



Rail service innovations

A future outlook

Industry Sector, Mobility Division

SIEMENS

Mobility is the key success factor of modern economies

Changing requirements for rail services



Current situation

- Increasing rail traffic
- Changing transport behavior
- Growing complexity

Changing requirements

- Increase availability
- Reduce costs
- Focus on safety issues

The knowledge about the condition of vehicles and infrastructure will be of incremental importance in the future

Reactive Maintenance



- Maintenance based on fixed intervals
- Triggered by regulation
- Only visual inspection by service people

Proactive Maintenance



- Transfer of diagnostic data in fixed intervals
- „Just-in-time“ planning of maintenance
- Remote monitoring of the operation

Predictive Maintenance



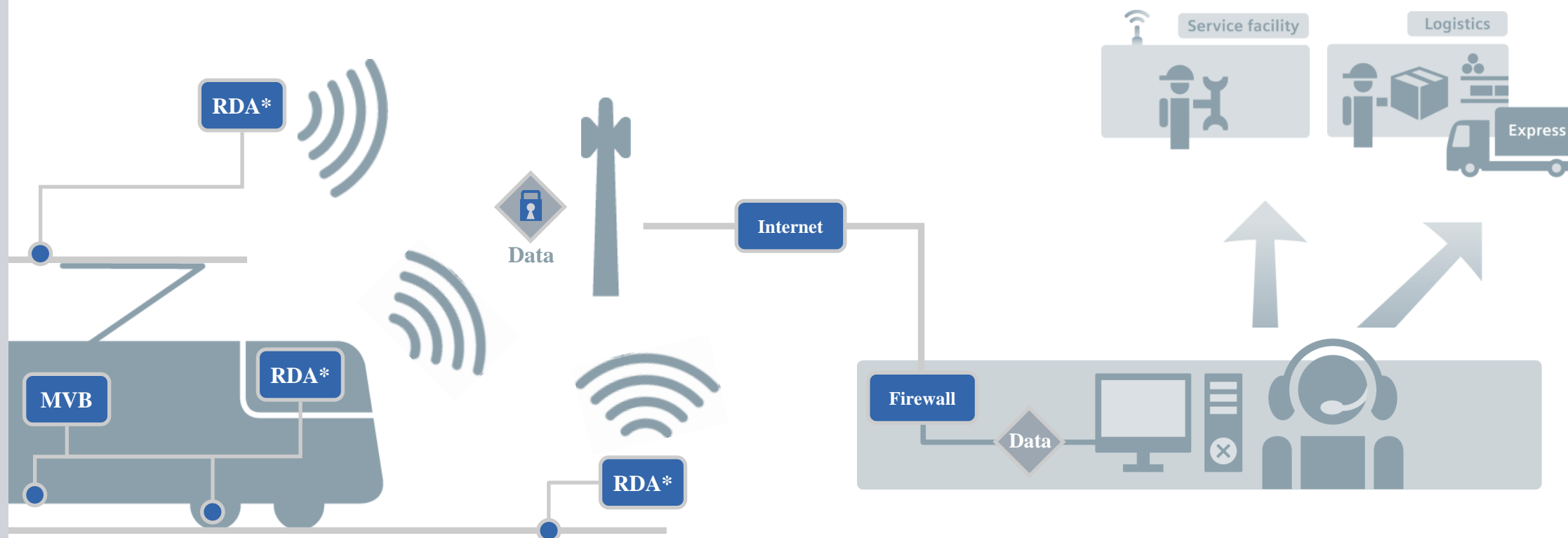
- Regular and steady transfer of data
- Prevention of faults through analysis of trends and patterns

Past

Future

Modern IT-infrastructure as basis for predictive maintenance – Evaluation of various data sources – from vehicles and infrastructure

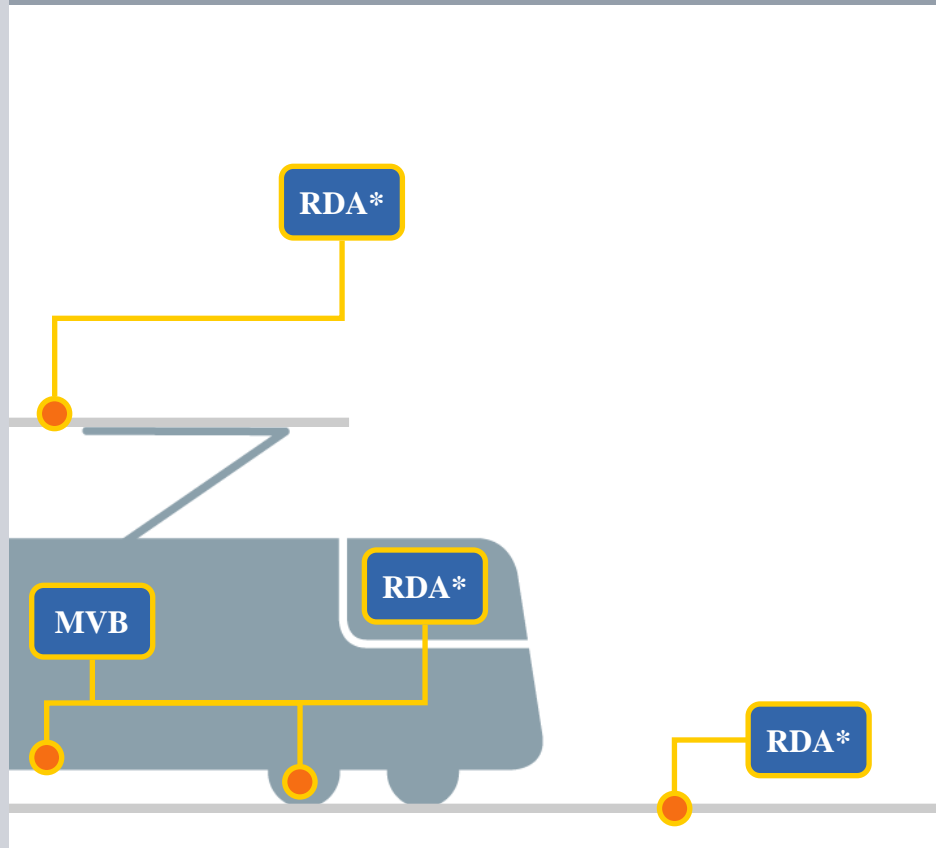
The path of the data...



* Remote Data Access

Indication of upcoming events – Via pattern or trend detection of significant signals

Sensors and data mining



Systems of the vehicles, e.g.

- Bogie
- Traction
- Brake
- Door
- HVAC

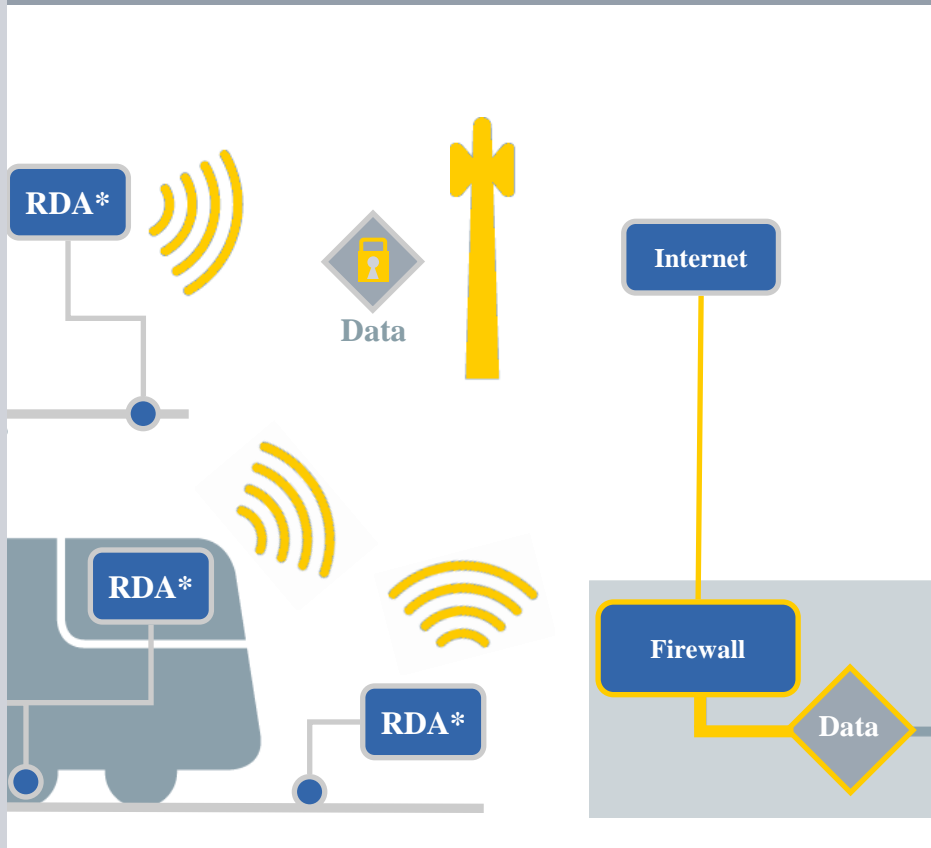
Systems of the infrastructure, e.g.

- Point machine
- Overhead line

* Remote Data Access

**Security is of greatest importance –
so that data is transmitted reliably from the rail systems**

Secure transfer of data



Security while transferring data:

- Codified data transfer
- Authentication and authorization
- Multi-redundancy

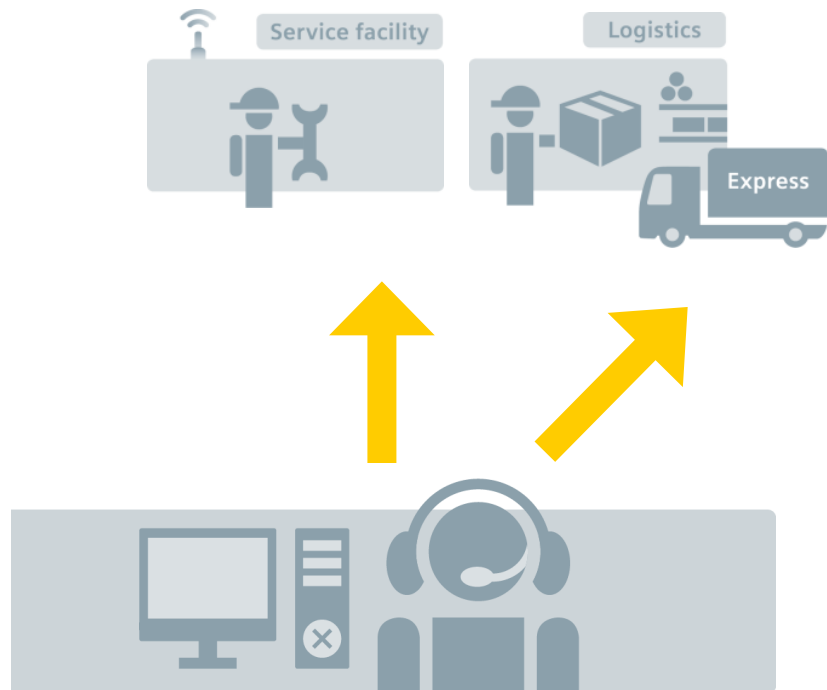
Guarantee

- No access from third parties, e.g. from the internet
- No transfer of viruses or other malicious software
- No abuse of sensitive data

* Remote Data Access

Qualified trend analysis and fault prediction – for less corrective maintenance in future

Predictive maintenance



Predictive maintenance

- Remote access to rail systems
- Constant monitoring of systems
- Utilization of all available data
- Conclusions on faults
- Linking diagnosis data with CMMS
- Better planning of all maintenance activities (Depot capacities, Spare part stocks, etc.)
- Maintenance intervals based on actual condition of systems

Analyzing the condition of rail systems – Improving reliability by monitoring of door motor currents

Predictive maintenance - Example





Let's face the future...

- **IT-technology will change the way, how we do rail service**
- **Lifecycle costs will be the driving factor for product and service decisions**

We will find an answer – Siemens Rail Services

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