

## Case Study DSO Electricity

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### Customer Profile

The customer is a distribution system operator (DSO), which, together with various subsidiaries, provides electrical connections for end customers.

### Project

In the context of the German energy transition, the legislator is making new demands on grid connections, e.g. metering of current consumption data from the electricity meters by the supplier, but also providing the metering data to the end customers. The Smart Meter Gateway (SMGW) required for this purpose requires a communication infrastructure, which in this case consists of Broadband Powerline between the inhouse power connection and a central Powerline Headend in the local network station. If there is no wired communication infrastructure in the local network station, then the connection to the central office is made from there via the LTE network of a public telecommunications provider. The connection to the LTE network is realized by a Garderos R-7728 router.

### Technical Requirements

#### Environmental Conditions

Local network stations are not air-conditioned. All components in the local network stations must be designed for a wide temperature range from -30°C to +70°C.

#### Network

The routers should be able to connect to the LTE networks of all German network operators, even in the 450MHz frequency range planned for critical infrastructures soon. In order to keep the administrative effort low, the routers are equipped with a SIM card in the factory and a configuration suitable for all networks is already provisioned. The router automatically selects the right network.

#### IPv6

In the final stage of expansion, the network infrastructure will supply several million households with a smart meter infrastructure. Since IPv4 addresses are already in short supply, the infrastructure is to be set up as a pure IPv6 network from the very beginning. IPv6 prefixes must be distributed to the routers at the LTE network level and the routers must pass on the IPv6 prefixes to the broadband powerline infrastructure via Stateless Address Auto Configuration (SLAAC) and DHCP-IPv6.

A special feature of the integration is the use of a delegated prefix over the LTE network to enable the direct routing of data from the SMGWs through the network of the public telecommunications providers.

## Security

The communication between the SMGW and Meter Data Management is carried out according to a BSI certified procedure and therefore does not need to be additionally secured by tunnels on the router.

The management of the router is secured by mutual authentication and the use of secure communication protocols (HTTPS, SSH, SNMPv3).

## Management

Basically there are 2 separate types of data traffic, on the one hand the data traffic from the SMGWs to the gateway administrator and to external market participants, in the following called user data, on the other hand the data traffic necessary for the administration of the network infrastructure, in the following called management data.

The network infrastructure should enable Quality of Service (QoS) at all levels and thus prioritize both management data and critical user data. This means that management data and critical user data should be prioritized over non-critical user data both at the level of the radio network and in the routed network. This is achieved in the LTE network by means of different APNs, each with a different bearer, and in the routed network by separate VLANs and QoS algorithms.

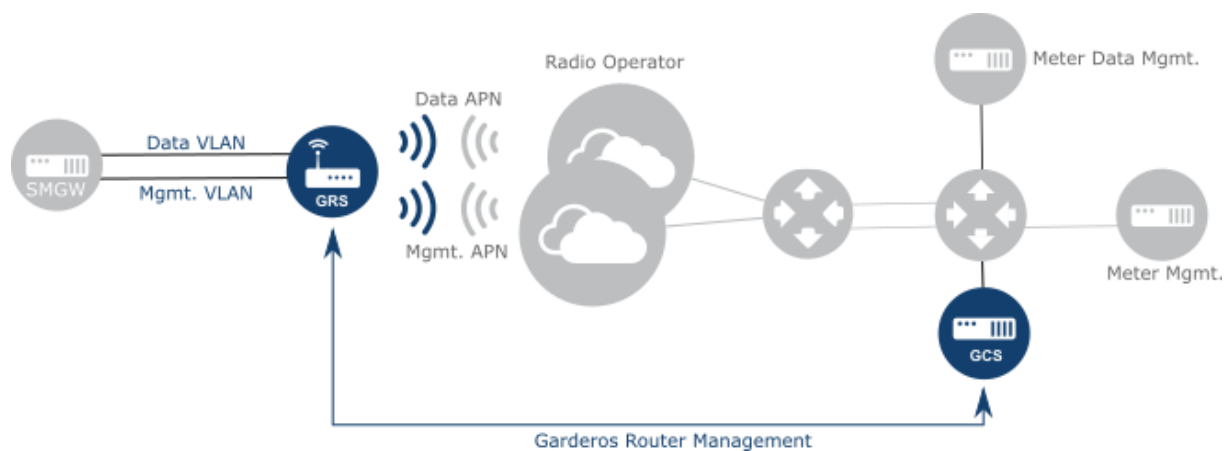
The LTE routers are configured by the central Garderos configuration server and can always be brought up to the current patch level via this server. The central management also handles the exchange of certificates at the end of their validity period.

## Realization

The implementation was carried out in a project of the distribution system operator (customer) together with Garderos (LTE router), Broadband Powerline manufacturers and mobile telecommunication network operators (LTE network).

The customer ordered the routers as a turnkey solution, so to speak, together with the services necessary to meet the requirements of the communication infrastructure.

During the project, the Garderos router was adapted to the specified requirements and integrated into the network of the mobile network operators in a joint system test.



Garderos sees itself as a competent partner to its customers, who can exactly fulfill the requirements of its customers based on the existing products. In particular the following work was carried out by Garderos:

- Specification of the requested new functions and coordination with the project management of the customer
- Implementation of additional functions, especially for the LTE network:
  - IPv6 over LTE
  - Dual APN
  - Automatic APN selection
  - SLAAC, prefix delegation DHCP-IPv6 relay and server
- Services for the commissioning of the network:
  - Support in setting up the management infrastructure (GCS) for the administration of the routers.
  - Support in creating configurations for the routers.
  - Support for the integration with the Powerline components and the LTE network.
- Coordination of the production at Garderos with the customer's processes
  - Implementation of additional management functions to enable automatic configuration of the routers for different LTE networks without manual interaction prior to installation.
  - Provisioning of the routers with the agreed configuration.
  - Electronic exchange of delivery data.
  - Delivery of the routers together with the antennas and additional labels required by the customer.

Garderos is ISO-9001 certified and has therefore naturally implemented regression tests for all adjustments to the router firmware. This ensures that new functions are not only included and functional during the project, but from now on in every new version of the firmware.

## Conclusion

Garderos' product portfolio includes routers for harsh environments that support a wide range of wireless technologies. This leads to very fast results already in the first phases of a project. The firmware of the routers can be quickly adapted by Garderos to new customer requirements. Garderos offers all necessary services and guarantees the availability of a reliable firmware for the future.