

ipRoute

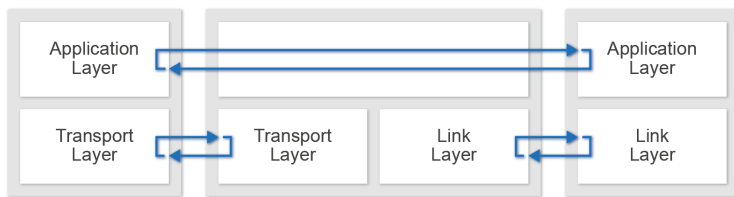
The IEC 60870-5-101/104 Router

ipRoute is a communication gateway for data transmission between the IEC 60870-5-101 and IEC 60870-5-104 standards, which takes advantage of the extensive compatibility of both protocols at the application layer.

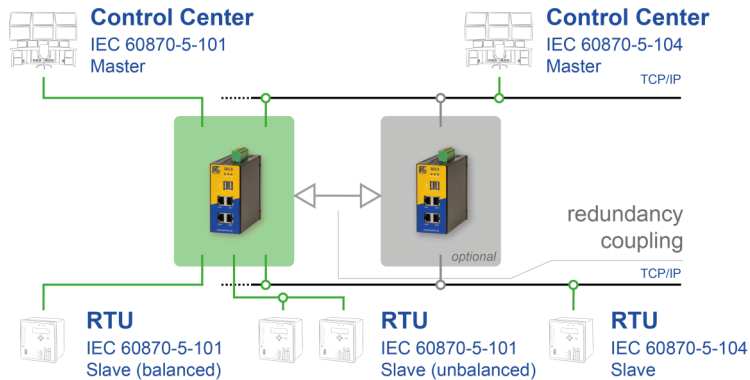
Control Center
IEC 60870-5-104
Master

ipRoute

Substation
IEC 60870-5-101
Slave



ipRoute is a router-based system. The ASDU (Application Service Data Unit) data packet exchange between the communication components is transparent. The IEC 60870-5-101 link layer functions and the IEC 60870-5-104 transport layer functions are however directly executed by *ipRoute*, as shown in the figure above.



FUNCTIONAL RANGE

• Configuration

Configuration and maintenance of the system is conducted through the integrated web interface, which provides central access to all settings and services.

• Protocols

ipRoute supports nearly all the link and transport layer functions defined by the IEC 60870-5-101 and IEC 60870-5-104 protocols. In addition, substations can be linked via dial-up connections.

Uplink to control center:

- IEC 60870-5-104 server
- IEC 60870-5-101 balanced slave
- IEC 60870-5-101 unbalanced slave



Downlink to substation:

- IEC 60870-5-104 client
- IEC 60870-5-101 balanced master
- IEC 60870-5-101 unbalanced master
- IEC 60870-5-101 dialup master

The individual protocols can be combined as desired.

• Information Processing / Functions

- Transparent ASDU transmission
- ASDU filtering
- Configuration of different address lengths
- Adaptation of IEC 60870-5-101/104 ASDU types
- Intelligent data flow control and bandwidth adjustment
- General interrogation
- Virtual RTU
- Time synchronization
- Redundancy

• Network Features

- Assigning multiple IP addresses to one physical Ethernet interface
- Network management using an integrated SNMP agent
- NTP based clock synchronization
- HTTPS/SSH/SFTP access
- DHCP
- DNS
- Bonding
- PRP
- VLAN



• Cyber Security

- Secure access to all administrative services (HTTPS, SSH, SFTP)
- Role-based access protection with login and password
- User administration for local users
- Central user administration via Active Directory (LDAP) and/or RADIUS
- Crypto Store for certificate management
- Creation of self-signed certificates and Certificate Signing Requests (CSRs)
- Import and export of certificates
- Configuration of VPN tunnels (OpenVPN and IPsec)
- Firewall
- Safeguarded real-time Linux operating system
- Safety according to IEC 62351-3 (TLS according to RFC5246) for TCP/IP based connections

PRECONDITIONS

To ensure successful integration of IEC 60870-5-101/104 systems, the following requirements must be met:

- ASDU addresses (CA+IOA) used must be unambiguous and unique for all connections, multiple assignments are not allowed.
- ASDU types used for the control station or substations must be compatible. This can be ensured by matching interoperability lists. *ipRoute* supports the conversion of following ASDU types (the behavior is configurable):

⇒ Monitoring direction ASDU types with long time stamp (M_SP_TB_1, M_DP_TB_1, etc.) into ASDU types with short time stamp (M_SP_TA_1, M_DP_TA_1, etc.) and vice versa.

⇒ Control direction ASDU types with long time stamp (C_SC_TA_1, C_DC_TA_1, etc.) into ASDU types without timestamp (C_SC_NA_1, C_DC_NA_1, etc.) and vice versa. The corresponding confirmations are also converted.

⇒ The test command with long time stamp C_TS_TA_1 can be converted into a test command without time stamp C_TS_NA_1.

THE HARDWARE

The selection of the suitable hardware platform for *ipRoute* relies on the number of required interfaces and the necessary data throughput.

Detailed technical data on our hardware platforms can be found at www.ipcomm.de.



The **SEC3** is a compact controller with two serial RS232/RS422/RS485 interfaces and two Ethernet adapters.



The mid-range model **MEC3** features up to six Ethernet ports and six serial interfaces. An optional expansion module with an integrated 4G LTE modem is available for mobile connectivity.

More information about *ipRoute* can be found at:
<https://www.ipcomm.de/product/ipRoute/en/sheet.html>

REDUNDANCY

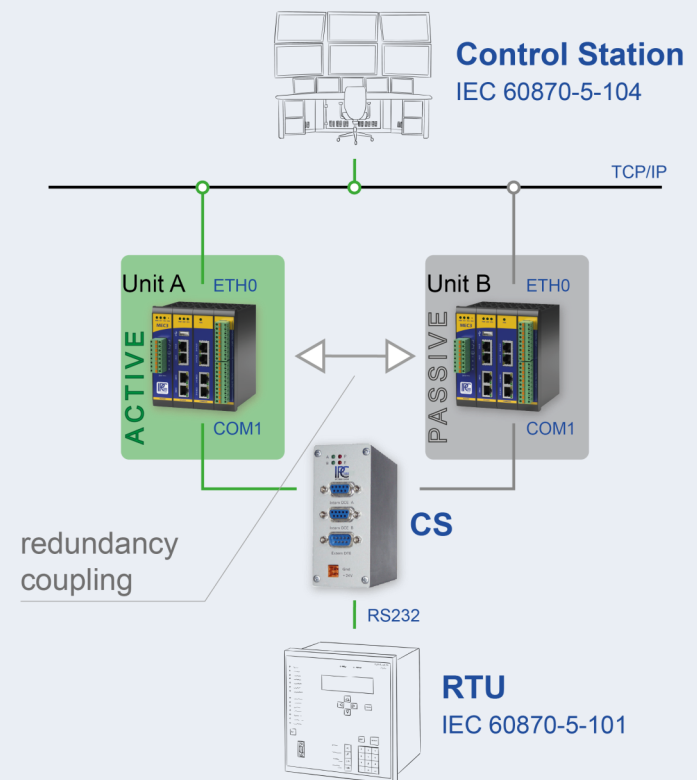
To meet even increased security requirements, *ipRoute* is fully capable of redundancy in combination with a second device.

- Line redundancy
- Device redundancy (hot-standby, parallel operation)

With redundant protocol converters, reliability can be ensured, based on the "hot standby" principle. At any one time only one device assumes the active role, while the passive device monitors the active one and takes the initiative if it fails.

This minimizes downtimes due to maintenance work or component and interface outages, for example.

The redundancy coupling can be realized via Ethernet as well as over serial connections. If separate serial communication connections must be connected to both redundant devices, the CS (channel switch) will be applied.



Example of a redundant solution with *ipRoute*.

