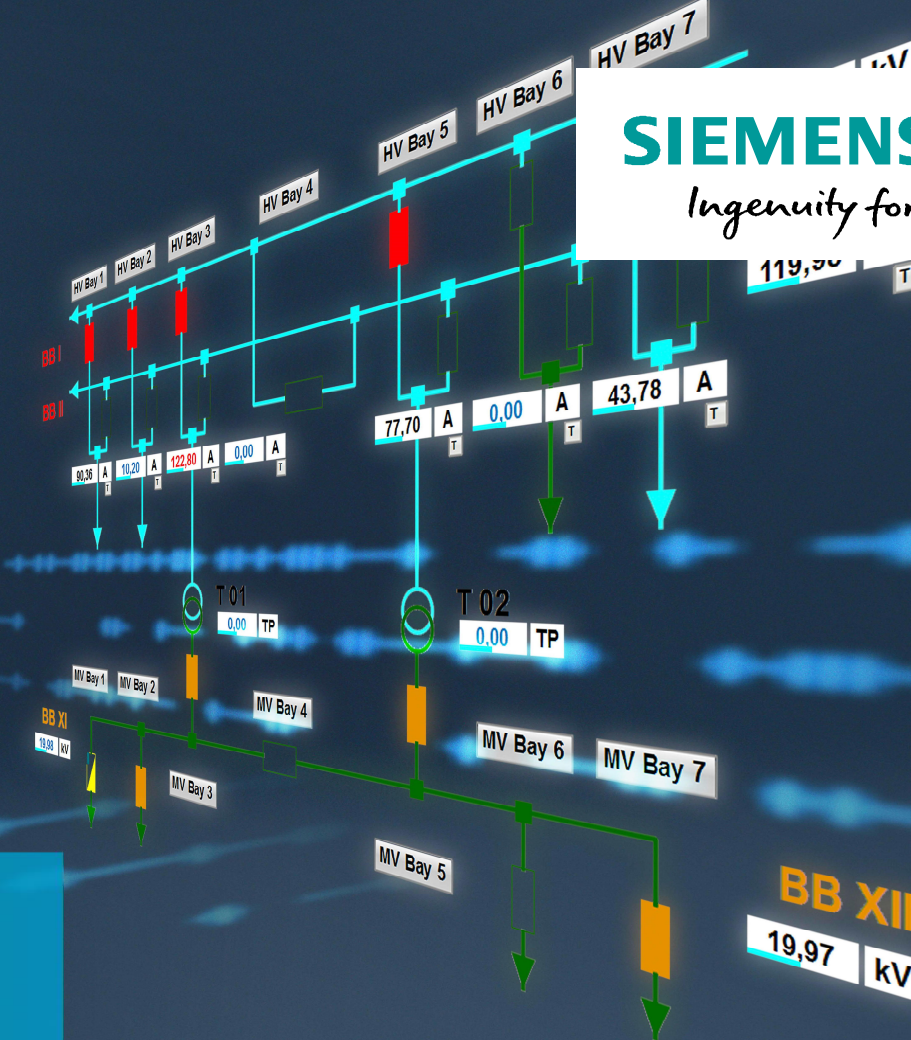


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Welotec - router and software solutions

Substation Automation & Protection Brugermøde 2020

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[siemens.com/digital-grid](https://www.siemens.com/digital-grid)

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This is Welotec



Experts for IT/OT convergence in the utility sector



- Founded in 1969
 - 25+ years of experience in the utility sector
 - Working with Siemens for 22+ years
 - Part of the Siemens A/S cubicals for 7+ years
-
- ISO 27001 and ISO 9001



That is why we are here



Solutions for HVDC, FACTS, T&D

- IEC 61850-3 Substation Server and Controller
- 4G LTE Routers, Edge Gateways and Antennas
- Management Software for mass deployments
- VPN, Firewall and security solutions for IT and OT
- Consultancy, Training and Design for IT/OT convergence solutions



That is why we are here

Part of the Siemens A/S DSO cubicals

- Reliable and secure 4G LTE communication for SICAM CP-8000, P800 and Q100
- Next-Generation solutions for your large scale roll out
 - Central management for mass deployments
 - Distributed and secure VPN infrastructure
 - Automated incident management
 - IT/OT network design and implementation

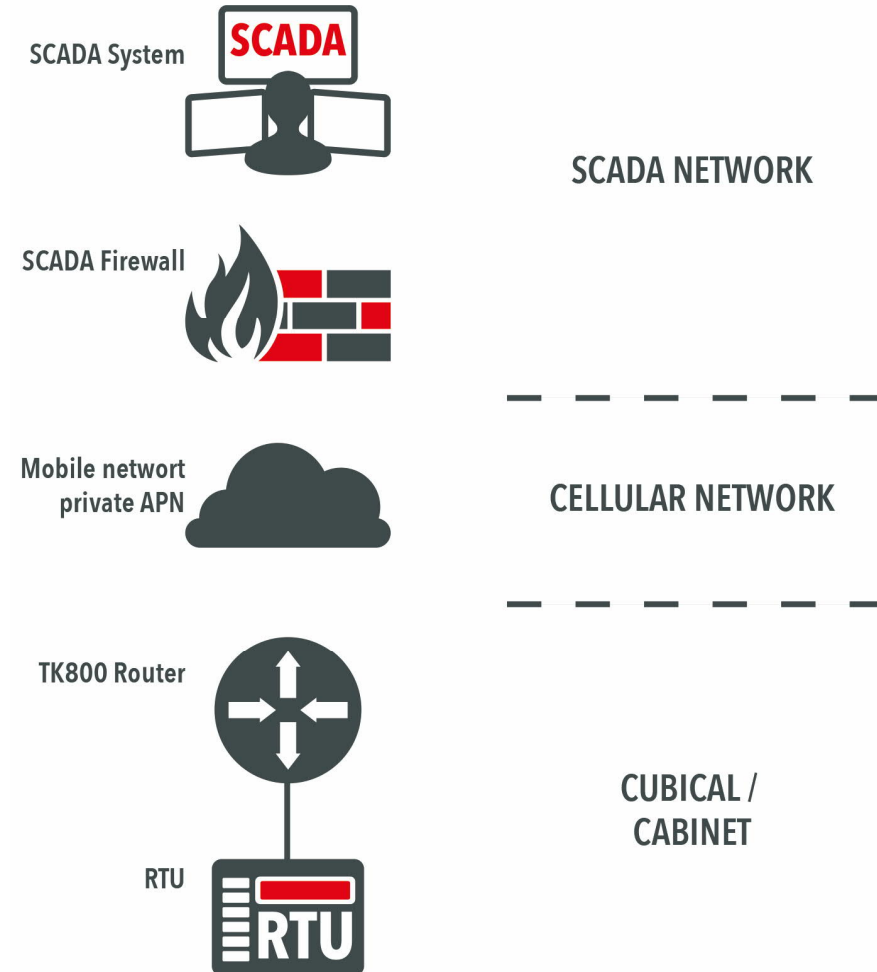


Sample use case

IEC 104 communication

- SCADA System
- Private APN
- Fixed IP-range for cellular network
- SIM card from mobile operator
- Router with same configuration
- SICAM RTU with fixed project and settings

➤ SIM IP is communication endpoint for SCADA system



Challenge

- Unboxing every device in the office
 - Insert SIM Card
 - Configuring every device manually
 - Check firmware – maybe adjust it for homogeneous environment
 - Documentation about IMSI / IMEI / Serialnumber for your asset management
 - Test the device
 - Bring it to your assembly / manufacturing department
- Many manual steps, high risk of failure

Router rollout

Solution - Smart EMS

- Secure management and rollout tool
 - Fleet management of devices in the field
 - Configuration, updates, onboarding
 - Data acquisition
 - Router analytics
 - Router troubleshooting
-
- Zero touch provisioning

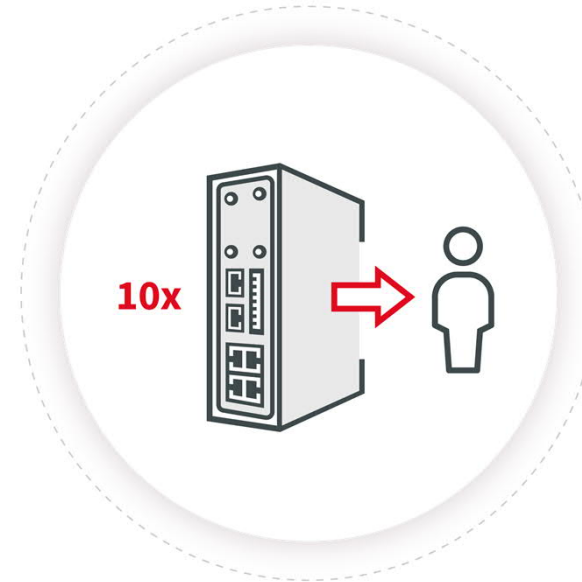


Zero touch provisioning



Step 01

Welotec TK800 Router is pre-configured at Welotec Factory and SIM is installed



Step 02

Devices (e.g. 50x TK800 Router) are shipped to siemens, customer, cubical manufacture

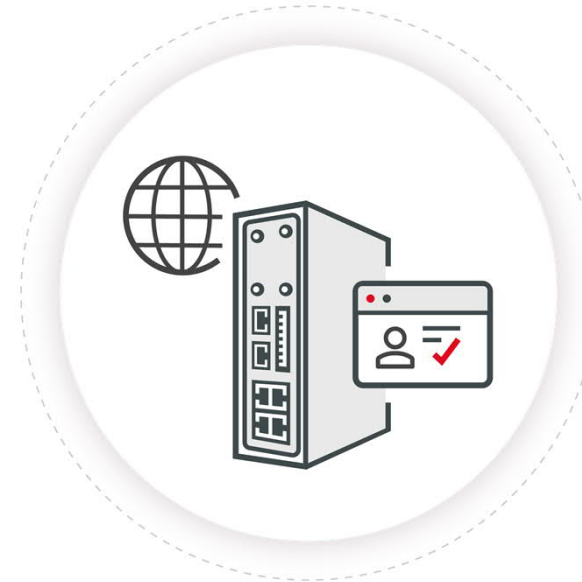


Zero touch provisioning



Step 03

TK800 is installed in the cubical, connect 4G antenna, Ethernet Cable and Power



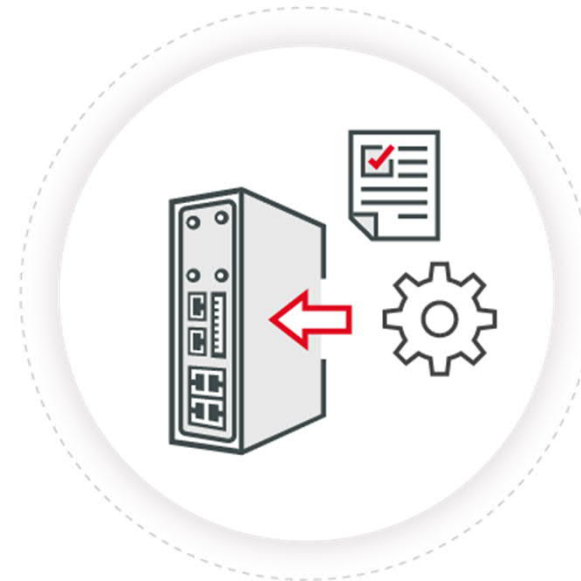
Step 04

TK800 is going online and showing up in the SMART EMS (self-registration)



Step 05

- a. Customer can activate TK800 in the SMART EMS and assign template
- b. electronic delivery node imported and router pre-defined



Step 06

Configuration and Credentials are installed in the TK800

Zero touch provisioning



Step 07

Router provisioned and
ready to use

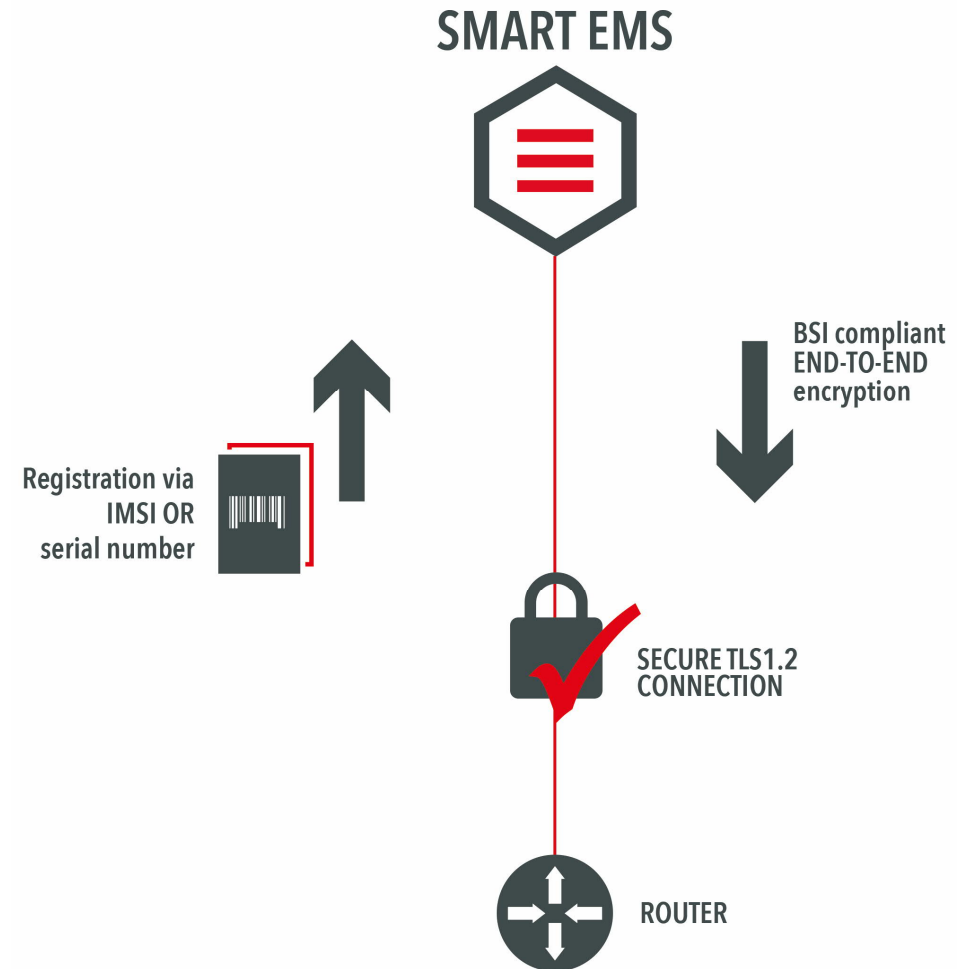
Advantages

- Less effort in the rollout procedure
- Less human interaction and failure
- Automated asset management
- Health status

Fleet management of deployed devices

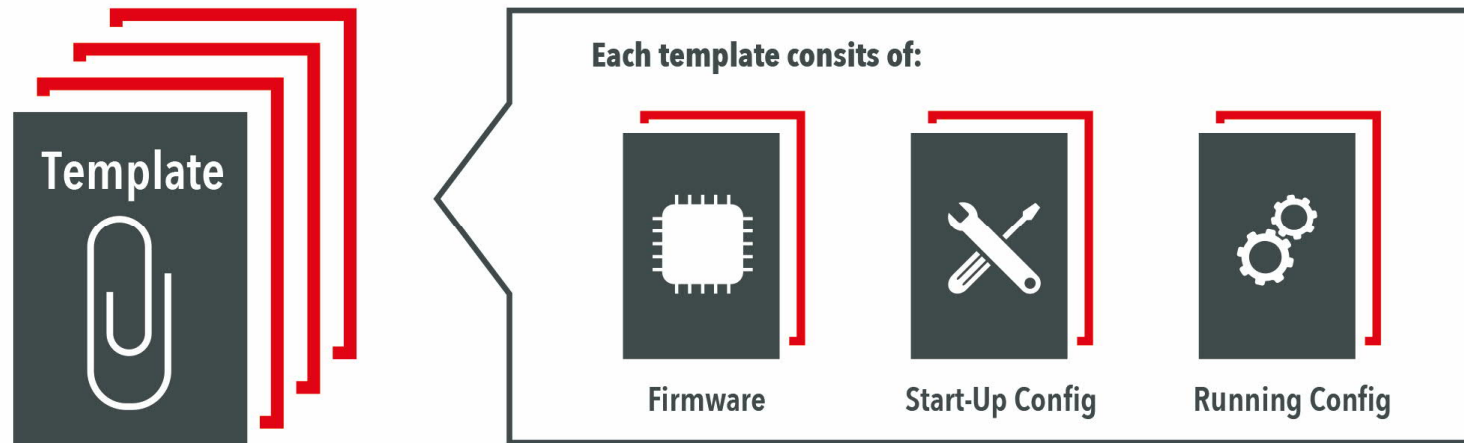
Communication concept

- Connection is established from the device to the SMART EMS
 - BSI conform end-to-end encryption
 - Connection TLS 1.2 encrypted
- Registration of the devices via definable variables
 - Serial number of the device
 - IMSI - SIM based -> Configuration recovers itself after device replacement



Template approach

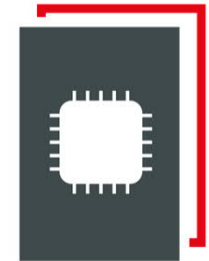
- Template based management approach
- Template includes firmware, startup and running-config
- Webinterface / API for configuration of templates, overview of devices and so on



Fleet management of deployed devices

Template Management

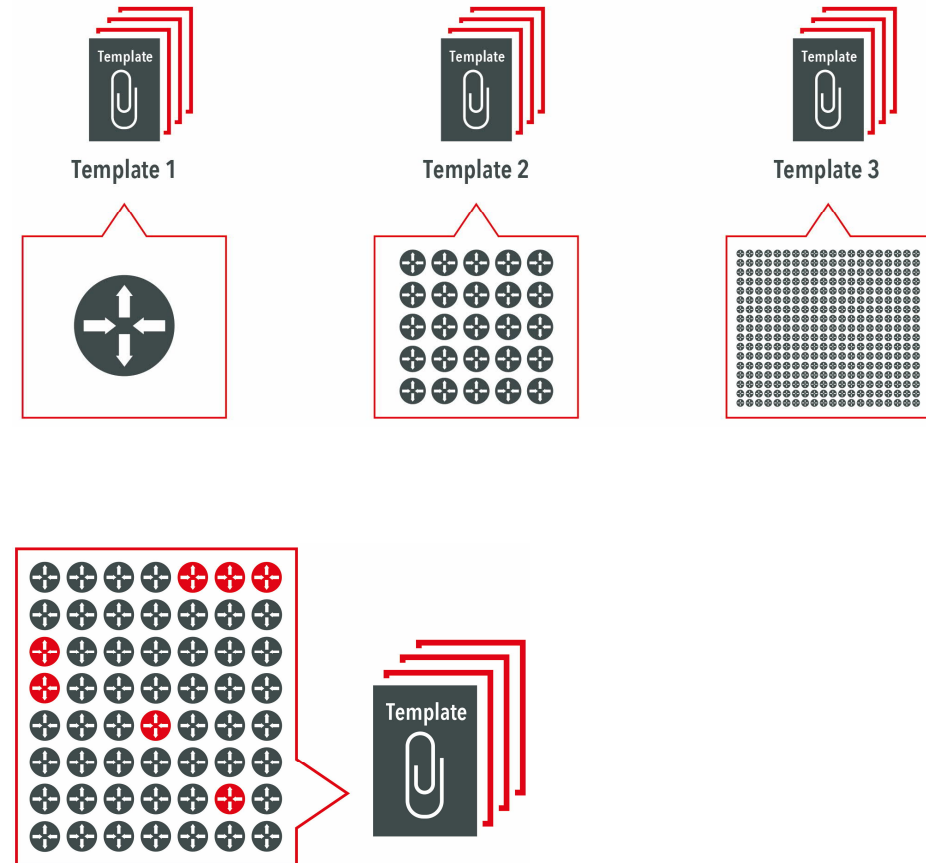
- **Firmware**
 - Remote Firmware Updates (New Features / Security Updates / Bug Fixes)
 - Roll out new versions step by step
 - Quick response to security incidents
 - Full control of the installed firmware
- **Start-Up Config**
 - Configuration is permanently saved on the device and also available after a power failure
- **Running Config**
 - Configuration is only saved in volatile memory. Once the router is disconnected from the power supply, the configuration is gone.
 - In the event of theft, no certificates or sensitive access data are stored on the device



Fleet management of deployed devices

Template Management

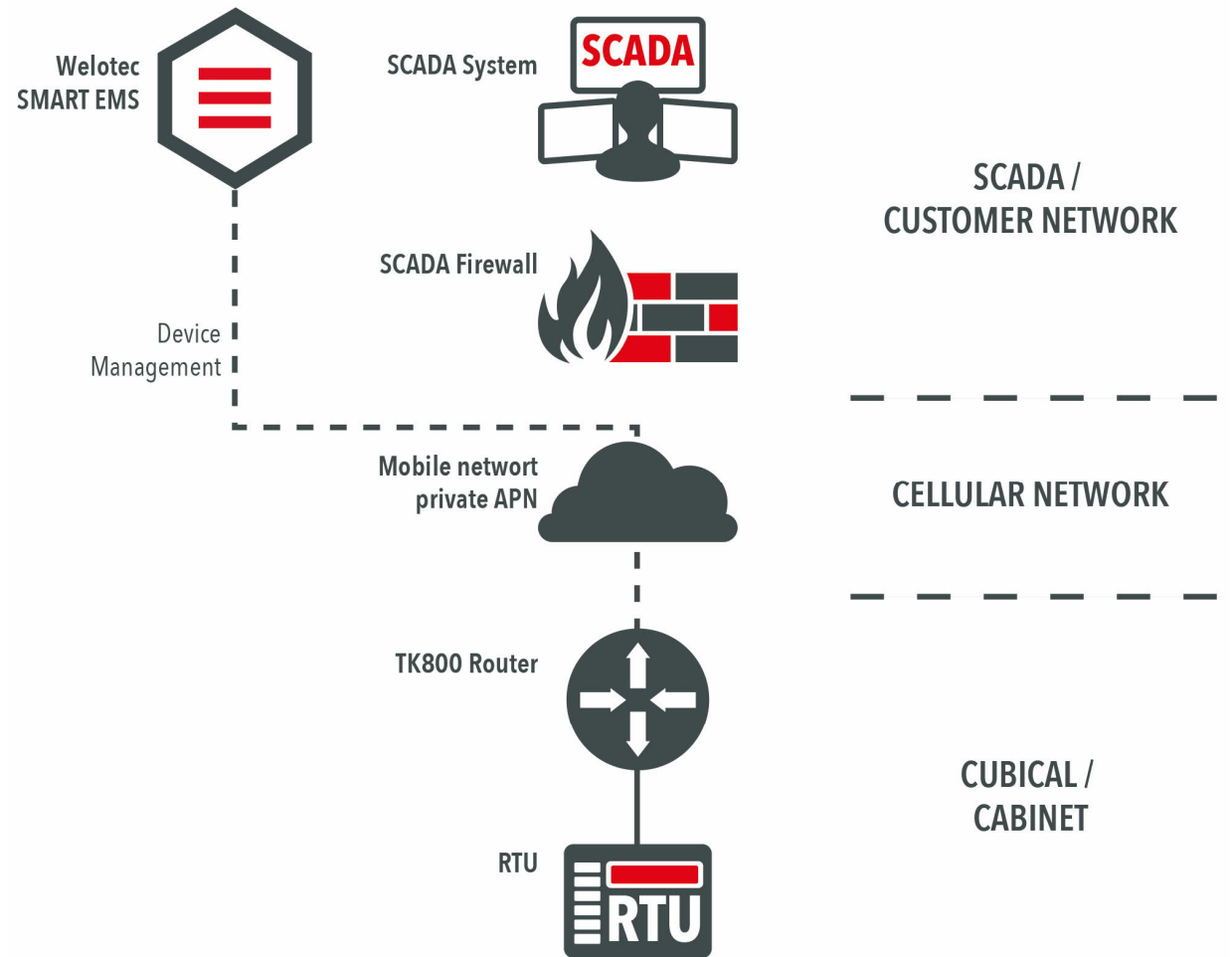
- Templates can be assigned to unique or multiple devices
- Definition of device-specific variables, often used: certificates, IP networks, pin code, device name, APN



Architecture

IEC 104 communication & Fleet Management with SMART EMS

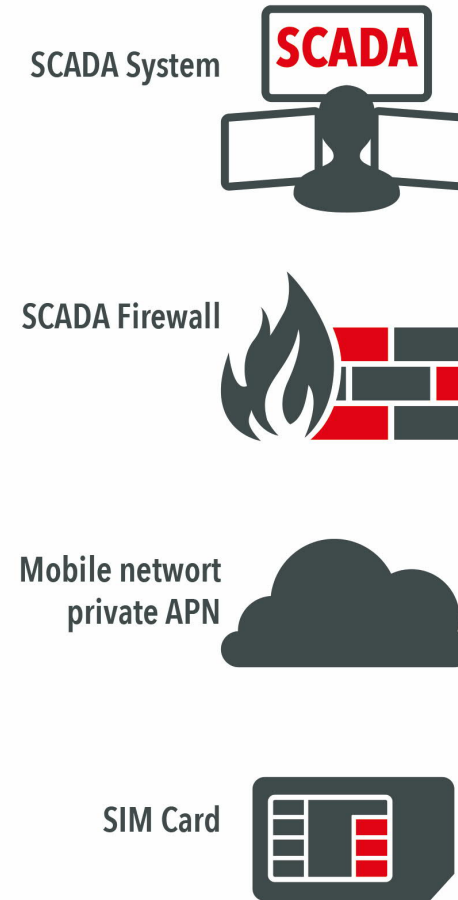
- Lets think about this for a moment....



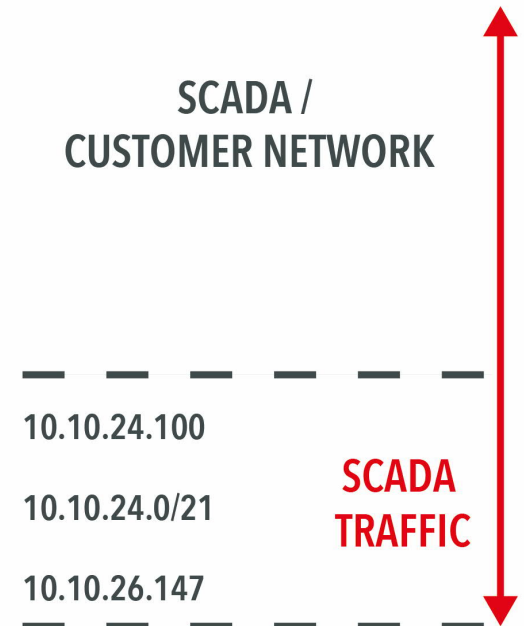
Architecture

Detailed view

- SIM IP is endpoint for SCADA traffic
- SIM is part of the SCADA network
- Putting a SIM into a laptop
 - Laptop has access to SCADA network
- **Goal**
 - Make the router the communication endpoint



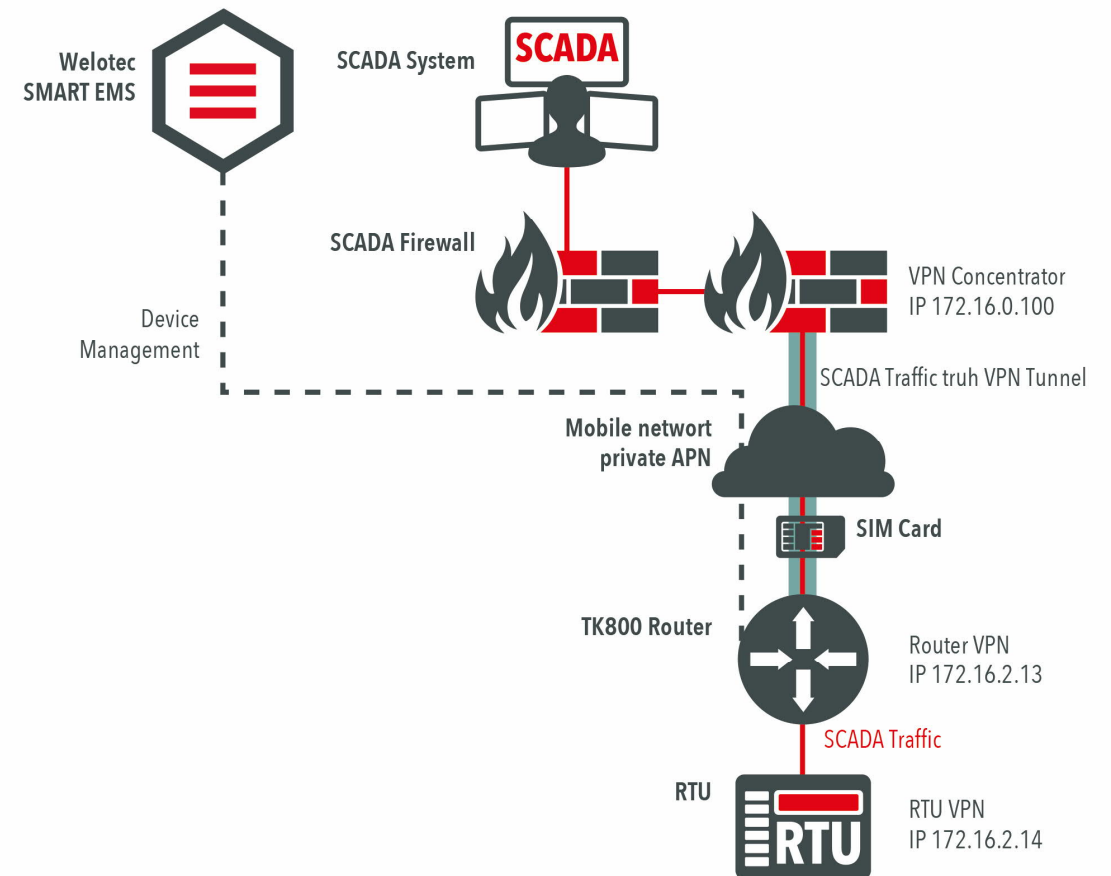
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Adding security and connectivity using VPN

Concept

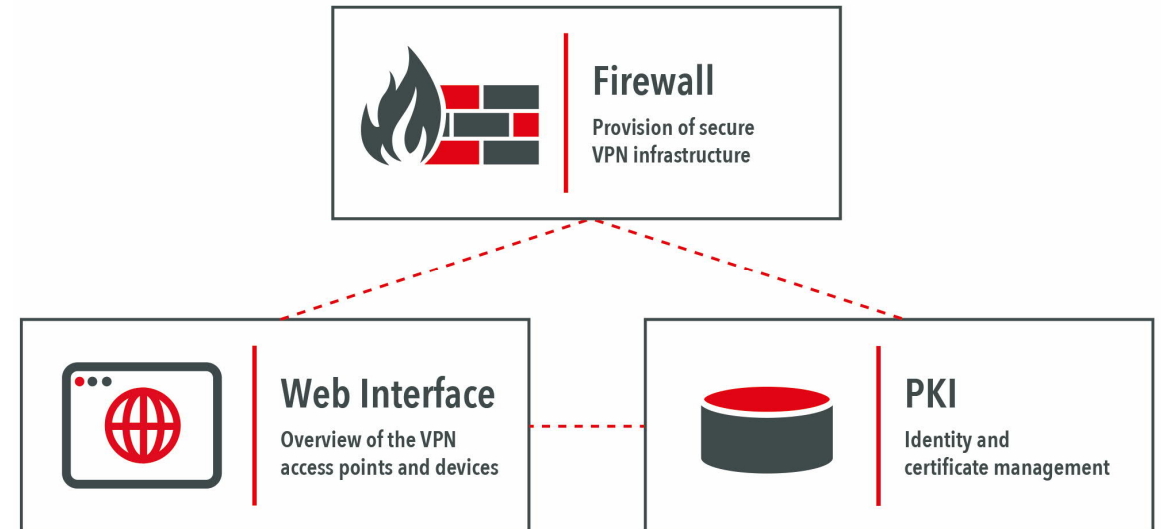
- Add VPN infrastructure to your existing setup
- VPN has to be established between Router and VPN concentrator
- VPN will be used as communication network for SCADA traffic, not your mobile provider network
- Router will only forward SCADA traffic from and to RTU using the VPN network IP
- SCADA traffic can not be seen in the mobile provider network



Adding security and connectivity using VPN

Solution

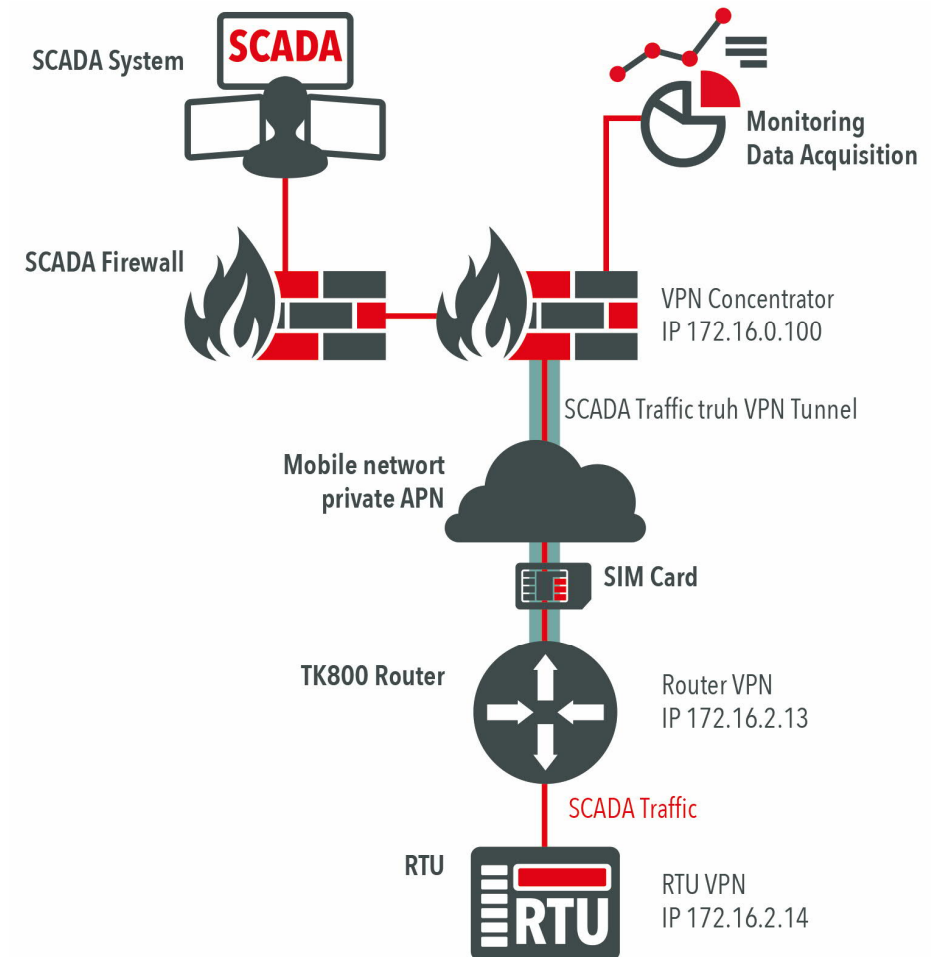
- Rollout fully automated via SMART EMS
- Integrated PKI
- API for connection between SMART EMS – PKI – VPN-concentrator
- Security sensitive data stored only in running-config of the router



Adding security and connectivity using VPN

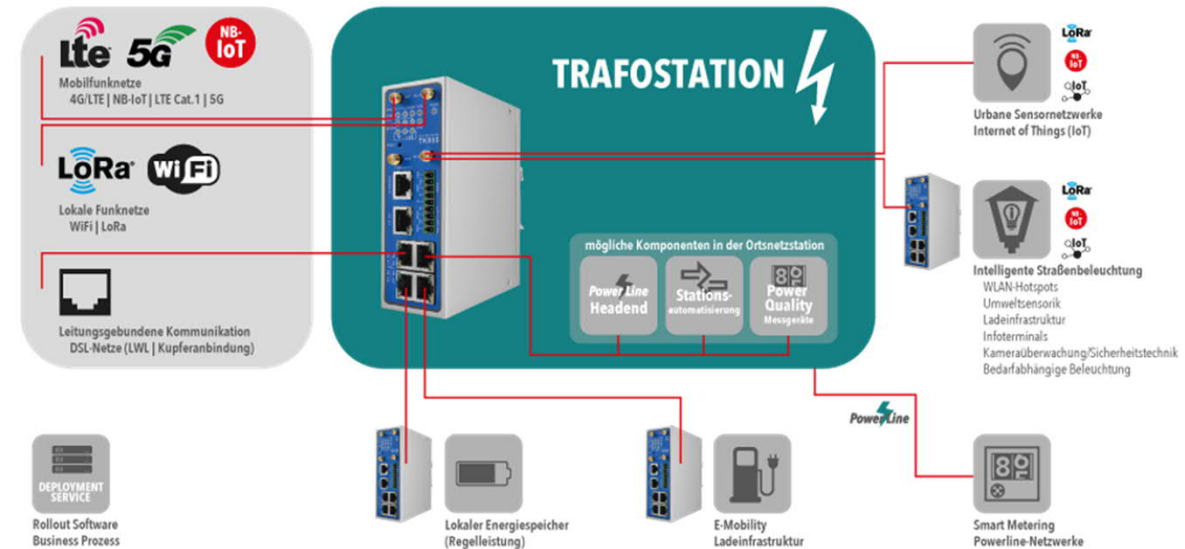
Additional benefits

- Remote access portal for your technicians (tag based access)
- Openvpn based connection
- Flexibility in regards of mobile provider network (your VPN network is the SCADA communication network)
- Every device (Router, RTU, ...) will get a single unique IP-address within the VPN
- Connecting monitoring-systems e.g. Solarwinds via VPN
- System fully integrated with APIs



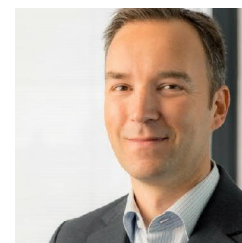
Future development

- **Edge computing capability for secondary substations**
 - Protocol conversion OT -> IT
 - For example Modbus to MQTT
 - Data collection and pre-processing
 - Easy integration of IoT applications
- **5G**
 - Usage of lower 5G frequencies
700 MHz to 2100 MHz
 - Real time applications e.g. Goose over the air



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