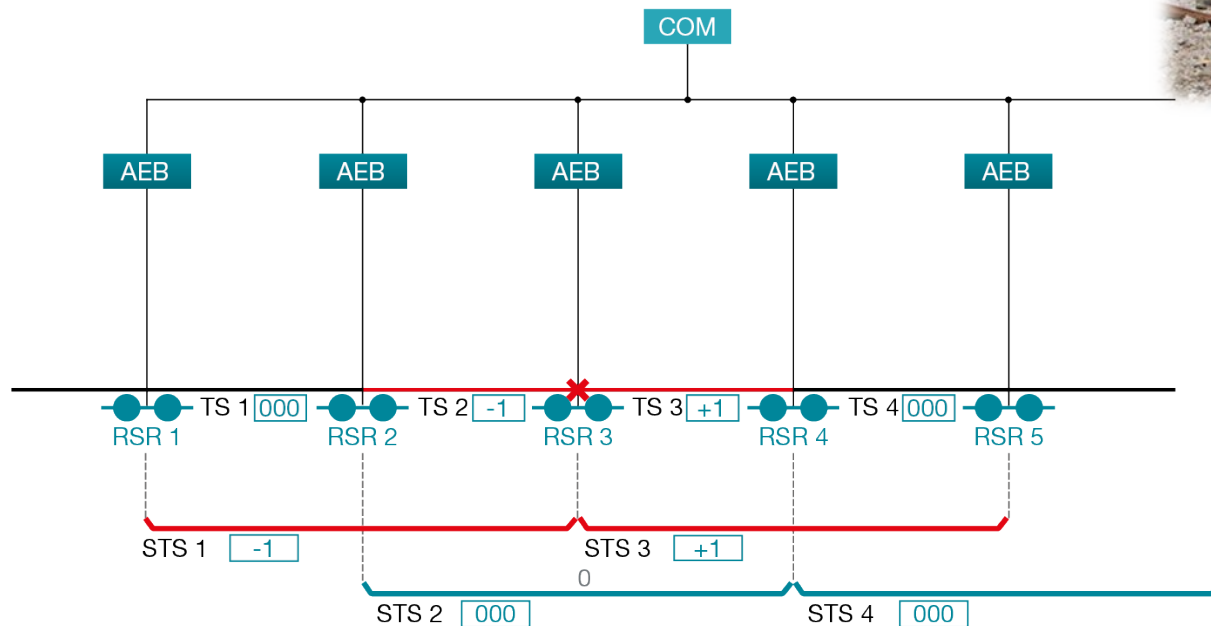
Solutions / Features - CHC



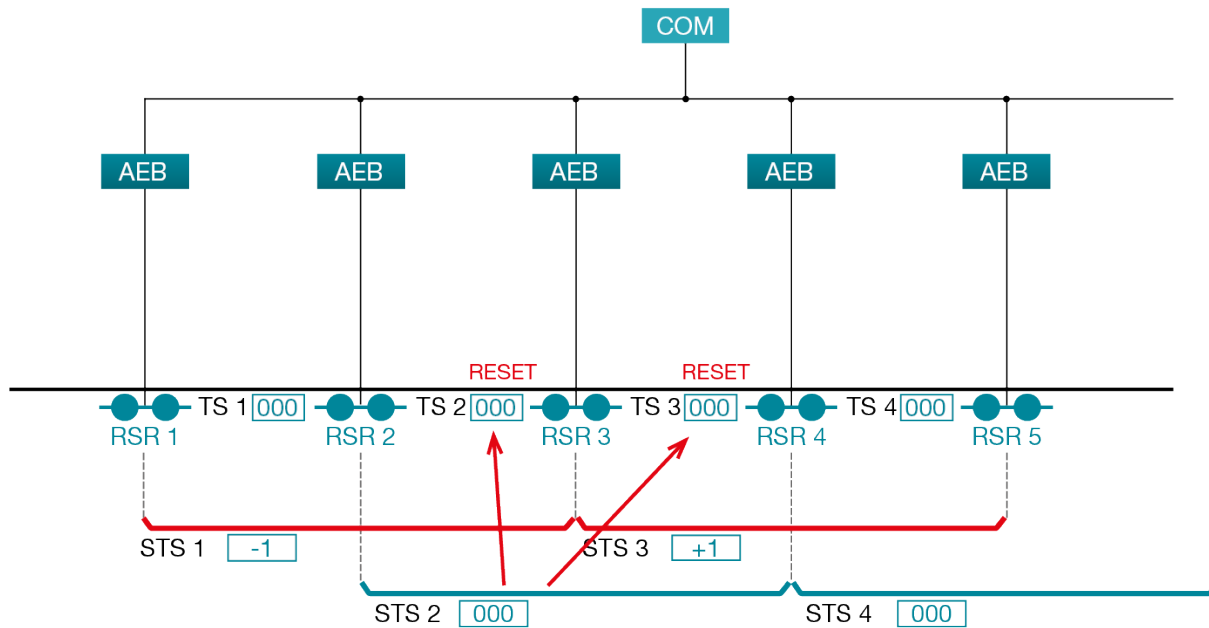
Supervisor Track Section STS



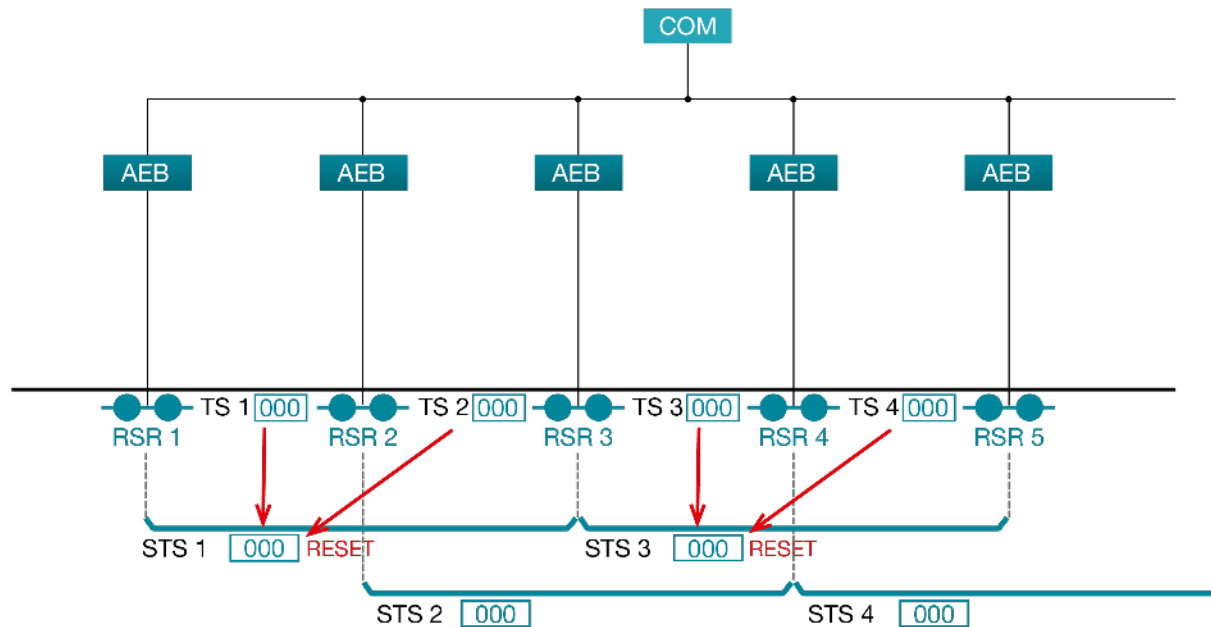
Supervisor Track Section STS



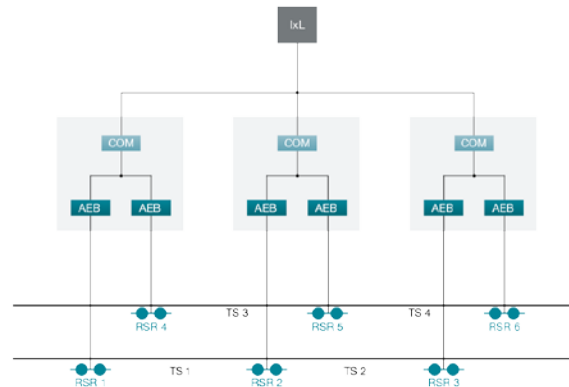
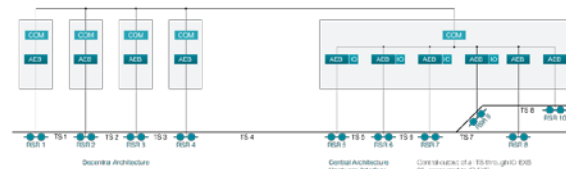
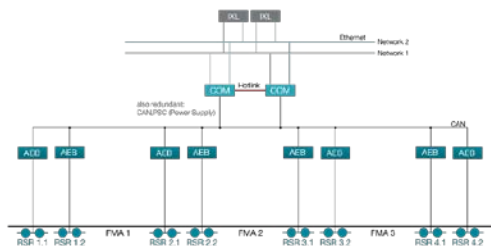
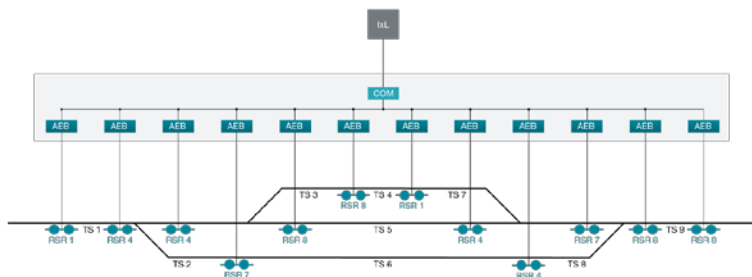
Supervisor Track Section STS



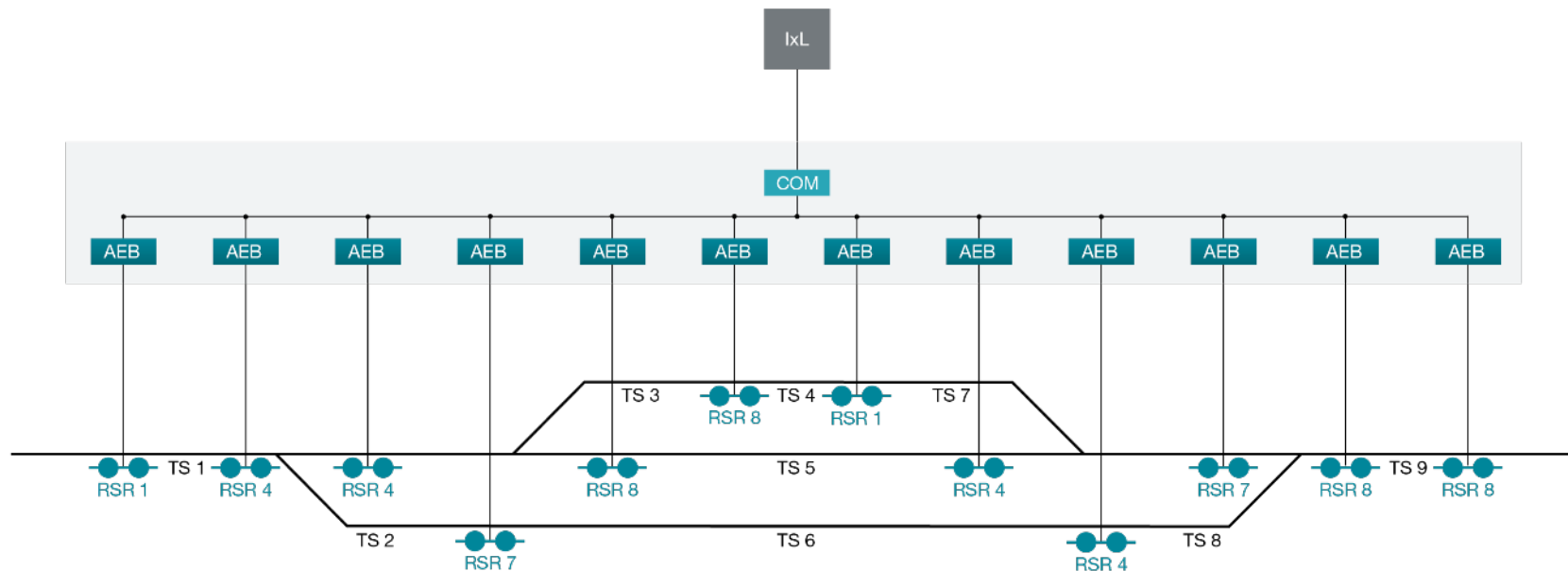
Supervisor Track Section STS



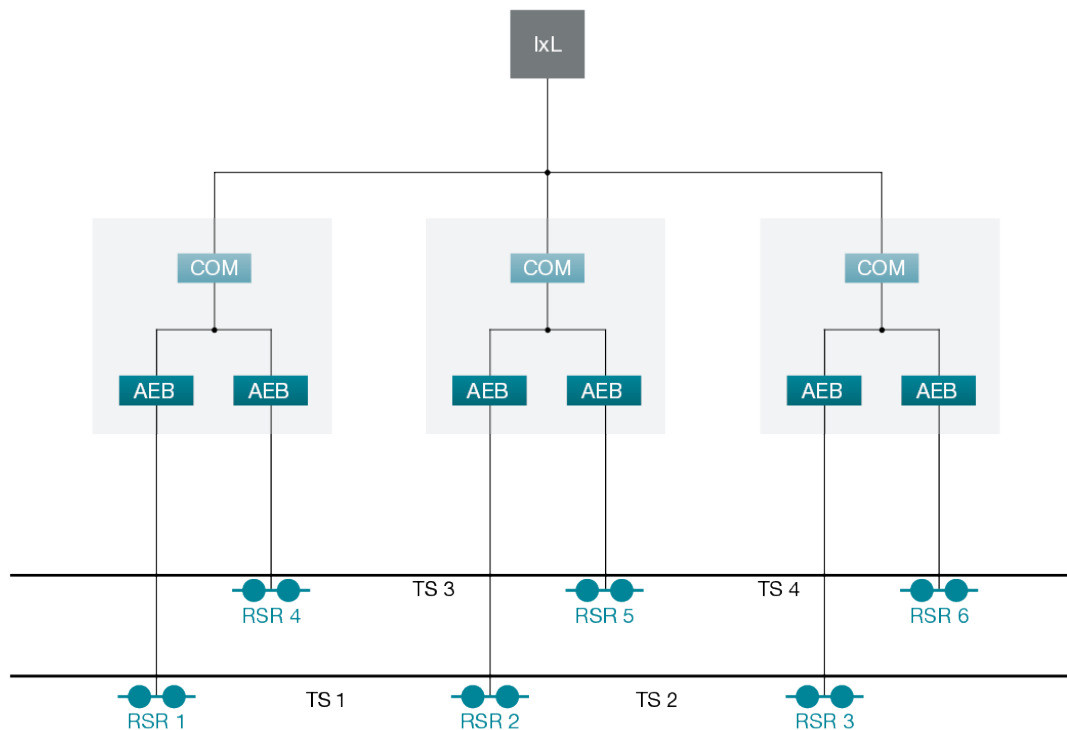
Architecture



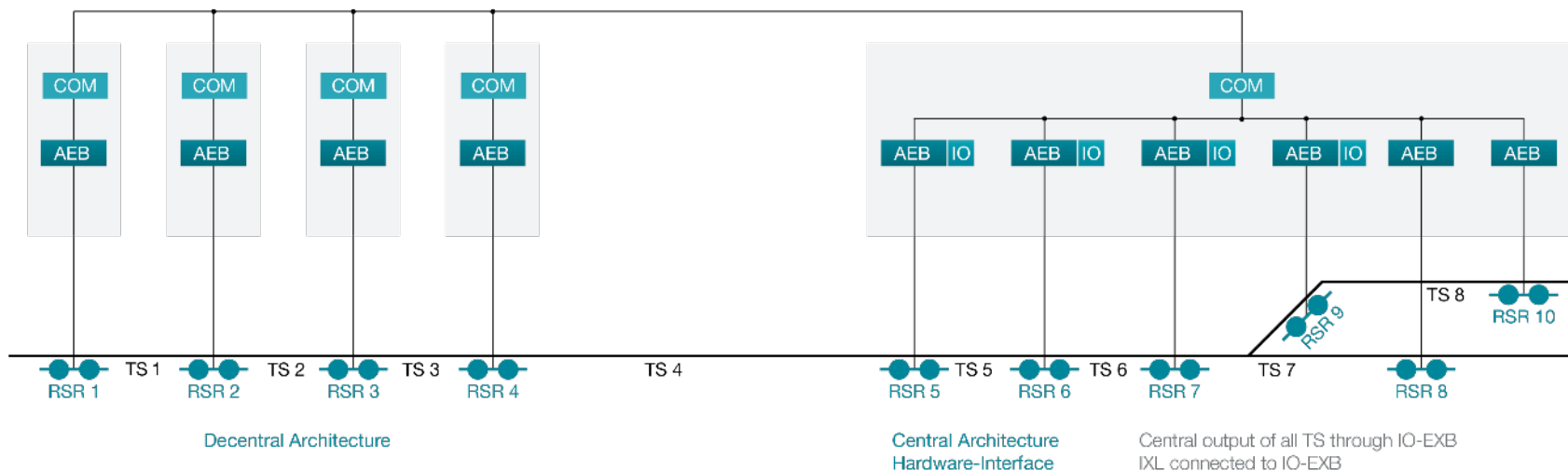
Features – Centralized Architecture



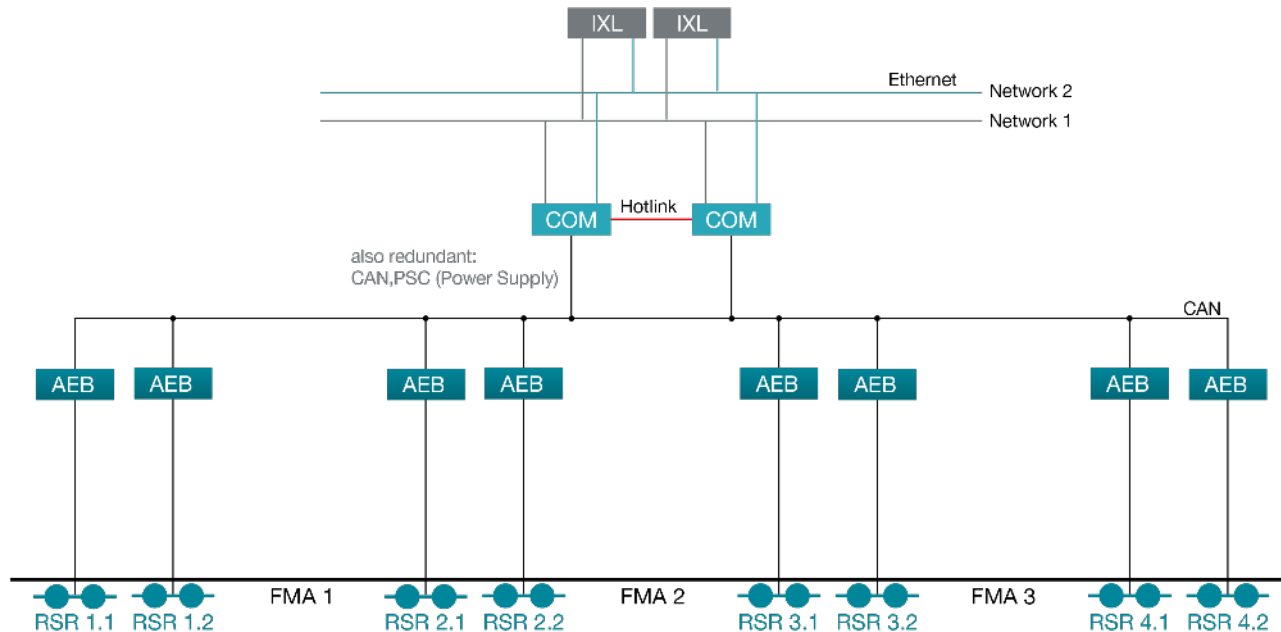
Features – Modular Architecture



Features – Combined Architecture



Features – Full Redundancy



Solutions – Modern interfaces

Software interfaces

Transmission via safe protocols

- Clear / occupied
- Direction
- IO-data
- Reset

Additional information:

- Diagnostic data
- Speed
- Diameter

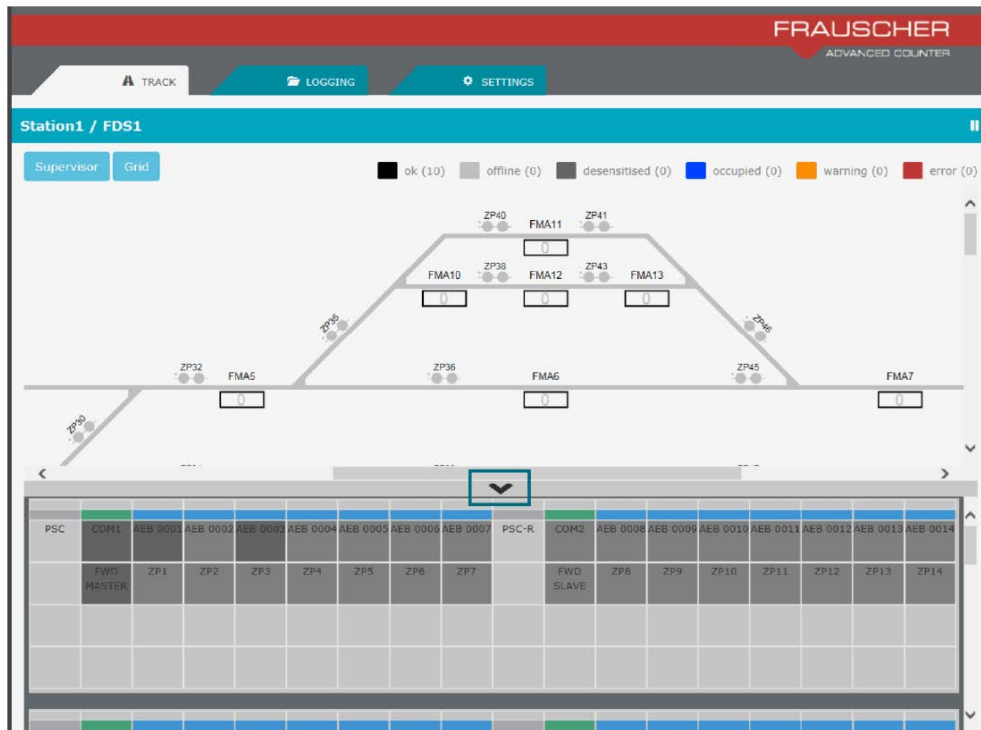
Hardware interfaces

- Relais
 - Clear / occupied
 - Direction
 - IO-data
- Optocoupler
 - Reset

Frauscher Safe Ethernet FSE

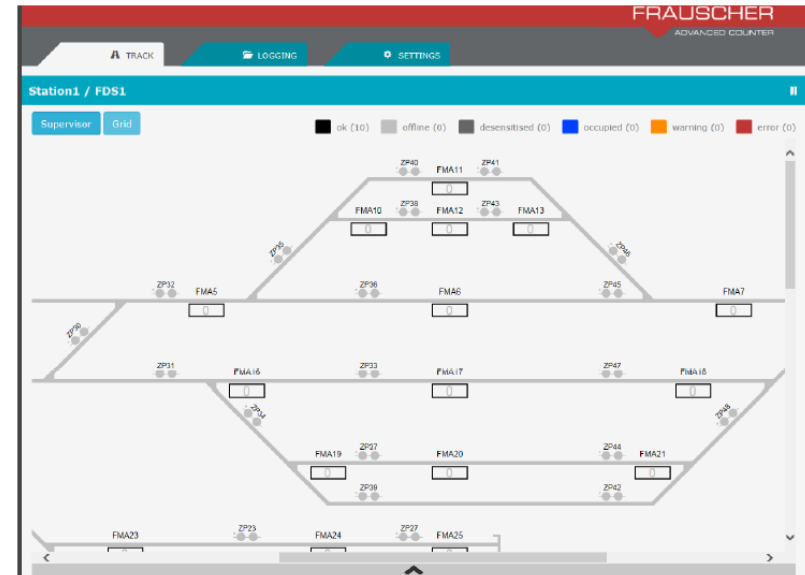
- Vital transmission in cycles
- Transmission in both directions
- Redundant network compatible
- Free definition of file contents to be transferred
- Transmission of up to 200 bytes of application data
- Simple and easy installation

Features – Advanced Diagnostics



Frauscher Diagnostic System FDS

- Remote diagnostics
- Immediate troubleshooting support
- Error messages in clear text
- Preventative maintenance
- Reducing maintenance costs
- Statistics
- Easy data storage and logging
- XML- Interface



Summary – Challenges solved

- ~~Backbone of railway signaling - harsh railway environment~~ IP68 ✓
- ~~Climate change → flooding / thunderstorms / etc.~~ ✓
- ~~Changing railway environment → growing demands~~ CHC / STS ✓
- ~~Maximum track availability & reliability needed~~ ✓
- ~~Cost efficient~~ Flexible architecture / diagnostics / included features ✓
- ~~Traction currents – electrification → electrical disturbances~~ No electronics at track side ✓
- ~~Unavoidable external disturbances → maintenance, vandalism~~ ✓
- ~~Different interfaces to different systems~~ Relay / serial interface / Ethernet ✓

Customized Solutions

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Customized Solutions



Customized solutions – Tram Lines



Flooding resistant – IP68



No vandalism



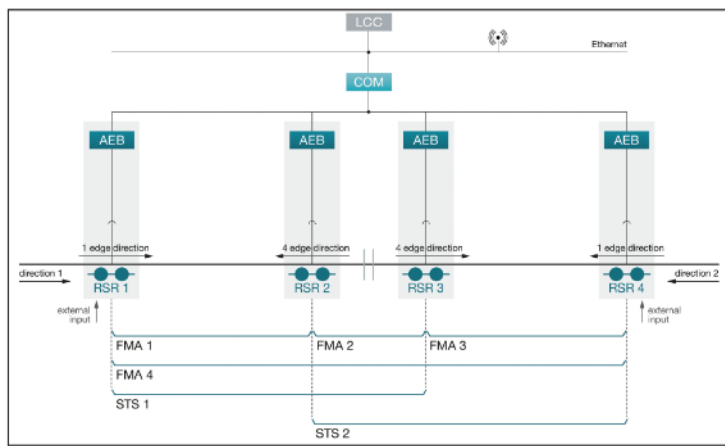
Widely service proven



Counting Head Control

Customized Solutions – Level Crossing

- FAdC for modern level crossings
- Intelligent features to enhanced LC operation
- Trigger for obstacle detection system



Customized solutions - Main Line / High Speed Line

- Dual axle counter – redundancy
- 450km/h
- No electronics at track side
- Centralized architecture
- Remote diagnostics
- SIL 4
- Flooding proven IP 68



References

High Speed Lines

CHINA



- Railway Beijing – Shanghai
- Axle Counters
- Speed: 300 km/h

ÖBB | AUSTRIA



- Line Vienna – St. Pölten
- Axle Counters
- Speed: 250 km/h

ADIF | SPAIN



- Various High Speed Lines
- Axle Counters
- Speed: 300 km/h

Tram

DUBAI



- Volume:
128 counting heads
90 track sections

BARCELONA



- Volume:
18 counting heads
10 track sections

REIMS



- Volume:
69 counting heads
45 track sections

Axle Counting Projects (CBTC fall back)

SILE HONGKONG



- Operator: MTR Hong Kong
- Volume:
94 counting heads
76 track sections

METRO SAO PAULO



- Operator: Metro Sao Paulo
- Volume:
1105 counting heads
881 track sections

LUCKNOW METRO



- Operator: Lucknow Metro Rail Corporation
- Volume:
372 counting heads
10 stations and one depot

Metro

METRO DELHI | IN



- Volume:
393 counting heads
26 stations

HOUSTON | USA



- Houston Metro was able to transport over 700.000 passengers during Super Bowl LI festivities without problems.

BEIJING METRO | CN



- Volume:
252 counting heads
215 track sections

Frauscher Advanced Counter provides:

**Maximum availability with
the optimum level of
safety and availability combined with
low life cycle costs**



Manfred Sommergruber
Technical Sales Manager

Frauscher Sensortechnik GmbH

Gewerbestraße 1 | 4774 St. Marienkirchen | AUSTRIA

☎ +43 7711 2920-0 | ✉ office@frauscher.com

www.frauscher.com