How digitalization is shaping the future of mobility

Digital station and cloud based signaling
With digitalization, we enable mobility operators worldwide to …

… make infrastructure intelligent

… increase value sustainably over the entire lifecycle

… enhance passenger experience

… guarantee availability
How digitalization is enabling operators worldwide to shape connected mobility

The digital station is at the heart of intermodality

Value creation through standardized frameworks (ATO)

Smooth migration to boost performance (ETCS Level 3)

Cybersecurity protects the digital infrastructure

Cloud-based signaling solutions become reality
In an era of interconnected and digitalized mobility, travel behavior is changing

One single interface
We offer comprehensive solutions for door-to-door travel
The digital station

...is the center point of urban mobility
The Digital Station Manager connects railway stations and passengers with cloud-based control software.

Digital Station Manager

- Security Management
- Passenger Information
- Communication
- SCADA

1 Supervisory Control And Data Acquisition
The digital station eco-system allows customers worldwide to optimize operations

- OPEX -20%
- Improved passenger experience

- Station Energy Optimizer
- Disruption Management
- Smart Asset Monitoring
- Security Solutions

- Traffic Control
- Traffic Regulation
- Rail Security

- MindConnectRail
- MindSphere

- Station Management
- Passenger Information
- Power Control

- Capacity Forecasting
- Ticketing and Passenger Flow
- Passenger Connectivity (WiFi)
- First/Last mile integration

- Controlguide Rail9000 (Signaling Line Management)
- Controlguide Digital Station Manager

Supported by Artificial Intelligence
Passenger forecasts based on Artificial Intelligence increase capacity and generate valuable travel information.
Combining data analytics from different subsystems on MindSphere unleashes a new dimension of optimization

- **Availability**
  - Demand Responsive Operation
  - Energy Optimized Operation
  - Radio Monitoring Dashboard
  - Predictive Capacity Management
  - Individual Passenger Information
  - iCCTV Security Solutions

- **Increased value over the entire lifecycle**
  - AI powered decision support

- **Passenger Experience**
  - MindConnect Rail
  - Digital Station Manager
  - CBTC
  - Station assets and infrastructure

- **Control and Automate**
  - Signaling Line Manager
  - CBTC
  - ATO
  - Traffic Regulation Rail Security
  - Power Control
  - Passenger Information

- **Move**
  - Connected Points

- **Safety and Integrity**
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MindConnect Rail ensures full connectivity and a safely protected railway infrastructure

Data Capture Unit (DCU):
Fully secured
Your safety relevant network remains physically isolated via the integration of Siemens CoreShield Data Capture Unit working as data diode

Wooden House

MindSphere

MindConnect Rail

Internet
Local / diagnostic network

Safety critical network

DCU
SIL4 certified

Other target systems
Operation Control Centre
Interlocking

Other target systems
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From conventional electronic interlockings towards a distributed architecture allowing for cloud based signaling

Our goal is the substantial reduction of hardware components
The Digital Interlocking becomes reality: One central interlocking for an entire country

- IP-based signaling for Norway
- Unlimited scalability
- Less cabling
- Standard interfaces
- Easy maintenance
- One overall system
- Improved analysis of operational data
- Enhanced diagnostic via standard interfaces
The future is cloud based services with one unified interlocking system for all elements

Features
- No spare parts
- Flexible release management
- 50% less space and energy
- Mixed applications on one platform
- Easy migration
- Geo-redundancy

Approved and ready for implementation
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ETCS Transformation: From track vacancy detection with infrastructure towards seamless train position reporting

- ETCS Level 1
  - Smart migration
  - Lower CAPEX/OPEX

- ETCS Level 2
  - Capacity increase
  - Continuous communication

- ETCS Level 3
  - Less hardware
  - High availability

- Standardization

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Based on proven ETCS technology, we unlock further benefits for railway operation with ETCS L3

- 15% capacity increase
- 20% less infrastructure costs
- Smart migration for mixed traffic
- Priority for safety and availability
Our solution for smart ETCS migration: Hybrid L3 System with virtual fixed blocks ready for implementation

Successful demo in December 2017 in the UK

ETCS Level 1 or 2  ETCS Level 3 overlay for fitted trains

Example:
Virtual Block with track vacancy detection following unfitted train
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Automatic train operation (ATO) over ETCS: Higher throughput, energy savings, driver relief

- Shorter headways by consistent driving
- Up to 20% energy savings by coasting
- Driver relief during starting
ATO over ETCS: Boost capacity and save energy

Standardized Frameworks: ETCS compatibility

Benefits

• **Smooter operation**: Trains stick to forecasted schedule
• **Increased capacity**: Driving close to braking curve
• **Fewer conflicts** and unplanned stops
• **Energy savings** through optimized train movements
• **Less wear and tear**: No unnecessary braking anymore
• **Protection of investment** through TSI conformity
Co-creating the future with our customers at InnoTrans
Experience the Railway Transformation with Siemens

Digital Interlocking  Augmented Reality  Real-time simulation
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