TCP/IP-Ethernet and Web-IO

This booklet has been produced for all those without special knowledge of computer networks who want to put Ethernet terminal units under TCP/IP into operation. It is divided into four parts:

- **Understanding TCP/IP-Ethernet**
  Here you will find the most important basic information about TCP/IP.

- **Further protocols and services**
  In this section you will find out how E-Mail works, what happens when a web page is called up and which important protocols and services you can come across in connection with TCP/IP-Ethernet.

- **Installing TCP/IP-Ethernet**
  Here the installing of TCP/IP-Ethernet on PCs with the common operating systems is described.

- **The small ABC of networks**
  Here we explain the most important terms and abbreviations that you can come across in dealing with networks.

All important sequences and interrelationships will be explained clearly.

Do not worry: We will not get lost in details. We have deliberately restricted ourselves to things which are really important for an understanding of the technologies described.

In the end it is not necessary to know every detail of every protocol to be able to put TCP/IP network components into operation.
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TCP/IP is a purely logical protocol and always requires a physical base. As already mentioned at the beginning, Ethernet today enjoys the widest use of the physical network topologies. Ethernet is also found as the physical base in most TCP/IP networks.

TCP/IP and Ethernet are brought together by embedding every TCP/IP packet in the user data area of an Ethernet packet.

Setup of a TCP/IP Ethernet data packet

On the way from the application on the PC to the network the user data passes by several driver layers:

- The application programme decides to which other network users the data should be sent and passes on the IP address and TCP port to the TCP/IP driver (also often called TCP/IP stack).
- The TCP/IP driver coordinates the setup of the TCP connection.
- The user data passed over from the application programme are divided by the TCP driver, according to size, into smaller transmittable blocks.
- Every data block is first of all packed by the TCP driver in a TCP packet.
- The TCP driver passes on the TCP packet and the IP address of the receiver to the IP driver.
- The IP driver puts the TCP packet in an IP packet.

- The IP driver searches in the so-called ARP table (Address Resolution Protocol) for the Ethernet address of the receiver indicated by the IP address (more about this later) and passes on the IP packet together with the Ethernet address identified to the Ethernet card driver.

- The Ethernet card driver puts the IP packet in an Ethernet packet and passes on this packet via the network card to the network.

The procedure is carried in the reverse order at the receiver:
• The Ethernet card recognises from the Destination-Ethernet Address that the packet is meant for the network user and passes it on to the Ethernet driver.

• The Ethernet driver isolates the IP packet and passes it on to the IP driver.

• The IP driver isolates the TCP packet and passes it on to the TCP driver.

• The TCP driver checks the contents of the TCP packet for correctness and passes on the data, with the aid of the port number, to the correct application.

At first glance this multilayered transmission process seems enormously complicated. But only the strict separation of logical protocol (TCP/IP) and physical protocol (Ethernet) makes it possible to exchange net-overlapping and hardware-independent data.