About the IEC-60870-5-101/-104 protocols

The protocols IEC 60870-5-101 and -104 ("IEC-101" and "IEC-104") are well established telecontrol protocols to implement communication between control station and substations. They allow general interoperability between devices of various manufacturers. The IEC-101 protocol uses serial connections for transmission, whereas the IEC-104 protocol is based on a TCP/IP infrastructure and benefits from the advantages of packet oriented communication technology. In the context of modernization of telecontrol networks, migration from the IEC-101 to the IEC-104 protocol is a common scenario. However, not in all cases it is necessary to exchange the complete telecontrol hardware components at the same time, since the similarity of both protocols allows conversion and thus a mixed mode operation, i.e. between an already IEC-104 capable control station and legacy IEC-101 substations that are connected via protocol converters.

IEC-101/104 support in the HY104 family

The HY-104 devices allow for an easy network extension or rebuild to a packet oriented Ethernet network with modern features like monitoring, automatic redundancy in the case of error, and virtual networks (VLANs, for example to transmit IP telephony additionally).

The following devices come with integrated IEC-101/104 features:

- HY104-DSL
- HY104-DSL2
- HY104-DSL/FO
- HY104-FO2
- HY104-ETH

Additionally to offering state-of-the-art transmission technology, the HY104 devices come with integrated IEC-101/-104 features, like IEC-101/-104 conversion, transparent tunneling of serial telecontrol protocols, as well as network infrastructure monitoring using IEC-104.

- **Transmission of serial data streams through an IP network**: In this mode of operation, the HY-104 devices transmit the serial data streams of a telecontrol protocol like IEC-101, RP570, Modbus, SEAB 1F (and many more) through an IP network. Using this feature, the telecontrol infrastructure within the substations may remain, while the communication infrastructure can be replaced and made future-proof.

Further informationen:

HYTEC Gerätebau GmbH
Cochemer Str. 12 - 14
D-68309 Mannheim
Tel.: +49 (0) 621 72075-0  Fax: +49 (0) 621 72075-18
Web: www.hytec.de  Email: info@hytec.de
**IEC-101/-104 conversion:** The HY-104 devices can act as protocol converters between an IEC-104 control center and IEC-101 RTUs (Remote Telecontrol Units). Thereby the control center can be modernized and the communication technology can be brought up-to-date, while the existing telecontrol technology in the substations can remain, to be replaced later step-by-step. After adjusting the freely configurable protocol parameters on both sides (i.e. station address and object address lengths), the central station can access the RTU data transparently. There is no need to specify certain dedicated object addresses in the converter, since all objects are forwarded transparently. Changes in the connection state of the RTUs will be propagated to the central station. The following modes of operation are supported:

- **Point-to-Point operation:** Behind every HY104 protocol converter there is exactly one IEC-101 RTU.
- **Point-to-Multipoint operation:** Multiple IEC-101 RTUs are connected to the HY-104 converter device with a party-line. For each substation a dedicated IP address is maintained on the IEC-104 side of the converter. The central station can dispatch the requests to the RTUs simultaneously, these requests will be buffered within the HY-104 devices, to be processed sequentially using polling mode.

**Monitoring the communication equipment via IEC-104:** The HY104 devices can act as RTUs and provide information regarding link states and alarm states respectively, using IEC-104 requests. In this manner the communication equipment can be monitored by an IEC-104 control center.