



Fig. 13/62 Front view of the Ethernet modem

### Function overview

- RS232 interface for data transfer and configuration of the modems
- Serial data rate and data format (RS232 / RS485) for the terminal devices is selectable from 2.4 kbit/s up to 57.6 kbit/s with data format 8N1, 8E1
- FO interface for serial data transfer
- 10 Mbit Ethernet interface (LAN) to the 10/100 Mbit Ethernet network
- Increased security with password protection and IP address selection is possible
- Exchange of serial data via Ethernet network between two Ethernet modems (e.g. DIGSI protocol, IEC 60870-5-103 protocol)
- Exchange of serial protocols via Ethernet without gaps in the telegram structure

### Description

A control PC and protection relays can exchange serial data via an Ethernet network using two Ethernet modems 7XV5655. Connection to the Ethernet modem is in each case made via the asynchronous serial interface of the terminal devices. In the modem the serial data is packed into the secure IP protocol as information data, and is transferred between the modems using the Ethernet connection. Conformity with the standard and gap-free transmission of serial DIGSI or IEC 60870-5-103/101 telegrams (frames) via the network is ensured by the modem which receives the serial telegram communication and packs the serial IEC telegrams into blocks for communication via the Ethernet. Data is transmitted in full duplex mode, the serial handshake is not supported. Connection is set up between the IP address of the dialing modem in the office and the IP address of the answering modem in the substation and is configured prior to dial up with DIGSI by means of AT commands via the RS232 interface.

The substation modem may be configured to have password protection, and provides the additional security feature, permitting access only from defined IP addresses, e.g. only that of the office modem. The modem is accessed with DIGSI Remote like a normal telephone modem with the exception that instead of telephone numbers, IP addresses are assigned by the network administrator for each modem.

## Application

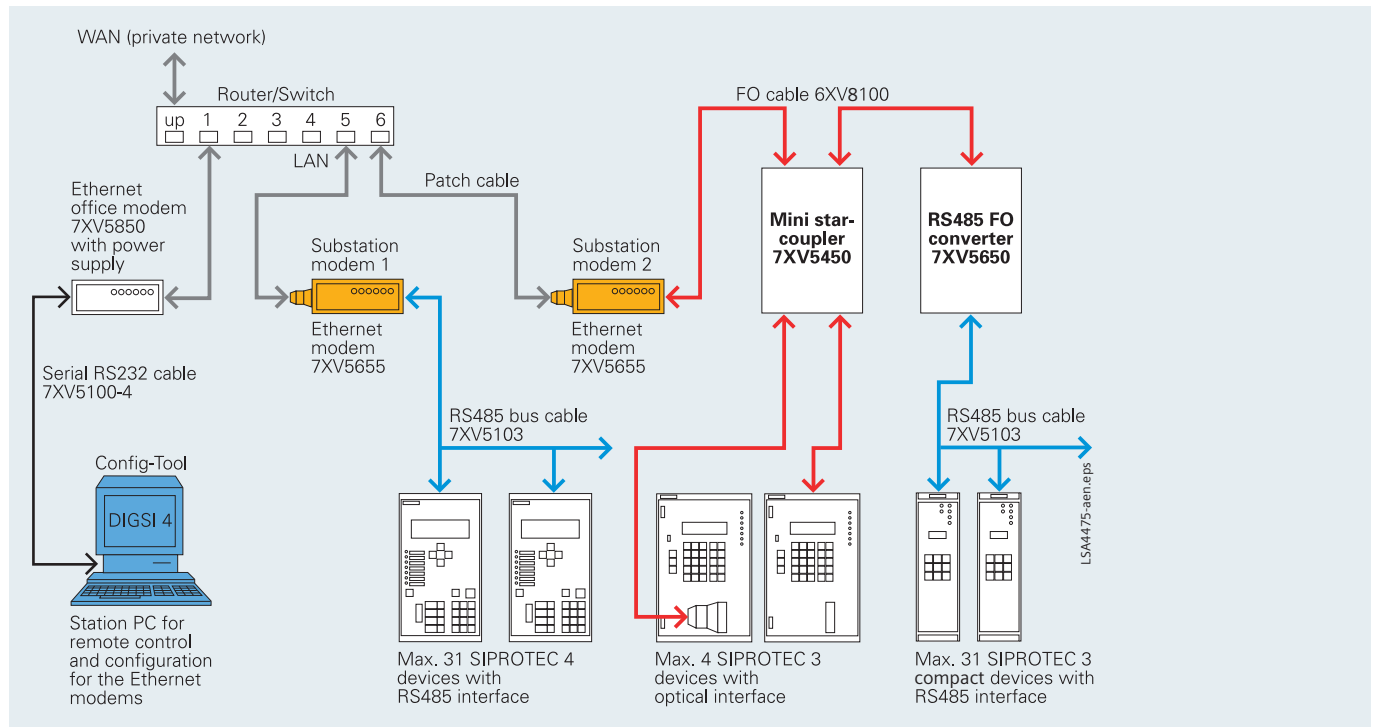


Fig. 13/63 Operation of various SIPROTEC protection unit generations via Ethernet modems

### Application

Using the office computer and DIGSI 4, both substations 1 and 2 may be dialed up via the Ethernet modems. An IP point-to-point data connection is established between the office and corresponding substation modem when dialed up via the network. This is maintained until the office modem terminates the connection. The serial data exchange takes place via this data connection whereby the modem converts the data from serial to Ethernet with full duplex mode. Between the office modem and the office PC the highest data rate e.g. 57.6 kbit/s for SIPROTEC 4 devices is always used. The serial data rate of the substation modem is adapted to the data rate required by the protection relays e.g. substation modem 1 with 57.6 kbit/s for SIPROTEC 4 and substation modem 2 with 9.6 kbit/s for SIPROTEC 3 devices. These settings are only pre-set once in the modem.

The Ethernet modems are integrated similarly to telephone modems in DIGSI 4. Instead of the telephone number, the pre-set IP address assigned to the modem is selected. If later an Ethernet connection is available in the substation, the existing modem can be replaced by an Ethernet modem. The entire serial bus structure and cabling may remain unchanged.

### Technical data

#### Connections

RS232 interface 9-pin SUB-D or  
 RS485 interface 9-pin SUB-D settable by switches  
 FO interface 820 nm with ST connectors for the connection to 62.5/125 µm multi-mode FO cables.  
 Ethernet 10BaseT, 10/100 Mbit, RJ45 connector  
 Power supply / Fail safe relay with screw-type terminals

#### Housing

Rail mounting, plastic, charcoal grey, 90 x 90 x 107 (W x H x D) in mm

#### Wide-range power supply / fail safe relay

Auxiliary voltage DC 24 to 250 V and AC 115/230 V connected with screw-type terminals  
 Fail safe relay for power supervision connected with screw-type terminals

#### Indication (8 x LED)

Power	Operating voltage o.k.	System	RS232 connection established
RS232 Tx/D	Transmitting data to RS232	RS232 Rx/D	Receiving data from RS232
LAN Tx	Transmitting data to LAN	LAN Rx	Receiving data from LAN
Error	Error on RS232	Link LAN	LAN connection established

### Selection and ordering data

Description	Order No.
<b>Ethernet modem</b>  Ethernet modem for serial, asynchronous transmission of data up to 57.6 kbit/s via the 10/100 Mbit Ethernet and configuration software DIN-rail device mounting device suitable for substation. Connection to Ethernet via RJ45 connector. Serial connection SUB-D 9-pin socket RS232/RS485 interface settable by switches. FO interface 820 nm for 62.5/125 µm multi-mode-FO cables. Auxiliary supply DC 24 – 250 V and AC 115/230 V. Fail safe contact for device supervision. With gender-changer (pin-pin) for adaptation to DIGSI-cable 7XV5100-4 (cable not included in the scope of supply).	<b>7XV5655 - 0BB00</b>





Fig. 13/64 Front view of Ethernet serial hub for substation

### Description

By means of the serial hub and the associated configuration software it is possible to establish serial communication via an Ethernet network between a PC or notebook running DIGSI 4 and SIPROTEC protection relays. The configuration software installs virtual serial interfaces (COM ports) on the PC. Each COM port is allocated to a serial hub within the network by means of its IP address. This must be set in the serial hub. The PC is connected to the network via Ethernet interface. The protection relays are connected via an RS232/RS485 or FO interface to the serial hub. Connection with DIGSI is achieved via the virtual COM port on the PC and the IP address of the serial hub in the substation. The serial data is packed as user data into a secure IP protocol in the PC and transferred via the Ethernet connection to the serial hub. The requirements regarding standard compliant gap-free transmission of serial DIGSI or IEC 60870-5-103/101 telegrams (frames) via the network is complied with by the communication driver on the PC and the serial hub which monitor the serial telegram communication. The serial IEC telegrams are transferred in blocks across the Ethernet. Data communication is full duplex. Control signals of the serial interfaces are not used.

### Function overview

- Configuration software for Windows NT/2000/XP to configure virtual COM ports on the PC and for configuration of the serial hub.
- RS232/RS485 – interfaces for data transfer and configuration of the serial hub
- FO interface for serial data transfer
- Serial data rate and data format (RS232) for the terminal devices is selectable from 2.4 kbit/s up to 57.6 kbit/s with data format 8N1, 8E1.
- 10 Mbit Ethernet interface (LAN) to the 10/100 Mbit Ethernet network.
- Better security with password protection for the access to the protection relays via the serial hub
- Exchange of serial data via Ethernet network (e.g. DIGSI protocol, IEC 60870-5-103 protocol)
- Exchange of serial protocols via Ethernet without gaps in the telegram structure

## Application

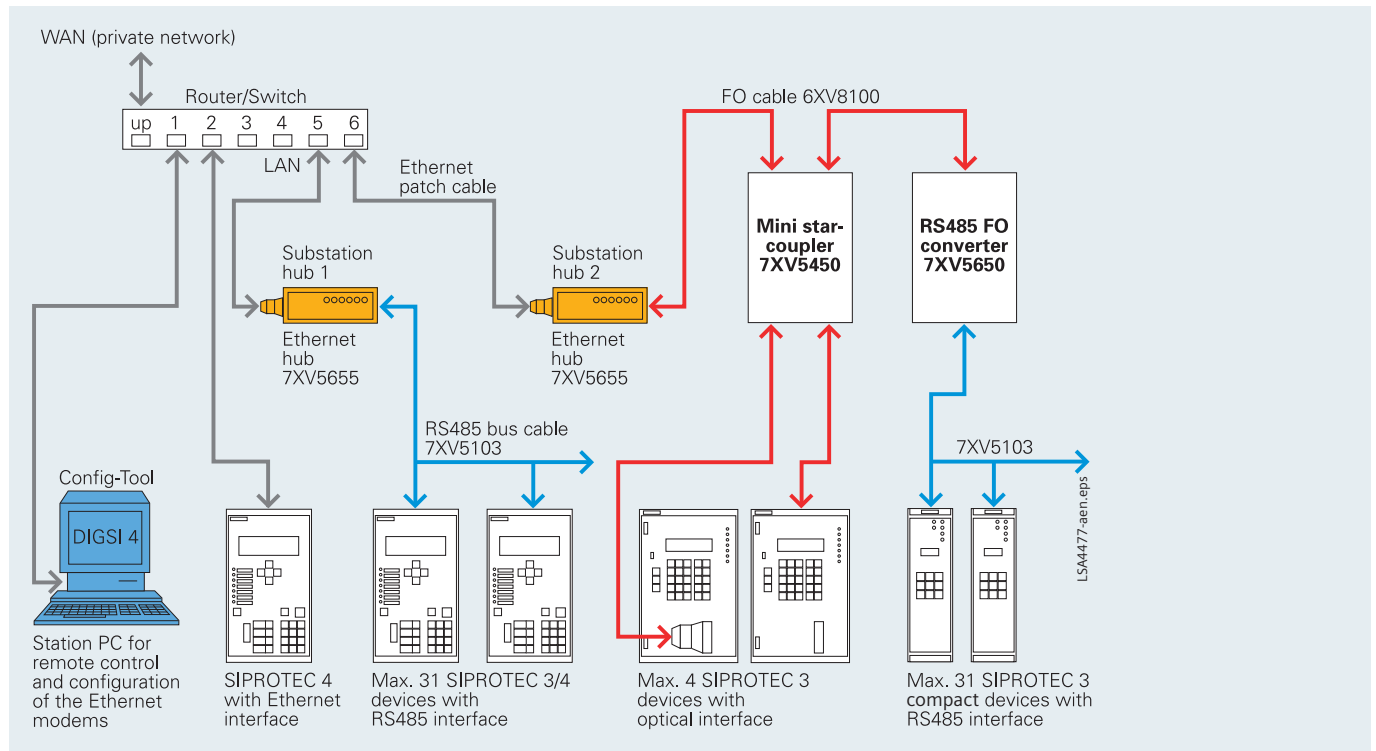


Fig. 13/65 Operation of various SIPROTEC protection unit generations via serial hub

### Application

From the office PC running DIGSI 4 it is possible to select one of the serial hubs 1 and 2 via one of the virtual COM ports. In DIGSI 4, when the COM port is selected, a IP point-to-point data connection via the network is established and maintained between the office and the relevant substation modem until the interface is released. The serial data exchange takes place via this data link, whereby the data conversion from serial to Ethernet is full duplex. The office PC towards the network is always operating with high data rate, as the data is fed to the network via the network driver on the PC. The serial data rate of the serial hub in the substation is adapted to the baud rate set in the protection relay, e.g. serial hub 1 with 57.6 kbit/s for SIPROTEC 4 and serial hub 2 with 9.6 kbit/s for SIPROTEC 3 devices. These parameters must be pre-set

on the serial hub. With DIGSI 4 the serial hubs are integrated by means of further serial COM ports (max. 254). The connection to the IP address of the serial hub in the network is achieved by opening the corresponding COM port. If an Ethernet network to the substation or in the substation is available, serial data can then be transferred via this network.

The existing serial star or bus structure with cabling in the substation can still be used.

SIPROTEC 4 devices from version 4.6 and newer with integrated Ethernet interface may be connected directly to the router or switch by means of a patch cable.

### Technical data

#### Connections

RS232 interface 9-pin SUB-D socket or  
 RS485 interface 9-pin SUB-D socket selectable via DIL switch.  
 FO interface 820 nm with ST connectors for connection to multi-mode FO cables.  
 Ethernet 10BaseT, 10/100 Mbit, RJ45 connector to Ethernet  
 Auxiliary voltage/alarm relay (5 terminals)

#### Housing

Rail mounting, plastic, charcoal grey, 90 x 90 x 107 (W x H x D) in mm

#### Wide-range power supply/fail safe relay

Auxiliary voltage DC 24 to 250 V and AC 115/230 V connected with screw-type terminals  
 Alarm relay for monitoring of the device

#### Indication (8 x LED)

Power	Operating voltage o.k.	System	RS232 connection established
RS232 Tx/D	Transmitting data to RS232	RS232 Rx/D	Receiving data from RS232
LAN Tx	Transmitting data to LAN	LAN Rx	Receiving data from LAN
Error	Error on RS232	Link LAN	LAN connection established

### Selection and ordering data

Description	Order No.
<b>Ethernet hub for substations</b> Serial hub for serial, asynchronous transfer of data up to 57.6 kbit/s via 10/100 Mbit Ethernet including configuration software. Connection to the Ethernet via RJ45 connector. Serial connection with S232/RS485 interface via SUB-D 9-pin socket or optical with 820 nm ST connector and multi-mode FO cable. Wide-range auxiliary supply for DC 24 – 250 V and AC 115/230 V. With gender-changer (pin-pin) for adaptation to DIGSI cable 7XV5100-4 (cable not included in the scope of supply).	<b>7XV5655 - 0BA00</b>