

Customer Applications

INSYS Smart IoT Ecosystem in Practical Use



INSYS Smart IoT Ecosystem

The flexible technology basis
for your M2M and IoT applications



The Internet of Things (IoT) drives new business models in industry. In order to be able to transform ideas in sales at short notice, the technology behind must be easy and flexible to use.

The INSYS Smart IoT ecosystem is a flexible, highly pre-integrated end-to-end ecosystem and contains all necessary communication elements to gather, process and provide data from distributed applications quick and easy. The open IoT communication solution allows both, edge and cloud computing, as well as combinations of both

besides data transfer. Your ideas can be implemented with low effort and realised quickly if required. Benefit from our flexible, adaptive and scalable one-stop solution and rely on industrial quality made in Germany!

Your benefits:

- Sophisticated M2M and IoT communication solution
- High pre-integration of hardware, software and services
- Flexible, adjustable and scalable system
- Supports approaches for edge and cloud computing

Your additional benefit:

- Brief time to market
- Quick return on investment
- Cost and risk reduction also for non-durable business models



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Alarming App in Linux Container of 4G Router

Connection to any process control systems

www.insys-icom.com/AN241



Initial situation

Cities, municipalities, associations and wastewater producing industrial units operate widely ramified wastewater systems, treat process water and operate heat stations.

In case of more recent structures, the function of the controls and plants is monitored continuously to be able to alarm the stand-by duty immediately in case of a failure.

Old plants are far from this level and retrofit often resulted an uncontrolled growth of devices like data loggers, switches and routers.

In addition, the two largest Swiss providers will shut down their GSM network (2G). Swisscom with end of 2020, Sunrise already end of 2017.

Objectives

The Swiss STEBATEC AG provides their customers with latest plant technology for precise flow measurement and optimum sewerage control as well as cloud-based process control systems specifically developed for this. The existing monitoring and alarming system STEBalarm based on MoRoS HSPA routers already had many beneficial features like:

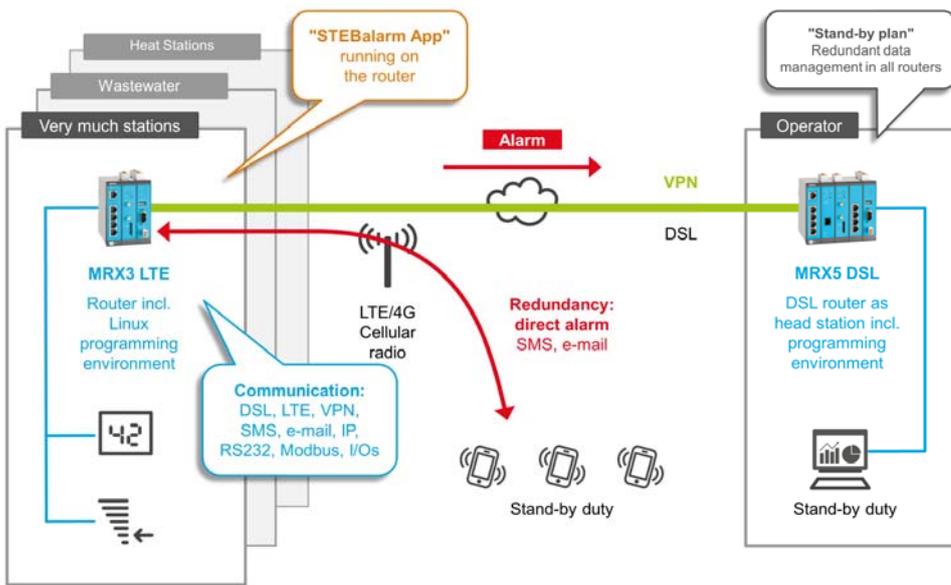
- Parametrisation-capable and integrated stand-by planning
- Data exchange with process control systems
- Configuration via JSON import/export
- Meter data acquisition via Modbus or M-Bus connectible to each customer plant.

However, the new STEBalarm shall master much more:

- Using all cellular networks up to 4G/LTE
- Local intelligence at the spot in one device
- Data processing/storing
- Secure data communication

Solution

The cellular 4G router MRX5 acts as head station and distributes the stand-by settings to all autonomous substations (MRX3).



Benefits and values

- Future-proof and flexible thanks to the icom Smart-Box: LXC programming environment (Linux container) integrated in the router
- All Stebatec apps are running on the router
- No additional software installations, updates and licences
- Saving small industrial PCs (IPC)
- No data loggers necessary

Benefits of the MRX router series:

- STEBalarm and other apps are running side-by-side in the icom SmartBox, an environment based on Linux containers (LXC) integrated in the router. This saves an IPC, additional software installations, updates and licences.
- MRX routers can be easily extended by MRcards, e.g. with the MRcard ES by four switch ports; this saves costs and brings IT security since the ports can be monitored.
- Customer-specific MRcard developments are also possible.
- STEBATEC customers benefit from the 4G routers of the MRX series by the very good 4G network coverage in Switzerland.

Highlights of the STEBalarm software

- Meter data are pushed to an FTP server as *.csv.
- STEBalarm alarms via pager, SMS or e-mail and communicates via Modbus/TCP or I/O.
- The stand-by plan is exact to the hour, knows holidays and has a fairness generator that alarms those employees first who had the least service duties.
- STEBalarm stores the information as backup automated in the head station.
- Critical alarms can be dispatched in two different ways to increase security.
- Escalation levels and prioritisations can be defined freely here.

Summary

"We plan to switch any existing and future software of STEBATEC to the MRX. We also use the MRX routers for our partially guided or MID controlled pneumatic sewerage control. The MRX is simply a great device!"

Jonathan Brechbühl
Head of Support
Stebatec, Brügg (CH)

Monitoring and Remote Maintenance for Stormwater Overflow Basins

Configuring fault indicating router instead of programming

www.insys-icom.com/AN167



Initial situation

Combined system sewers that direct sewage and storm water to the waste water treatment plant in one duct reach their limits quickly during heavy rain. The KRITIS sector study "Nutrition and Water" (public version, revision date 05.02.2015, p. 78) of the BSI (German Federal Office for Information Security) rates the water-level control process such that "waste water will be diverted untreated" in case of its failure.

Stormwater overflow basins within the sewers protect waste water treatment plant and ecosystem by buffering water mass and pumping it back to the sewer controlled after the rain has ended. Therefore, IT security is very important when updating the data processing technology.

6

Objectives

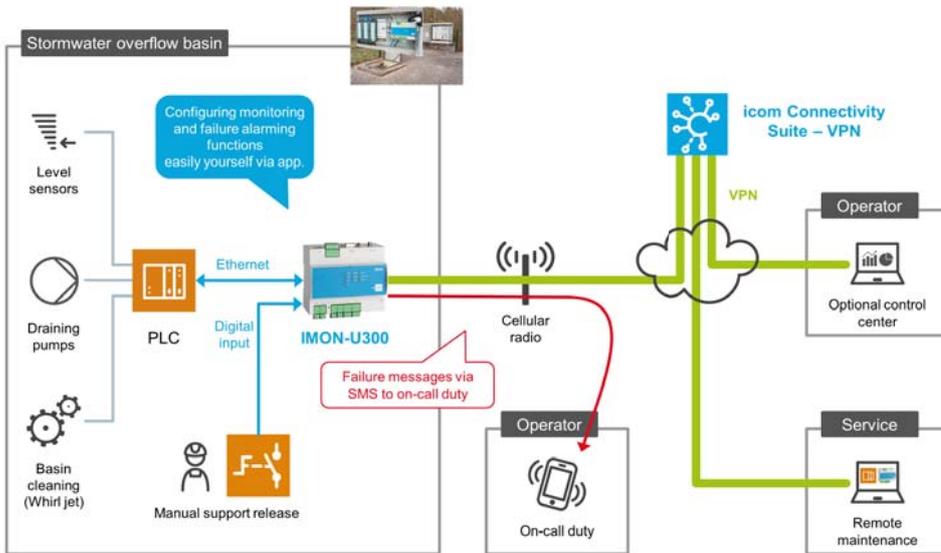
In order to meet the operational requirements, the Wasserversorgungs- und Betriebsgesellschaft Grafenwöhr (WBG, water supply, distribution and operation corporation) follow an innovative approach:

- The realisation of the fault indicating technology is much easier and the systems are ready for user quicker with the professional routers of INSYS icom.
- The fault indicating functions can be changed flexible simply by reconfiguring instead of rewiring like for the old "rattle technology" and without reprogramming controls (PLCs).

Solution

The outstanding improvement is "configuring instead of programming" and saves effort for PLC programming.

- From now on, the monitored values and actions are simply configured in the Monitoring App of the fault monitor IMON-U300 of INSYS icom using a browser.
- This allows to realise all monitoring and fault indicating functions with less effort for service providers and an easy adaptation of the customer himself if required.



Benefits and values

- Cost-efficient fault indicating technology
- App can be configured easily using a browser
- Configuration can be adapted by the customer himself
- Configuring instead of programming
- Processing data points independent of the protocol (edge computing)
- Secure data connection via icom Connectivity Suite – VPN.

Summary

"The big advantage of the Monitoring App of INSYS icom is the ready tested app that is only configured knowing the own application – and this without programming knowledge!

A 365 m³ (12900 cu.ft.) stormwater overflow basin has been equipped with a professional router of INSYS icom after a planned complete refurbishment: It connects and processes all data points independent of manufacturer and protocol, sends the fault messages via SMS reliable to our on-call duty staff and could also transmit the relevant data to a control center or cloud systems.

The experts of our electrical equipment manufacturer beab GmbH use an encrypted connection via the VPN of INSYS icom for temporary remote maintenance. Establishment and closure of the VPN tunnel is controlled by our on-call duty staff IT secure using an on-site switch."

Gerhard Maier
 Technical Manager
 Wasserwirtschafts- und Betriebsgesellschaft Grafenwöhr (WBG)

Connecting Network Cameras via Cellular Radio

Continuous monitoring and remote configuration

www.insys-icom.com/AN150



Initial situation

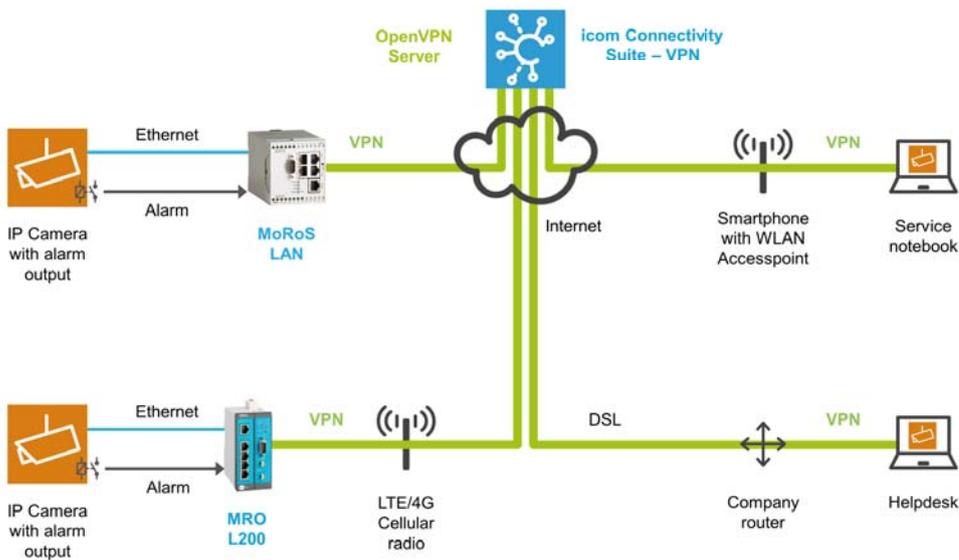
Services in technical plants like renewable energy producers – biogas plants, "wind mills", photovoltaic parks (PV) and hydroelectric power stations – for example are often expensive and could be prepared better or reduced by a "preliminary inspection".

Objectives

- Saving travel cost and working time
- Installation independent of existing Internet accesses
- Transmitting images/video sequences via FTP
- Stationary and mobile use
- First installation and service without configuration of the video cameras
- Generation, management and distribution of the VPN certificates is to be performed by a VPN service

Solution

- INSYS Smart Devices (MRX, Mo-RoS, EBW, MLR series) combined with the icom Connectivity Suite – VPN (VPN service) are used.
- Any number of cameras are combined via closed VPN user groups that authorised persons can connect for live view or configuration. Every camera can upload images or video streams.
- If the connection is to be established only in case of a failure, the camera can trigger the INSYS icom router for connection establishment using the switch output.



Benefits and values

- Live streams on notebooks and smartphones
- Insight at any time from everywhere
- Easy to extend
- Alarming with image of evidence
- Highly available and web-based OpenVPN server
- Remote configuration of the network cameras

Summary

- Encryption and automatic VPN configuration is taken over by the icom Connectivity Suite – VPN. Besides all INSYS Smart Devices, notebooks, computers and smartphones (iOS, Android) can be used as VPN client; temporary users connect via web proxy.

Live images help to prepare remote maintenance services. Experts of different manufacturers support from remote and save travel cost.

Alarming and event-triggered FTP upload of photographic evidences is always possible via INSYS Smart Devices and saves expensive alarm equipment.

INSYS Smart Devices make secure, encrypted and stable connections also to remote field devices.

Many video cameras can be operated in the icom Connectivity Suite – VPN and also addressed with the same IP address.

Processing Heating Fault Messages Automatically (M2M)

10 to 20 hours time advantage for on-call service

www.insys-icom.com/AN202



Initial situation

The heat station operation includes troubleshooting besides operational management. Failures often remain unnoticed during daytime if the heating failed at night and there was still enough warm water for a shower in the morning.

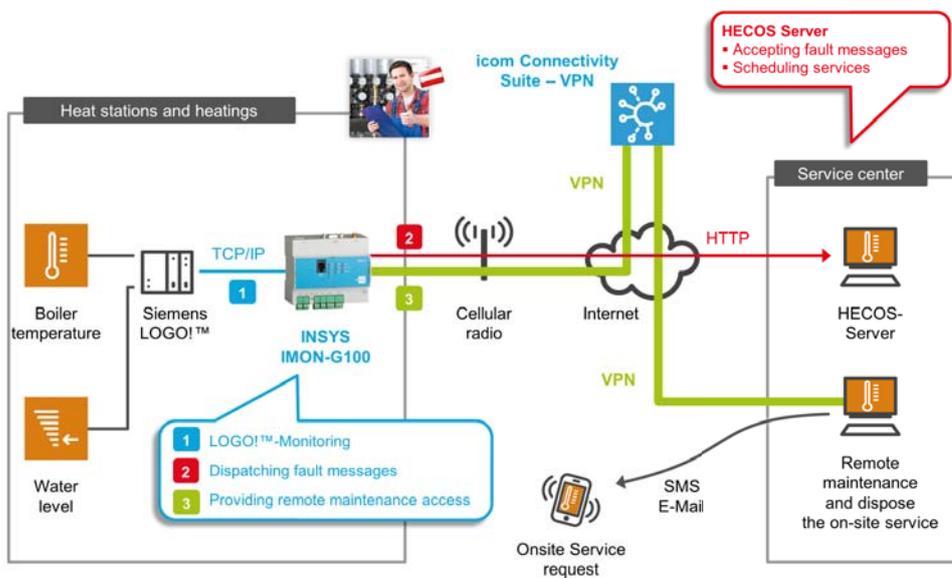
If tenants complain after returning from work, repair services must be organised under pressure.

Objectives

- Anticipating service for increased quality of live
- Cost-optimisation by omission of routine inspections
- Open up new, profitable business areas

Detailed requirements

- Permanent availability of the INSYS Smart Devices
- Omission of wasted services due to technical false alarms
- Automatic failure reporting to central HECOS server
- Detailed failure reports and remote access that all spare parts can be carried with the first service
- Mostly unattended control center
- Automatic processing of the "Done" message and alarm deletion
- Message dispatch via cellular radio for plug & play installation independent of the customer's infrastructure
- Encrypted data communication for remote maintenance



Benefits and values

- Automatic fault reporting yields 10-20 hours time advantage
- Service knows fault prior to customer
- Suitable spare parts thanks to detailed failure reporting
- Stress-free on-call service
- Satisfied customers
- New customers due to new business models

Solution

In the heating plant

- IMON-G100 with Monitoring App from INSYS icom for full monitoring of all values in the registers of the Siemens micro controller LOGO!™
- Monitoring App in IMON-G100 dispatches messages via HTTP – and acts as cellular VPN router for remote maintenance at the same time.
- Intelligent interconnection with icom Connectivity Suite – VPN.

In the control center

- Self-programmed HECOS server from Messtechnik GmbH & Co KG processes incoming HTTP failure messages and dispatches SMS/e-mail to service technician.

Summary

“We’ve needed alternatives and have found the INSYS routers quite quickly since they ‘have a way with’ the Siemens LOGO!™.

A seven month endurance test was successful in all respects: The routers are very reliable and the support by INSYS is extraordinary. We’ll develop new markets primed like this.

Therefore, we’ll equip all existing and new customers with INSYS routers and the icom Connectivity Suite – VPN for VPN connection.”

Walter Walzl
 Management Assistant
 Engineering and development
 Meßtechnik GmbH & Co KG
 Feldkirchen near Graz

Groundwater Level Measurement in Off-grid Regions

Monitoring App in fault monitor controls measuring instrumentation

www.insys-icom.com/AN210



Initial situation

Groundwater levels of different locations are measured using monitoring wells. Often observers determine the water levels using a well depth finder or electric light plummet manually. The measuring values are visualised using contour lines; this also allows conclusions about the flow direction of the groundwater.

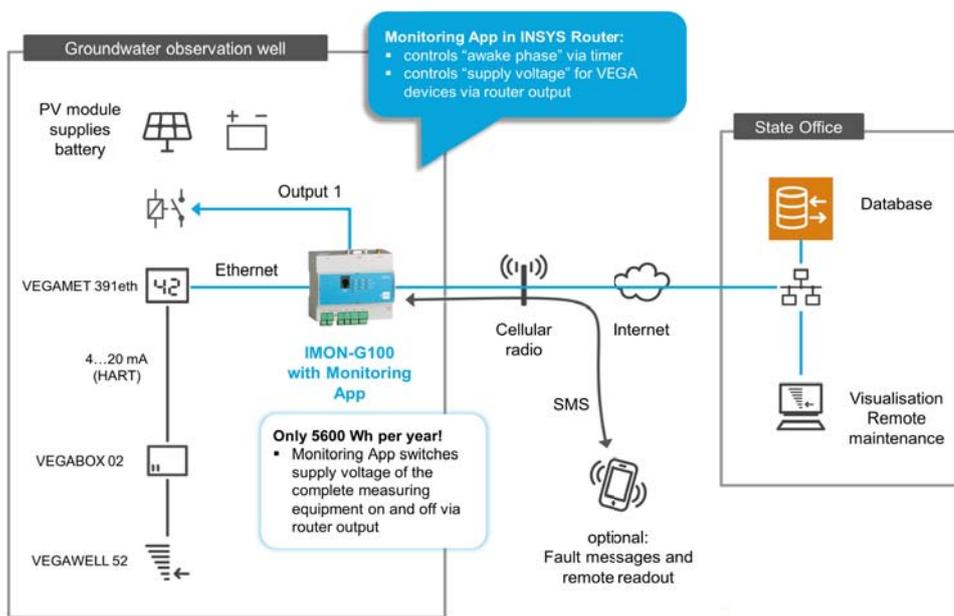
Objectives

Due to decreasing groundwater levels in the north reservoir polder in Nordmeldorf, State Agency for Agriculture, Environment and Rural Areas in Schleswig-Holstein has contracted a project with the following objectives:

- Permanent monitoring of a groundwater observation well
- Automatic measurement and data dispatch via cellular radio
- Energy-saving measuring station

Solution

A submersible pressure transmitter records the water level. The evaluation unit VEGAMET391Eth reads out via the 0...20 mA interface and HART protocol and dispatches via the GPRS router IMON-G100 from INSYS icom. The energy-efficient process control is assumed by the Monitoring App in the router by switching the power supply of the VEGA devices time-controlled on and off via a relay output at the router.



Benefits and values

- Switching measuring station on and off time-controlled
- Operating off-grid measuring equipment energy-saving
- Monitoring App switches power supply via relay output of the router
- Saving routine inspections
- Continuous measurement value logging
- Always up-to-date groundwater level database
- INSYS router is always available for remote access

Summary

Monitoring App helps to save energy

The VEGA devices are only switched on by the Monitoring App via a relay output of the fault monitor IMON-G100 only for measurement.

This lowers the annual energy consumption – with the same measuring cycle – by 78,60 % to 5600 Wh!

However, the permanent availability of the INSYS Smart Device IMON-G100 has the benefit of a remote access to the measuring equipment.

Operating Data Logging of Silos

Current filling level triggers next filling trip

www.insys-icom.com/AN108



Initial situation

Operating data logging (ODL) comprises technical and organisational actual data, for example from production, environment, trade and logistics.

The data is captured for documentation and control of operational processes – but are not always available for lack of data connection.

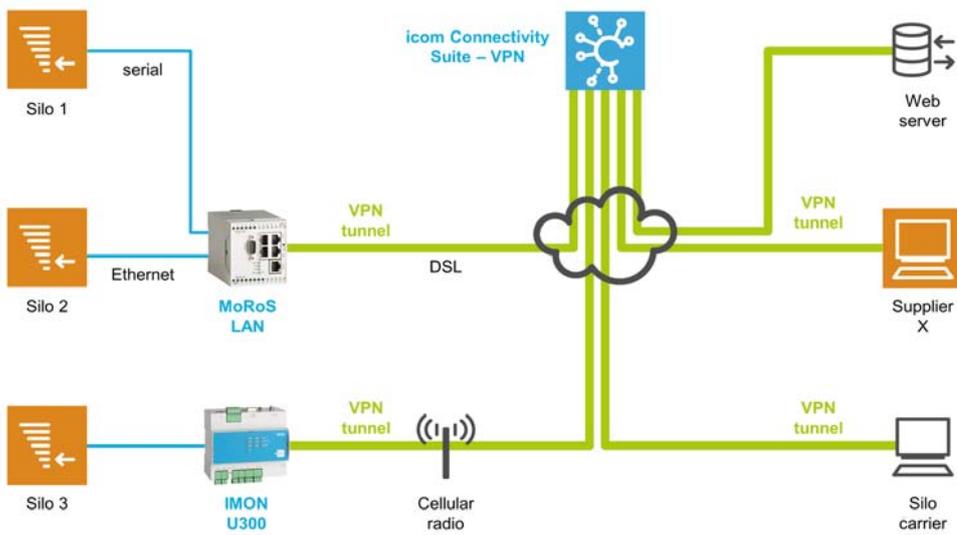
Objectives

- Filling silos in time
- Realising stationary, transportable and mobile applications
- Saving separate data loggers

Solution

The silo filling level is determined automatically using sensors and transmitted to a web server or private cloud. Transportable silos transmit their geo-data also.

- The proven INSYS Smart Devices, for example from the IMON series, transmit filling levels and other operational data like internal temperature via all common networks (LAN, ADSL, SDSL, telephone, cellular radio, WLAN)
- INSYS Smart Devices with integrated programming environment in the router replace separate data loggers and micro controllers.



Benefits and values

- Basis for SCADA systems
- Just-in-time filling
- Real-time monitoring
- Scalable (silos, business partners)
- Perfect for transportable silos
- Any short update intervals by cellular network "always online"
- Data logger by integrated programming environment in the router

Summary

- Remote access takes place via encrypted connections of the iCom Connectivity Suite – VPN; this can also be used for centrally managed software updates.
- Cost-effective logistics due to fully-automatic planned supply tours.
- ERP systems of suppliers have always access to the latest data.
- Silo rental companies have always a view on all locations.

Smart Grid: Medium-high and Low Voltage Systems

Ensuring network quality and protecting network equipment

www.insys-icom.com/AN139



Initial situation

Renewable energies are already forming the basis of a sustainable energy supply. The integration of the local and volatile renewable energy producers is a challenge. The medium-high and low voltage systems are being converted to smart grids to maintain network quality and supply reliability. Additional measuring and data technology always provides latest network operation data. The availability of data about network damping and hotspots is critical for the business:

- Distribution network operators use it to control their networks.
- Companies with sensitive processes use it to monitor special quality agreements with their power suppliers

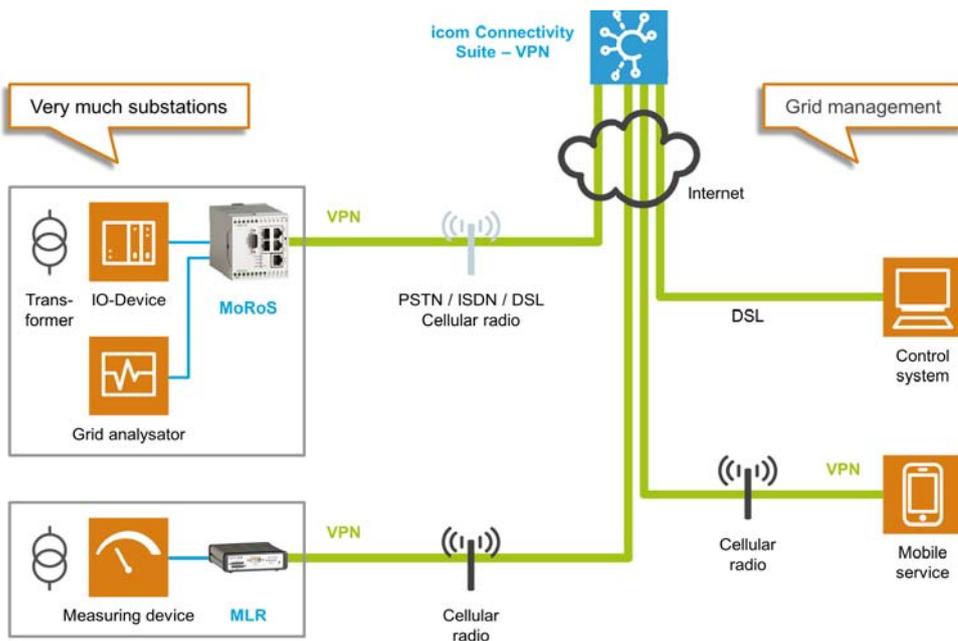
Objectives

- Integrating renewable energy producers
- Equipping power distribution networks with modern data technology
- Protecting equipment

Solution

Basic measures for increasing the capacity of existing networks and managing the network reactions when connecting renewable energy sources are for example:

- voltage control at the local distribution system transformer
- reactive power control at the PV converter
- generation management by power limitation or shutdown
- protection of network equipment like transformers, aerial lines and cables



Benefits and values

- Toughening grids with data processing technology
- Evaluating measuring data at the site and alarming
- Transmitting data from measuring equipment, event recorders or network analysers
- Managing distributed supplies
- Ensuring the network quality (DIN EN 50160, DIN EN 61000)

Summary

INSYS Smart Devices of the MLR series have proven their performance on a pilot project of REWAG Regensburg-energie- und Wasserversorgung AG & Co. KG, Ostbayerische Technische Hochschule Regensburg OTH and Maschinenfabrik Reinhausen.

13 significant values have been read out every 10 seconds from more than 70 local distribution system transformers by an app in the router, provided with a standard time-synchronous date/time stamp, stored and sent to the OTH as an XML file. More than eight billion data records have been transmitted reliably

Field-proven router like the programmable INSYS Smart Devices (MRX, MoRoS, EBW, MLR) with icom Smart-Box or INSYS Sandbox and the innovative icom Connectivity Suite – VPN of INSYS icom contribute significantly to smart grids.

Solarkiosk Connects Village

Power and Internet for off-grid colonies

www.insys-icom.com/AN177



Initial situation

Off-grid households in Africa spend an average of \$120 for power substitutes like candles, paraffin, kerosene, etc. to have light during the long nights close to the equator as well. This is often up to 40% of their yearly income. Mobile phones are widely used in rural areas. But charging a battery often takes a 2-day journey to the next town and can cost up to half a dollar.

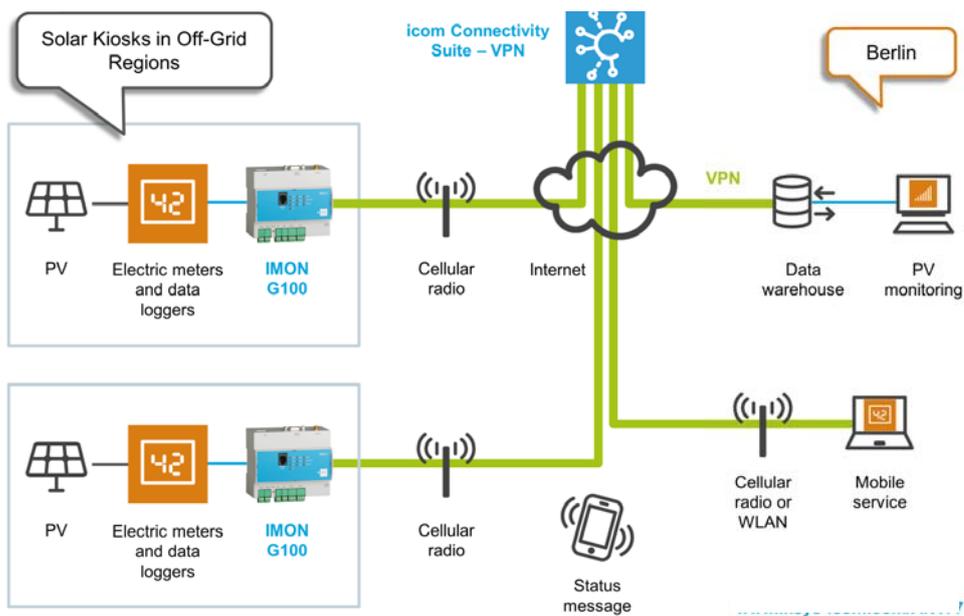
Objectives

The idea is as brilliant as it is simple: Providing people without grid access, for example in Africa and Asia, with energy, convenience goods, tools and services. A single kiosk with its photovoltaic (PV) cells on the roof and a battery in the solar kiosk can supply the village with enough power that people are able to charge their mobile phone or cool their medicine.

Solution

Industrial routers – INSYS Smart Devices – and innovative connectivity and security services of INSYS icom are used:

- One mobile router IMON-G100 per solar kiosk for monitoring the PV modules (power generation and consumption). The kiosk operator could even realise a small alarm system for sending an SMS if a detector has triggered using the I/Os of the device.



Benefits and values

- Supplying off-grid regions
- Providing access to information and education
- Providing power – for light and medicine cooling for example
- Providing infrastructure for small-scale entrepreneurs
- Saving money for power substitutes
- Avoiding environmental pollution by diesel generators

Summary

- The VPN network service icom Connectivity Suite – VPN serves for encrypted data communication with other network participants. It minimises the installation at the site to "SIM card plug and play" via automated VPN configuration of the terminal devices. Client management and certificate management are web-based.
- Solarkiosk enables people to charge their mobile phone in their village, cool their medicine and save money with this.
- The Solarkiosk service has always the latest PV operational data.

"The Solarkiosk project supports community and own initiative instead of paying development aid. My customers come from afar. My kiosk became a real social meeting place and mini market of the village. I can't describe how much this means for me."

Citation: Ethiopian small-scale entrepreneur

Heating, Ventilation, Air Conditioning (HVAC) and Home Automation

Best indoor climate and lowest down times

www.insys-icom.com/AN165



Initial situation

A good indoor climate and world-wide climate protection are compatible targets.

Comfortable rooms and maximum energy efficiency need forward-looking home automation and building management solutions for this.

Objectives

- Integration with classic DDC-BA components (Direct Digital Control Building Automation) for control and management tasks
- Remote control, remote maintenance, monitoring, remote debugging
- Permanent monitoring
- Data logging
- Immediate information about failures via SMS or e-mail

Solution

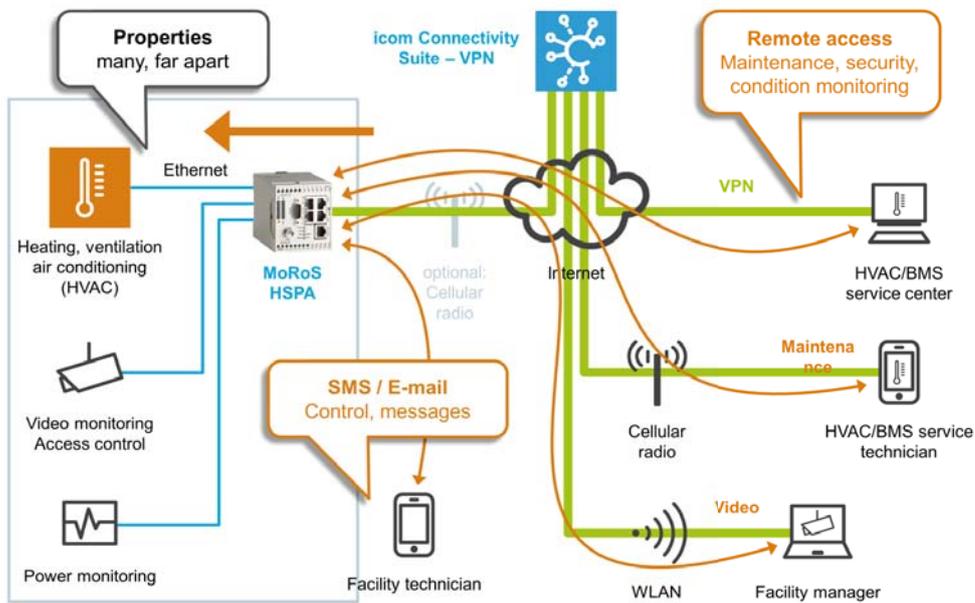
You'll find all necessary components in our product portfolio:

INSYS Smart Devices

- MoRoS series: Smart all-in-One
- IMON series: Smart entry
- EBW series: Smart basic
- MRX series: Smart Modular Device Apps
- icom SmartBox or INSYS Sandbox for own apps

Connectivity and Security Services

- icom Connectivity Suite – VPN (VPN service)



Benefits and values

- Remote management of buildings
- Permanent real-time monitoring of buildings, green-houses, stables
- Data logger in the router knows the "history" of the failure
- Linking the building management systems
- Integrating existing serial devices in IP networks
- Always protected access to local network networks "behind the router" like access control, video monitoring, heat stations

Summary

The interaction of heating, ventilation, air conditioning, illumination, sunblinds and further building management systems (BMS) becomes often possible with integrated technology first.

- Protected access to local network networks "behind the router" like access control, video monitoring, building management systems (BMS)
- Access at any time to serial terminal devices with the serial Ethernet gateway in the INSYS devices and the free software for virtual COM ports VCom® of INSYS icom

Cellular Router Replaces Discontinued GSM Modem

Maintaining the complete functionality and best future IoT prospects

www.insys-icom.com/AN228



Initial situation

The controls of the portal and self service washing plants of Kärcher generate detailed service and failure messages to ensure high availability of the washing plants. These messages are immediately transmitted to the operator and the service staff of Kärcher via SMS and e-mail.

Particularly useful: Statistical data of the plant can be read out and remote operations can be executed from remote via SMS.

Need for action occurred in 2015: Kärcher had to procure a replacement for e discontinued GSM modem in the Remote Diagnostic System RDS I.

Objectives

- Maintaining of all functions
- Replacement unit can be used 1:1 in the washing plants
- Investment protection
- Scooping possible cost savings and technological benefits

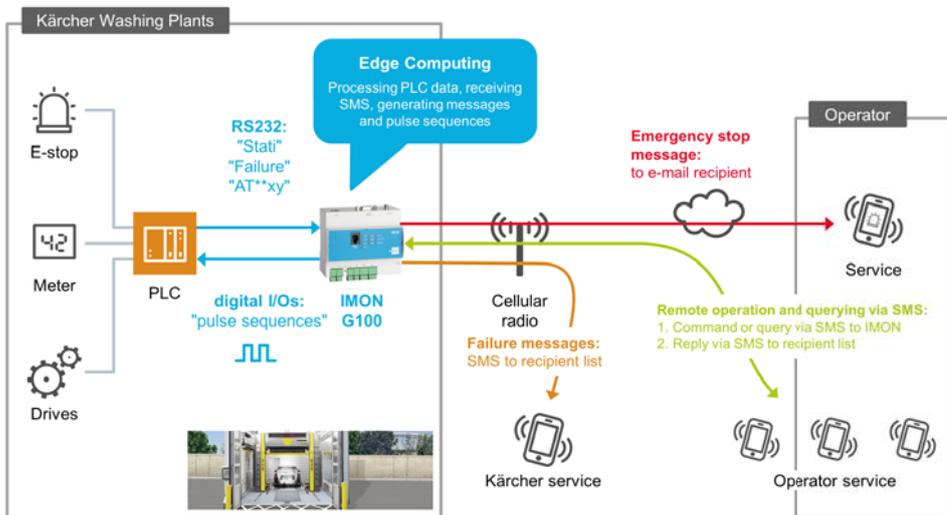
Solution

INSYS icom offered a replacement unit with the cellular router IMON-G100 – that did not fit at first sight. The IMON-G100 was the perfect solution for this migration scenario at closer inspection. Because it offers the

interfaces used before (RS232, two digital inputs and outputs each). It goes without saying that the new cellular router of INSYS icom can easily be configured via the LAN port using a web browser. This renders the separate configuration software HSComm that was necessary for GSM modems so far unnecessary.

The INSYS Sandbox for edge computing makes the INSYS Smart Device IMON-G100 special. This is a programmable Linux environment in the router for customer-specific Device Apps. The Kärcher app processes PLC data and generates messages and pulse sequences.

Therefore, all functions of the previous GSM modem could be realised via app in the new cellular radio.



Benefits and values

- Maintaining the complete functionality by programmable router
- 1:1 replacement saves modification effort
- Continuing to use PLC and wiring without any modification
- Operation as normal
- Investment protection for existing plants
- Prepared for IoT and remote maintenance

Summary

- Configurable message texts and recipient groups
- Configurable SMS to e-mail gateway
- Converting incoming SMS control commands to pulse sequences and outputting them via the digital outputs of the IMON-G100 to the PLC
- Sending messages as SMS and e-mail
- Detecting an emergency stop and sending a message
- Receiving failure codes from the PLC and sending messages

"Our prerequisite was 100% functional integrity and to ensure our high service quality. Our service staff need to know the operating conditions of the plants; then, they'll know where the problem is and are able to bring the proper spare part with the first visit already."

Needless to say that we've not been excited when the discontinuation of the GSM modem was announced, but INSYS icom supplies an innovative successor device and is always available for expert support – both has convinced us. Moreover, we've created a forward-looking basis for further develop-

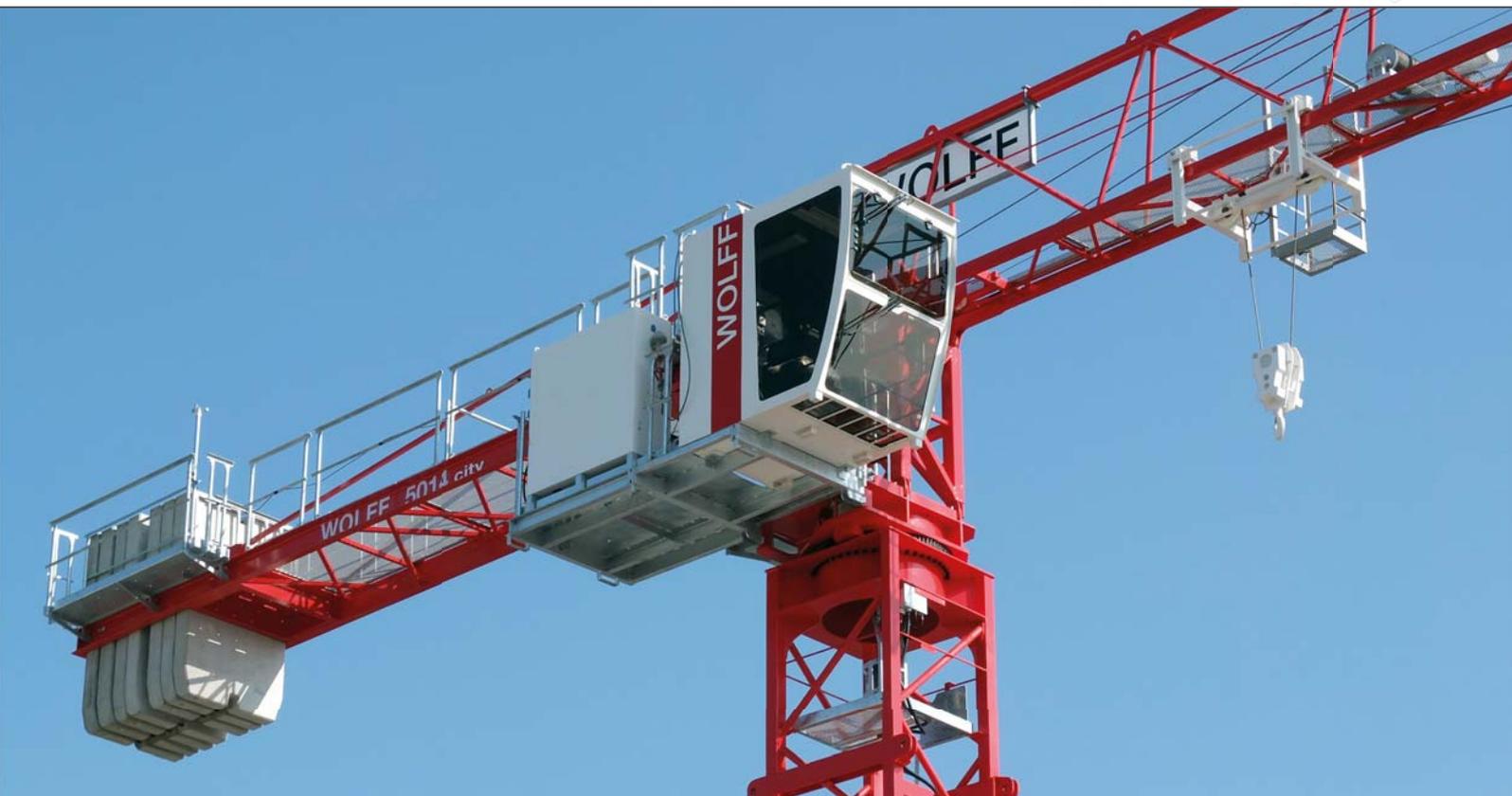
ments together to provide our customers with additional benefits in the next years as well. Therefore, we're still relying on INSYS icom!"

Oliver Berger
Group Manager
Development & Engineering
Engineered Solutions
Kärcher, Winnenden

Highly Available Building Cranes due to Remote Service

Perfect communication with S7-300 via MPI adapter

www.insys-icom.com/AN181



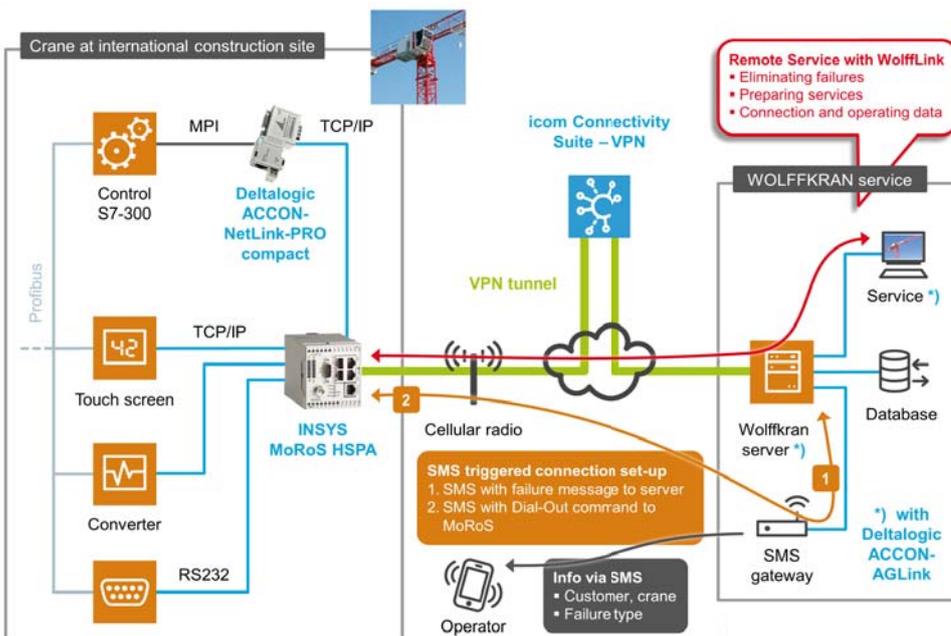
Initial situation

Wolffkran, a premium manufacturer of tower cranes, has developed a worldwide usable teleservice concept. It includes the helpdesk software WolfLink and condition monitoring for the rental crane fleet.

Objectives

The following requirements for a cellular radio to be used in the crane have been framed for boundless and secure data communication from and to international construction sites:

- GSM modem replacement
 - Worldwide use of router and SIM card
 - Encrypted data communication
 - Automatic re-establishment of the VPN tunnel upon connection termination
 - Automated connection control (SMS, e-mail)
 - MPI communication with Siemens S7-300
- Robust devices for construction site use
 - Long-term available devices
 - For retrofit in cranes with RS232 PLC



Benefits and values

- "Site is running" due to highest crane availability
- Time- and cost-optimised services
- "Familiar" with the S7-300 via MPI adapter
- Routers can be configured quickly
- Very good price/performance ratio of the INSYS routers
- Can be used flexible with existing units (RS232)

Solution

The Siemens PLC S7-300 in the crane dispatches failure messages (SMS, e-mail) via the cellular router MoRoS HSPA to the central Wolffkran server. This controls the establishment of an encrypted VPN tunnel by the cellular router via SMS.

Remote debugging

Helpdesk staff can access the PLC and other devices in the crane directly.

Remote monitoring

The helpdesk and management software WolffLink is able to read out all relevant data (failures, conditions, connections) automatically from the S7-300 for condition monitoring.

MPI interface

The communication and programming adapter Accon-NetLink-PRO compact and the communication library Accon-AGLink of the INSYS icom partner Deltalogic provide for a smooth communication with the proprietary MPI interface of the S7-300.

VPN interconnection with encryption

The icom Connectivity Suite – VPN enables a comfortable online management of VPN connections and certificates as well as the automatic replacement of VPN certificates.

Summary

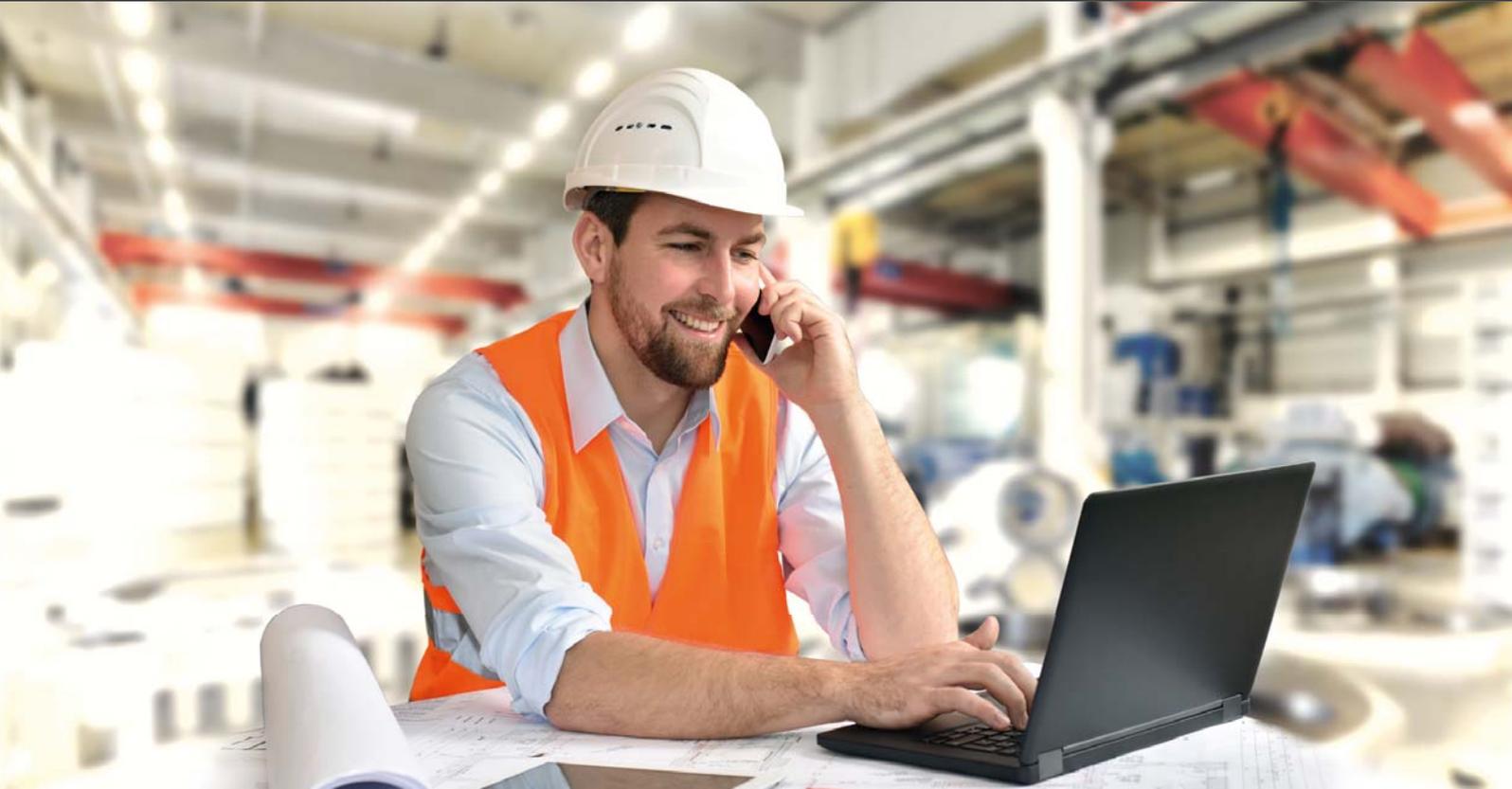
"We've found the solution for our high demands: The MoRoS cellular routers provide lots of functionality and can be configured quickly – this saves hours of work. Moreover, the routers have important options that we'll need for future services. That's why we equip all our cranes with MoRoS HSPA of INSYS icom."

Andreas Wagner
Head of Electrical Engineering
WOLFFKRAN, Heilbronn

Remote Service for Machines, Plants and Devices

Commissioning service, remote maintenance and failure reporting

www.insys-icom.com/AN195



Initial situation

M2M and teleservice increase productivity – not only for machine tools and machining centers. The added value of teleservice for commissioning and remote maintenance in case of failures pays off since helpdesk technicians can access the PLC and other devices in the machine from remote as if they would be at the site.

TODAY, individual connections are used for REMOTE MAINTENANCE between machine supplier and operator. Connection establishment is customer-specific:

- by the operator at the machine
- by the PLC in the machine
- by an expert of the machine manufacturer for example during the call

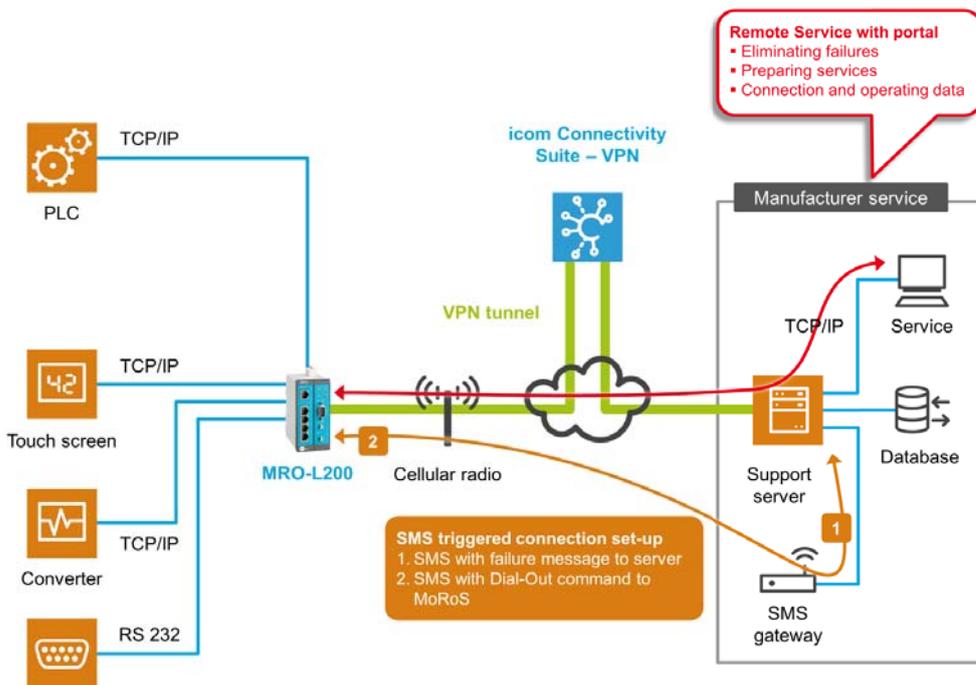
Modem connections are being replaced by IP connections with encrypted VPN connections. Configuration and management of the VPN certificates is quick and easy with the INSYS Smart Devices and the icom Connectivity Suite – VPN of INSYS icom.

Objectives

TOMORROW, production systems and interconnected devices connect to your TELEPRESENCE PLATFORM automatically in the Internet of Things (IoT) and find your desired experts depending on the situation.

The experts will execute the classic remote service still more efficient using integrated knowledge platforms and mobile devices save travel and are "at site" more quickly.

Predictive maintenance allows to provide devices, machines and plants always with individual maintenance. This avoids failures and changes fixed operating times to flexible projectable maintenance.



Benefits and values

- Secure connections with only a few clicks
- Quick commissioning via remote support
- Increased productivity due to less downtime
- Automated updates for INSYS routers
- INSYS router easy to configure via consistent GUI with integrated online help
- Immediate failure messages (SNMP, e-mail, SMS)
- For inventory and migration (RS232)

Solution

The INSYS Smart IoT ecosystem is a flexible, highly pre-integrated end-to-end ecosystem that contains all communication elements for realising IoT concepts. The ecosystem supports edge and cloud computing as well as mixed approaches – this allows to realise and adjust ideas quick and easy.

Summary

The highest possible added value for the customers of INSYS icom results from the INSYS Smart IoT ecosystem.

In this flexible ecosystem, a customer-specific Device App in the router, the INSYS Smart Device, can communicate with the customer application via the appropriate Application Connectors.

This makes much more operational and failure data available for analysis (cloud computing).

This gives information about complex issues and helps to avoid failures and plan maintenance work more specific in future. Moreover, the transparent user behaviour allows bespoke offers like “pay per use”, what ensures growth and competitiveness.



Quelle: Umsetzungsempfehlungen für das Zukunftsprojekt Industrie 4.0, April 2013

Quelle: Umsetzungsempfehlungen für das Zukunftsprojekt Industrie 4.0, April 2013

Condition Monitoring and Control of Data Processing Centers

Fast VPN connections via ADSL and 3G

www.insys-icom.com/AN153



Initial situation

The Correct Power Institute for technical safety and rational energy utilisation (CPI) located in Marsberg is an engineering company founded in 2004.

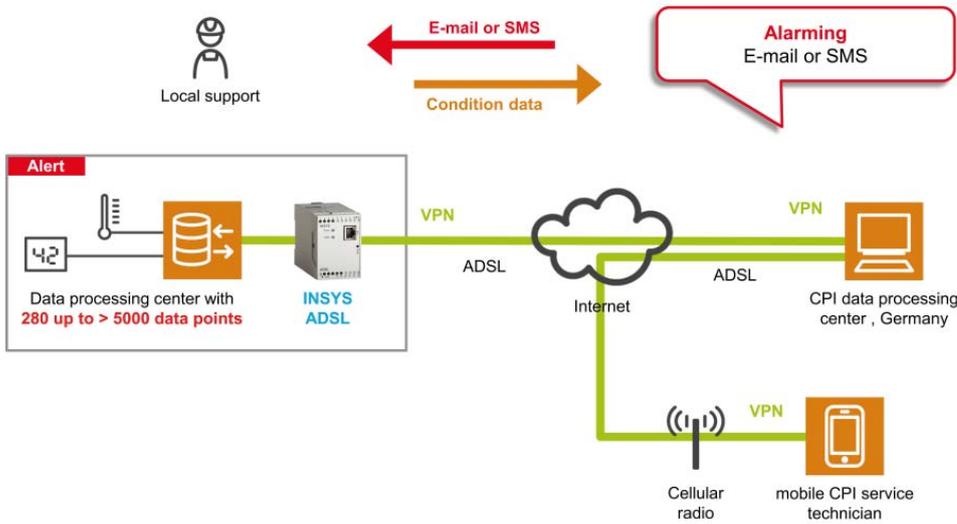
CPI realises data processing centers ranging from 100 kW to 24 MW with concepts for saving monetary and energetic resources – up to fail-safe design, the so-called Zero Defect Data-center Design (zD3).

The small data processing centers Data-center-in-a-Box only require water and power for the provision of a highly available IT infrastructure in any building or room. They are independent of building-specific air conditioning and fire extinguishing systems and can be installed in the office directly as noise-reduced version.

Monitoring of all components used allows for profound analyses that CPI offers its customers, like stores, national security agencies and banks as the after sales service "Cloud Power Monitoring". CPI operates a data processing center for this that is TÜV-certified.

Objectives

- On-site climate control as per defined target profile.
- Condition monitoring of UPS, air conditioning, IT systems and fused outgoing circuits. Logged are 280 data points for the smallest data-center-in-a-box and more than 5000 data points in the data hall of a large data processing center since a total loss of cooling can bring a data processing center to a standstill within two and a half minutes.
- Countermeasures like load reduction, displacement of virtual machines or load shedding will immediately be initiated in case of severe deviations. In addition, an external alarm via SMS or e-mail will be triggered.



Benefits and values

- Permanent condition monitoring
- External alarming via SMS or e-mail
- Effective monitoring of connections
- Automatic reconnection of VPN connections upon termination

Solution

INSYS Smart Devices ensure the connection to the CPI data processing center in Marsberg for the after sales services "Cloud-Power-Monitoring". The reliable DSL modems INSYS ADSL and the cellular routers MoRoS HSPA are used. Their innovative connection management for monitoring the VPN connection and the immediate reconnection following a connection termination have been decisive.

Summary

"One of the most important points is the innovative connection management of the devices: First, the independent monitoring of the VPN connection, and second, the immediate reconnection following a connection termination. That's why we successfully and gladly use the reliable DSL modems INSYS ADSL and the cellular routers MoRoS HSPA."

Dipl.-Ing. Bernd Steinkühler
Managing Director of CPI

Just-in-Time Fuelling on International Airports

M2M Solution for AFS Airfield Fuelling Vehicle via UMTS

www.insys-icom.com/AN154



Initial situation

AFS Aviation Fuel Services GmbH, Hamburg, assumes every step in the fuelling process for their customers and ensures short ground time consequently. Founded in 1986 as associated company by Lufthansa and BP, AFS is the leading service provider in Germany on the field of aircraft fuelling, fuel depot management and operational management today.

Fuelling aircraft on international airports is a logistical tour de force from the refinery to the aircraft. Moreover, it must be fuelled safely around the clock.

The ultramodern vehicle fleet that has been designed by AFS itself comprises 165 vehicles for kerosene and aviation fuel; more than half a million aircraft fillings with 6.14 million cu-

bic metres have been performed only for kerosene in 2011. All vehicles are equipped with on-board computer, touch screen, printer, PLC and measuring system.

The fuel handling system (FHS) of the AFS associated company "GlobeFuel" models all processes from the refinery up to fuelling at more than 150 airports world-wide.

Objectives

Objective is the smooth transmission of order data; these are the basis for the control of the just-in-time fuelling.

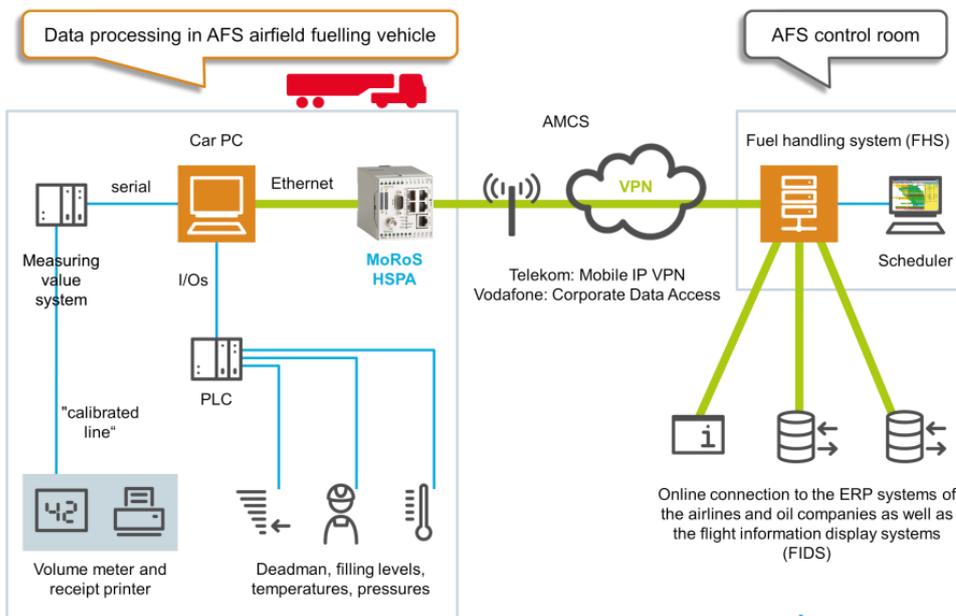
Solution

AFS equips its airfield fuelling vehicles with cellular routers from INSYS icom.

Order data get to the airfield fuelling vehicles via UMTS

The AFS Mobile Communication System (AMCS) developed by AFS transmits order data, like aircraft ID and position, fuel type and volume, oil company and fuelling time to the airfield fuelling vehicle.

Aircraft captains of some airlines can even order directly from the cockpit and get their receipt transmitted electronically.



Benefits and values

- Redundancy due to 2 SIM cards
- Robust cellular routers for permanent use in vehicles
- Easy configuration via web interface
- Can be integrated in VPN services of the providers
- Serial Interface for extensions
- Investment protection due to programming environment for customer programs

Summary

AFS uses the UMTS networks and VPN services of Telekom and Vodafone for data communication between FHS and the car PC systems.. The programmable cellular routers MoRoS HSPA are used as UMTS gateway in the vehicles. These routers with integrated 4+1 port switch have two SIM card slots and are equipped with one Telekom and one Vodafone SIM card. This makes data communication redundant and allows to use the included data volumes of the SIM card well-balanced. If no HSPA/UMTS network is available, the connection falls back to GPRS or EDGE automatically.

Reliability during continuous operation and investment protection

AFS has selected the INSYS router, "because the devices meet our high reliability requirements during continuous operation in airfield fuelling vehicles" says Jan Drömer, Information Systems Manager of AFS, and points out that "the devices can be configured very easily and quickly via a web interface despite their functionality".

Additional benefit due to extension options

Further decisive factors were the competent support of INSYS as well as the future extension options via the serial interface of the cellular routers and the integrated programming environment, "since running own scripts in the cellular router is the icing on the cake of innovation possibilities!"

Water Quantities, Status and Fault Messages in Real-time

Leading technology makes new business field possible

www.insys-icom.de/AN199



Initial situation

Italy has rich water resources and the lowest water prices in Europe, but is world-wide number two regarding mineral water consumption. Although the limits have been met nearly everywhere with 99.8 in 2010, tap water has a bad reputation.

Every Italian family spends 234 Euros per year for bottled water according to the study Censis 2014. 12 billion litres of mineral water have been bottled in PET containers 2006 already; this is another savings and environmental protection potential. 665,000 tons of oil have been consumed for this and only 1/3 of the PET bottles have been re-used - the remainders have been deposited.

Objectives

The set-up of public water dispensers – similar to the fountains in former times – had the following requirements:

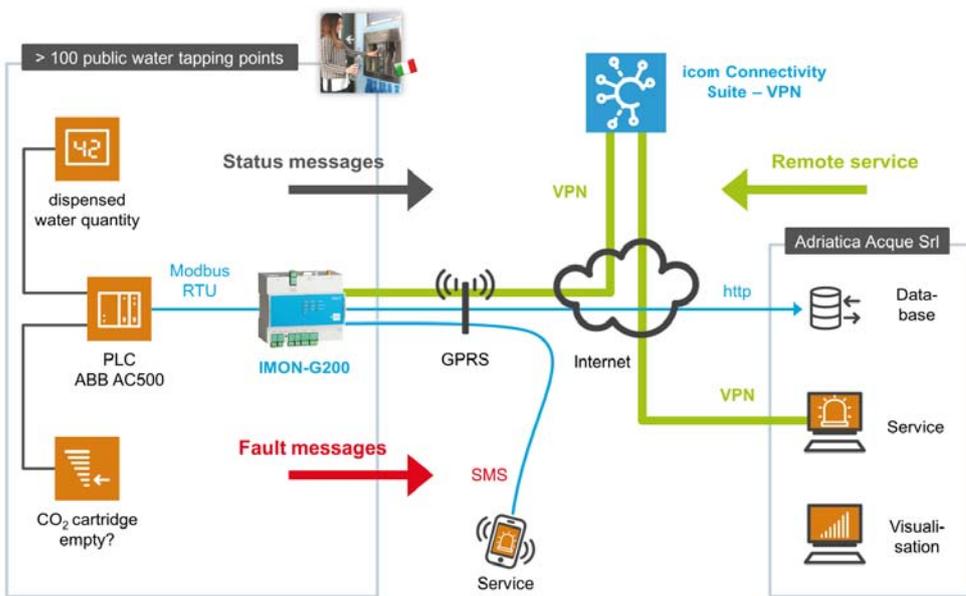
- Highly available data communication
- Remote maintenance to avoid expensive servicing
- Standard connection via cellular radio since data connections rarely exist at the set-up locations
- Reduction of the routine control checks at the site to an absolute minimum
- Sending faults via SMS immediately
- Status message before the CO2 cylinders become empty
- Storing drawn water quantities on a server in real-time.

Solution

The water supplier Adriatica Acque from Savignano sul Rubicone (Italy) equips the whole Emilia Romagna and neighbouring regions with public water dispensers, the "Cassette dell'acqua".

Our partner EFA Automazione from Cernusco sul Naviglio takes care of the data connection with the INSYS Smart Device IMON-G200.

The IMON-G200 is connected via Modbus RTU (RS485) as master to the SPS AC500 of ABB. It has a Monitoring App for Modbus and queries the flexible addressable Modbus registers of the PLC periodically or event-triggered. Then, it transmits the data via cellular connection and HTTP access to a remote server for visualisation on a PC.



Benefits and values

- Optimised process for exchanging carbon dioxide cylinders (CO2)
- Real-time data about water consumption, other measured values and faults
- Visualisation of the positive effects on the ecological footprint in the Internet
- New customers due to new business model
- One device for 3 tasks: Fault monitor, data upload and remote maintenance router

Summary

Moreover, the IMON-G200 is prepared for the integration into the icom Connectivity Suite – VPN; a VPN service that facilitates configuration and management of VPN networks significantly – and still guarantees full communication security.

The IMON-G200 has been selected because of its function combination:

- Fault monitor – for immediate SMS dispatch in case of an alarm (real-time) and
- Cellular router – for data upload via HTTP to a server and the IT security functions (VPN, firewall) for a secure remote maintenance access.

Two outputs at the IMON-G200 can restart the PLC via SMS control.

“The integration between PLC and router is quick and easy thanks to the configuration web interface of the IMON-G200 since this is intuitive and practical. After configuring the parameters for Modbus communication in router and PLC, both devices start to exchange information without any problems.”

“Thanks to the performance of the PLC and the versatility of the INSYS router, we could build the architecture more complex and design processes perfectly.”

Luca Franchini
Engineer and application developer of
Ing. Innovative Studio

IT Security in Public Utility Process Network

Renewable energy supply management in transformer stations

www.insys-icom.com/AN159



Initial situation

Pfalzwerke Netz AG is the leading energy supplier of the Palatinate and the Saar-Palatinate district. The grid area has a size of about 6,000 km² and comprises about 15,000 km circuit length, 62 transformer stations and 3,758 secondary substations.

The prego services GmbH is IT service provider of Pfalzwerke Netz AG for many years.

Objectives

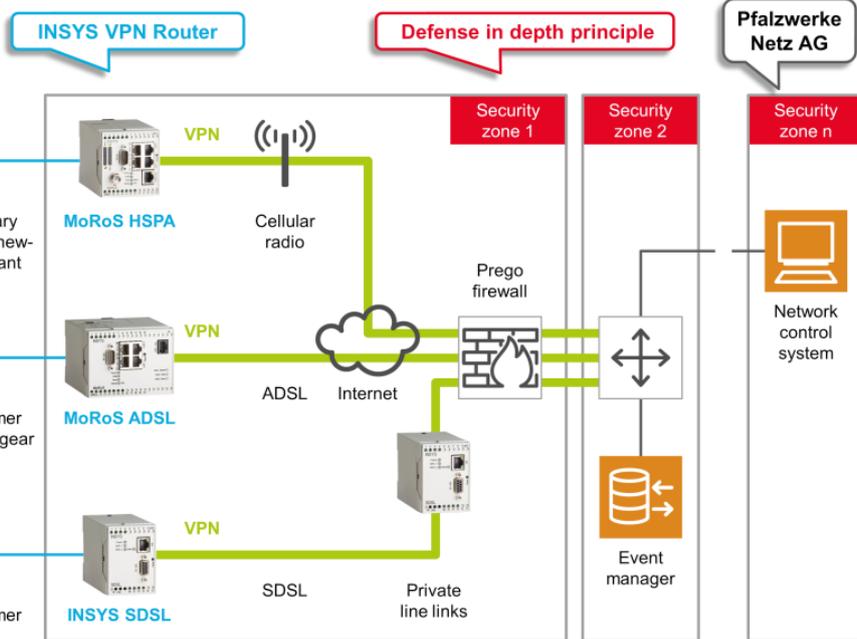
A whole bundle of requirements was to be fulfilled:

- New hardware components for telecontrol (because of discontinuation)
- Replacement for ISDN dial-up traffic (general modernisation)
- Continuous reduction of interruption minutes in the medium-high voltage system (requirement of Federal Network Agency)
- Management of the renewable energy suppliers with 110 kV supply (because of energy revolution 2011)

Guidelines provide the framework

ISO/IEC TR 27019 – that was not yet published at the time of the decision – has been turned into the measure of the solution.

The latest routers of INSYS icom comply with the concepts of the BDEW white paper and the associated execution notes. Requirement-specific security features have been implemented and put to the acid test.



Benefits and values

- Permanent monitoring of the IT infrastructure
- Manipulation protection
- Safeguarded connection of switchgear via own copper lines (SDSL) or public networks (ADSL)
- Safeguarded connection of locations in rough terrain or unsupplied areas (cellular radio)

Solution

Pfalzwerke Netz AG wants to use both, own and public telecommunication networks. The following routers are used for control and monitoring purposes:

Private data networks

- INSYS SDSL for own 2/4-wire lines (> 10 Mbit/s)
- MoRoS LAN for own data networks

Public data networks

- INSYS ADSL for broad-band Internet access (up to 25 Mbit/s)
- MoRoS HSPA, cellular all-round router for 2 SIM cards

All routers share the capability for industrial use, like minimum failure rates of the devices, DIN rail mounting and long-term availability for example.

Summary

"The benefits of our state-of-the-art network infrastructure, which is able to exceed today's security standards, are essential for a smooth operation."

Michael Steiger
Pfalzwerke Netz AG

"We monitor the whole IT infrastructure permanently. The reliable devices of INSYS icom make an important contribution, in particular when realising the security processes."

Peter Schrieck, Project Manager
prego services GmbH

Monitoring and Remote Query of Sampling Devices

Embedded cellular router for smallest space

www.insys-icom.com/AN188



Initial situation

MAXX Mess- und Probenahmetechnik GmbH is one of the largest sampling device manufacturers worldwide. Water analysis and water quality are in the focus of MAXX.

When developing the portable devices P6 L that are used in sewage ducts, the space for the complete data communication technology and the data logger was limited to the size of a few match boxes.

Moreover, it was necessary that the data in the data logger can be accessed via a web-based interface (browser) that the customers do not have to install a separate software for remote visualisation.

Objectives

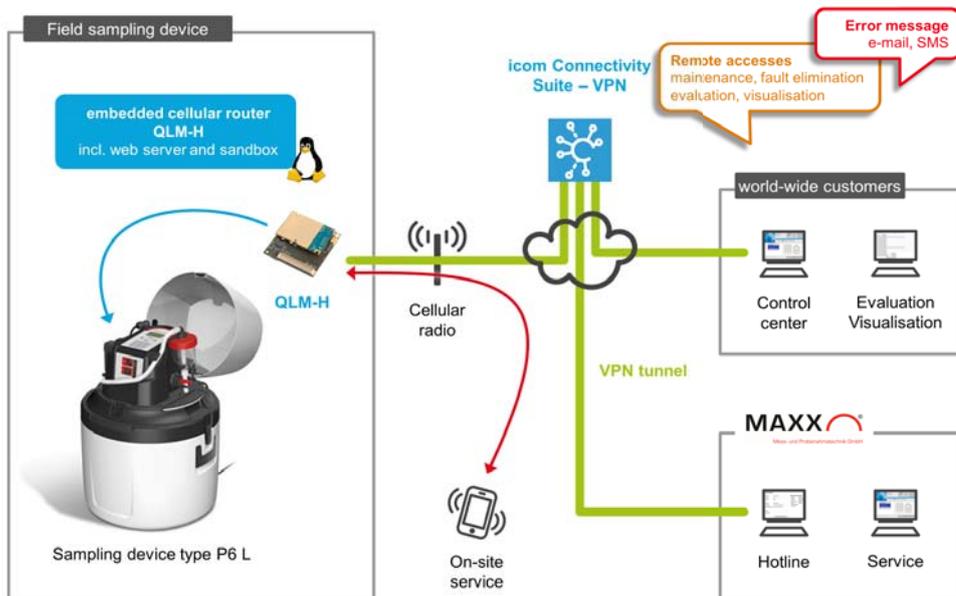
The following requirements to the cellular router are framed in the project:

- Very small due to limited space
- High security standards
- Common protocols
- Robust and suitable for industrial use
- SMS alarming also with very low field strength in subterranean tunnels
- Energy-efficient for energy self-sufficient application in battery-operated sampling devices
- GUI as web interface; no separate software must be installed by the customer (maintenance effort!)

Solution

The INSYS Smart Devices of the QLM series fulfil all requirements as single-board routers:

- The portable sampling devices cool the samples. The cooling temperature is monitored.
- Failures in suction, purging or battery will be signalled via e-mail or SMS. Routine inspections with road blocks are not necessary any more.
- The cellular router will be configured via a web interface. This saves cost for additional software for the customer
- Customer-specific solutions can be realised quick and easy in the sandbox of the router.



Benefits and values

- No software installation on customer PC
- Online data evaluation and visualisation
- Router memory for data and analysis software
- Router with highest security standards
- Messages and remote access save services
- Powerful embedded 3G router for smallest space
- Low-power for energy self-sufficient applications

Summary

- The software maxxwareConnect is running in the secure Linux environment (sandbox) of the embedded router and visualises the measuring data – also for remote access.
- Remote access via virtual display
Each customer can access the sampling device form anywhere using secure VPN connections.
- The QLM router has all security features on-board: e.g. an integrated firewall, encryption via VPN (OpenVPN, IPsec, PPTP).
- Router, data logger and IPC in one device: The sandbox makes additional controllers needless.
- INSYS icom offers a suitable development board, a free development environment and training.

*"Our P6 L must fit through a manhole in the street. We have planned space for a Linux board and an industrial PC in the housing – then we've found the embedded cellular router QLM of INSYS icom and are really very happy now. We have router, web server, fault monitor, data logger and industrial PC space and energy conserving in one device now with the QLM.
Even the colleagues in the manufactur-*

ing department benefit from this since the space gained facilitates the assembly.

Even if it was "only" a question of space first for the P6 L: We'll offer the QLM router to all of our customers in each sampling device!"

Tobias Wannemacher
MAXX Mess- u. Probenahmetechnik GmbH, Rangendingen

SCADA – Supervisory Control and Data Acquisition

Collecting and analysing real-time data

www.insys-icom.com/AN140



Initial situation

SCADA systems collect and monitor data from distributed facilities and measuring points automated. IEC 62264 and DIN EN 62264 assign SCADA systems to the process control level in the automation pyramid.

Fields of application

- Energy transport via extensive networks (power, oil, gas)
- Water/sewage management
- Building management systems
- Environmental measuring technology and monitoring
- Process data processing and process data visualisation
- Network control technology
- Traffic engineering (signal systems)

Field and client level

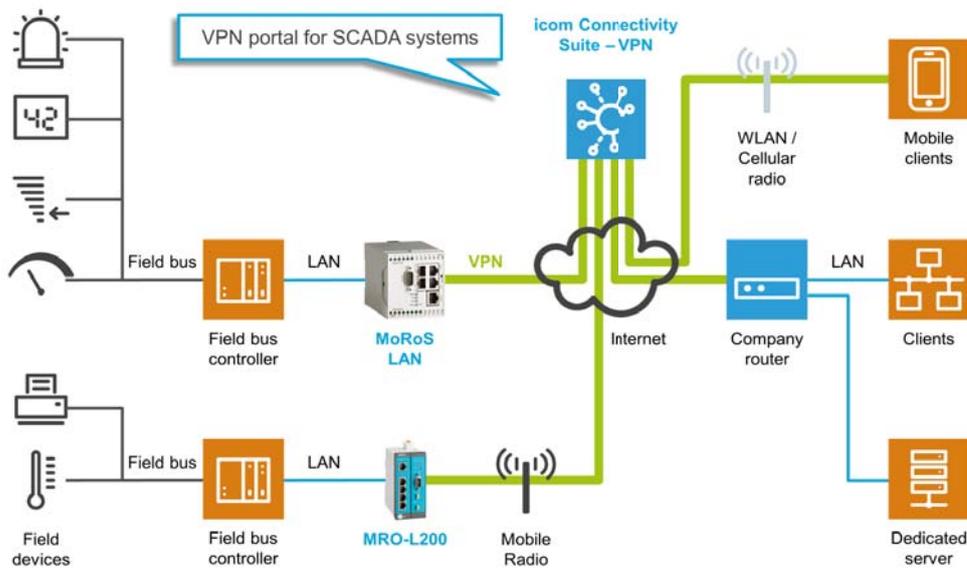
Process controllers communicate with the field devices for data collection via field buses on **field level**.

Users intervene for corrective action on **client level**.

Field and client level are connected via private or public data networks (Ethernet, DSL, telephone, mobile radio). A seamless communication is not always provided.

Objectives

- Stable data transmission
- Secure connections via wide area networks
- Management of interface problems



Benefits and values

- Monitoring, controlling and optimising plants
- Adjustable to all situations
- Transmitting data easily via cellular radio without complex radio data technology
- Investment protection because plants are able to "grow"
- Specified in IEC 62264 and DIN EN 62264

Solution

Smart Devices as well as Connectivity and Security Services of INSYS icom connect field devices and control centers.

They connect the field bus controllers with each other and with the client level via all modern communication networks.

Summary

One of the most important points for seamless communication is the innovative connection management of the INSYS Smart Devices.

It consists of

- autonomous monitoring of the VPN connection and
- their immediate reconnection following a connection termination.

Application Connectors of INSYS icom are practical gateways on field level between field bus and IP world for connecting all devices.

Reporting Faults and Ensuring Availability

Transparent access to IP networks and serial terminal devices

www.insys-icom.com/AN149



Initial situation

Monitoring machines, plants, operating equipment, raw material stocks, buildings and heat stations ensures normal operation; a precise notification must be sent immediately in case of a failure for a quick and successful intervention.

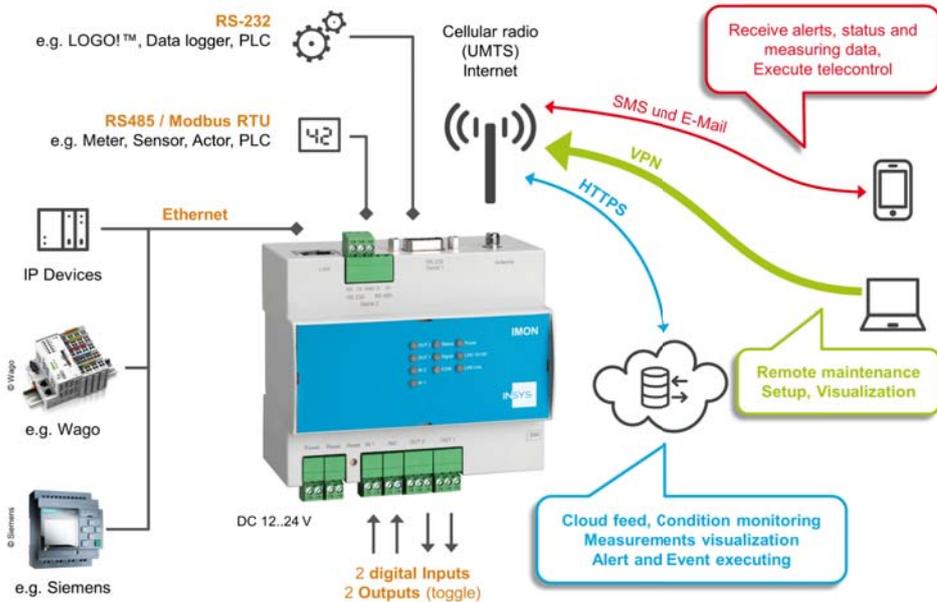
Objectives

- Monitoring of controls and field buses
- Sending significant performance data as SMS or e-mail
- Early warning system by boolean operations for combining measured values
- Sensing alarm contacts and issuing an alarm
- Performing complex tasks via measuring and monitoring relay
- Remote maintenance, remote operation, commissioning support

Solution

INSYS Smart Devices of the IMON series are fault monitor (SMS, e-mail) and cellular router in one unit: The integrated Monitoring App is available in 3 variants:

- Modbus TCP/RTU, function codes 1-6 and gateways as Application Connectors for many other protocols
- Siemens S7 series 200/300/400/1200/1500
- Siemens LOGO!™ 0BA4 to 0BA8



Benefits and values

- Monitoring control and field bus devices
- Sending significant performance data as SMS or e-mail
- Sensing alarm contacts and issuing an alarm
- Performing complex tasks via measuring and monitoring relay
- Transparent access to IP networks and serial terminal devices
- Remote maintenance ready for takeoff with icom Connectivity Suite – VPN

Summary

The routers monitor the following for the Siemens LOGO!™ only:

- Reading out flags, I/Os and process image
- Visualising process image
- Starting/stopping the program

The fault monitors are pre-configured for applications with measuring and monitoring relays and easy to configure using wizards. The cellular router uses the icom Connectivity Suite – VPN for encrypted communication.

"The realisation of specific customer requirements is a breeze with the various possibilities of the Monitoring App in the IMON routers and gives us customer solutions for optimisation, damage prevention and expansion" said Walter Walzl of Messtechnik GmbH & Co KG.

... and many more solutions



Your Leading Technology Partner for Industrial Data Communication



INSYS icom is the leading technology partner for professional data communication as well as M2M and IoT communication solutions since 1992. The product and service portfolio enables new digital services or the migration of existing technology in the course of Industry 4.0. End customers and partners can benefit from a quick introduction, optimised costs as well as low risk and thus generate completely new business models. Technologies of INSYS icom are secure, reliable, user-friendly and in industrial quality, "Made in Germany".

INSYS icom provides professional data transmission via LAN, DSL and cellular radio. In particular, the products meet the high requirements to critical infrastructures. Classic applications like remote maintenance, remote operation or condition monitoring can be realised and extended to individual IoT solutions by interconnecting the data points (e.g. sensor data). Centralised approaches where distributed applications forward their data to clouds and other storage and processing media and are controlled from there can be

combined in any way with local approaches where the local units have a certain autonomy.

The basis for all these applications is a highly pre-integrated, scalable and flexible ecosystem with professional routers and supporting connectivity services like VPN or SIM. Serial and IP-capable devices can be interconnected independent from manufacturer and protocol and their data can be acquired and processed. The connection to cloud services, mobile terminal devices and customer-specific infrastructures is just as flexible. Controls, protocol converters or the like can also be virtualised and consolidated on the router using an integrated software environment and suitable construction kits.

The holistic concept of INSYS icom comprises consulting, planning and integration services as well as hardware and software application development besides the standard products. This will be complemented by a competent technical service with own helpdesk.

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