ESA project download over ISDN router

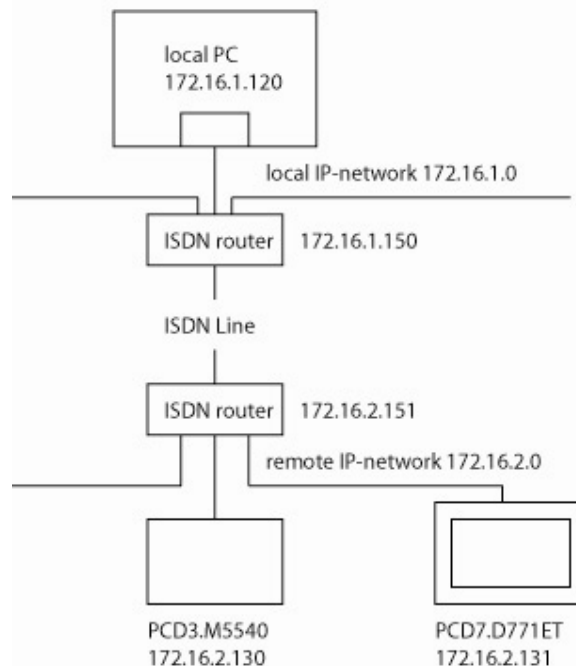**History:**
29.10.04   C. Durrer   Creation of test report

Content

Network constellation with two ISDN routers

1. Introduction

The aim of this test report is showing how it is possible to work with an ISDN router in order to maintain VTWIN (PCD8.D81W) projects on a remote system.
The main problem that can be solved this way is downloading projects to ESA terminals (PCD7.D7xx) equipped with a TCP/IP port. Unless the configuration described in this report is used, there must be a person who switches the ESA terminal VT505 into download mode over modem.

Since the main topic of this test reports is TCP/IP network traffic, the reader has to have some basic knowledge about the structure of IP networks and the functions of the main components as well as the configuration of the Ethernet interfaces of a PC.

1.1 Used hardware und software

Hardware:
ISDN Router (and IP-hub):   Allied Telesyn AR140 Internet Router
Touch screen terminal: PCD7.D771ET
PCD system as slave of terminal: PCD3.M5540
PC for programming/configuration of components of this test.

Software:
- PCD8.D81W Version 4.75 (VTWIN 4.75.00)
- PG5 V1.3.100
- Configuration Wizard for Router supplied together with router
- Internet Explorer for configuring Router
- (Telnet Client for connecting Telnet Server in order to manage built in Firewall of ISDN Router)

1.2 Programs

In order to properly recognise whether there is communication between the PCD and the touch screen terminal, a program counting up the register 0 and toggling flag 0 was created and downloaded.
On the PCD7.D81W there is only one page configured which shows the state of flag 0 of the PCD and displays the register 0.
The configuration of the PCD3 and of the PCD7.D771ET contain the IP configuration and in the S-Bus settings

2. Test setup with two ISDN routers

2.1 Network structure

The structure of the network is shown below. The routers mainly do connect the two sub networks and route packets from one to the other. Additionally, they work as hubs for the concerned sub networks.
As soon the local router receives a packet that has a destination IP address in the remote subnet, it will initiate a call and logon to the remote router. Once it got the access rights, it will send the telegrams to be routed.
The response telegrams will be routed back over the same way. If there is no communication for a specified time, the routers will disconnect and only work as hubs for the "own" networks.
All cables in the installation aren't crossed (since the internal hub of the routers do feature an uplink which has to be set to "Hub" in case the connection PC-Router is going over an hub (→hub-hub connection which would require a crossed cable if no uplink port were available)).

Network constellation with two ISDN routers
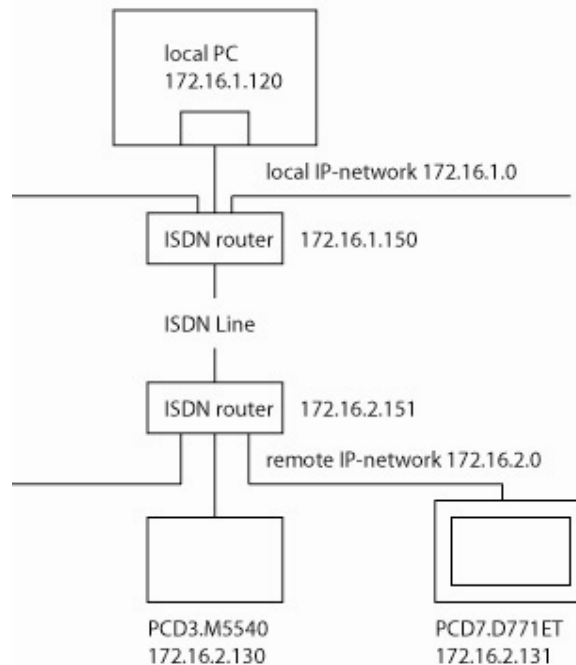
2.1.1 Programming and testing the PCD
The hardware configuration of the PCD must contain the correctly fitting IP address (of the remote network), subnet mask (in the example above 255.255.255.0) and the correct default gateway (ISDN router of the network where the PCD is connected to, means of the remote network). Additionally, S-Bus support must be enabled and an address must be set (in the structure above: 0).
The user program on the PCD mainly does commute the flag 0 and increment the register 0. These two PCD medias will be displayed on the terminal PCD7.D771ET.
A backup of the PG5 project (Project ISDN-router_ESA.zip) is located in the same folder as this document.

A good test for this project is to run it on the same network as the PCD7.D771ET. If the register 0 and flag 0 are shown, the communication is running. If the values of these medias are changing, also the program is running properly.

2.1.2 Programming and configuring the touch screen terminal
In the project for the touch screen terminal the IP address settings of the PCD7.D7xx as well as the communication settings of the PCD3 (including S-Bus address) have to be entered correctly.
In the example project which is located in the "common files" folder of the PG5 project "ISDN-router_ESA" there is only one page showing register 0 and flag 0 of the PCD3 (172.16.2.130, S-Bus station 0 in the example project).

2.1.3 Installing and connecting the routers
The installation and configuration of the routers most likely does require some changes in the network configuration (TCP/IP settings) of your PC. There is a CD coming together with the routers which provides an installation wizard for the routers. Unfortunately, you won't have much choices regarding the network interface configuration of the routers while the first initialisation. Therefore the routers will end up being DHCP servers and having the IP address 192.168.242.242.
Therefore you have to set up your IP interface of the PCD as DHCP client. This has to be done in the TCP/IP settings of the Network properties (to be found on W2k under Startmenu/Settings/Network and Dial-up settings/<your network>). In the TCP/IP settings check the option "Optain an IP address automatically". Of course you can use the "AR100 access wizard" delivered together with the ISDN router for this task (note that this wizard will also set the router as proxy server in the Internet Explorer (IE) "internet options".
In the main menu of the start.exe of the CD "AR100 SERIES INTERNET ROUTER-INSTALLER AND DOCUMENTATION". You now can select the option "configure router". This will show you the IP address of your connected router (very likely 192.168.242.242).
After executing the "Configure Router" wizard or setting the default gateway as well as the proxy server to the router you'll be able to connect to the router connected to the IP interface of your PC. Open IE and type "http://192.168.242.242" as address to be browsed. The following login prompt should appear (but with your router's IP-address):
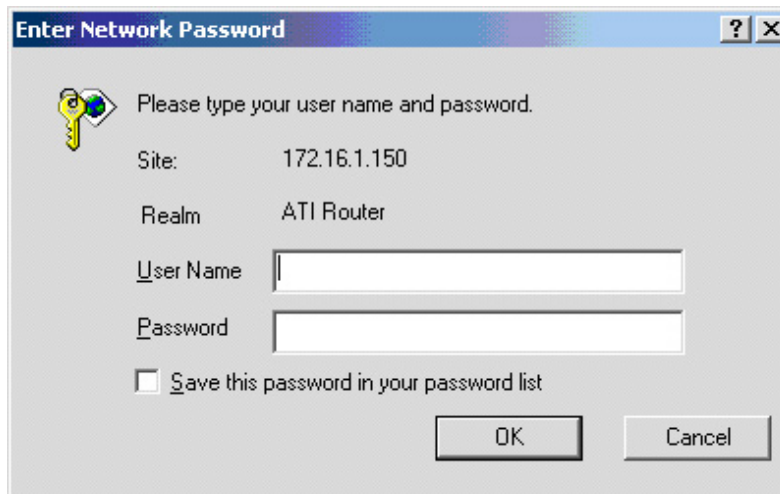
As User Name type "**manager**" and as password "**friend**" in order to access the router. Now the configuring procedure of the router starts with the following window:

2.1.4 Configuring the routers

Once a connection to the routers is established the routers first have to be configured. This is done by web pages of the router-internal web server that are shown e.g. on the Internet Explorer (IE). Below a screenshot of the first page of a not configured router is shown:
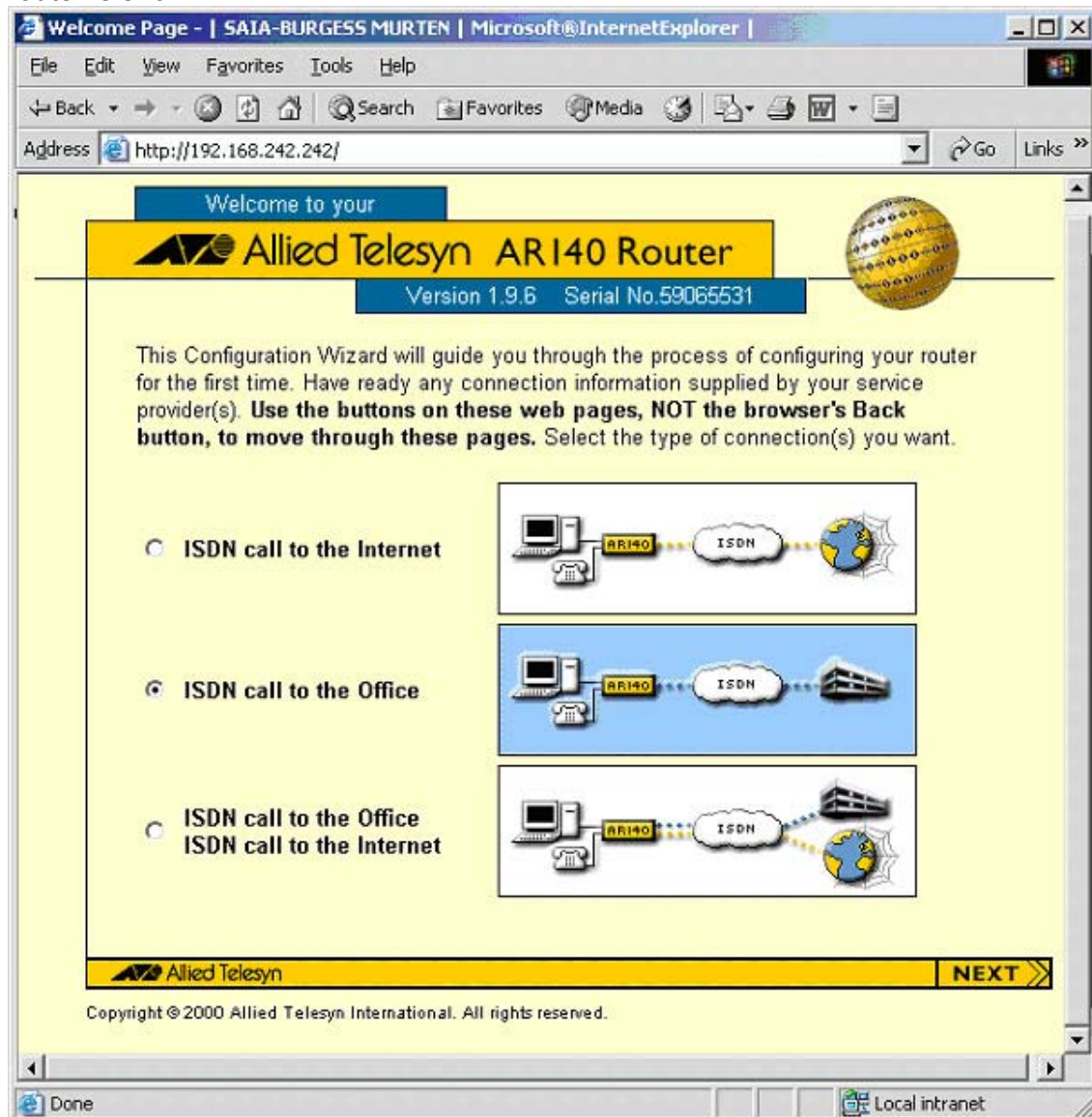
During the configuration of the router you'll be prompted for the following settings:

- Type of connection (to access a remote network, select "ISDN call to the Office")
- Number for phone on port 1 and on port 2 (needed in order to set the MSN; multiple subscriber number).
- Remote office ISDN number (which will be the router you call or is called), Remote office username and password (access information you need to connect to the remote network)
- Local username and password (password that is required to enter the router your connected with at the moment)

After setting this main information you can end the wizard.

In order to use the router for downloading and connecting PCD controllers and ESA terminals you'll have to set up the Ethernet connection according to your needs.
Note that since neither a PCD nor a ESA terminal supports DHCP it is not recommended to use this option unless you need it for some other PC's on the remote or local network.
This is to be done on the page "Ethernet LAN Connection" which applies on the Ethernet interface of the router:
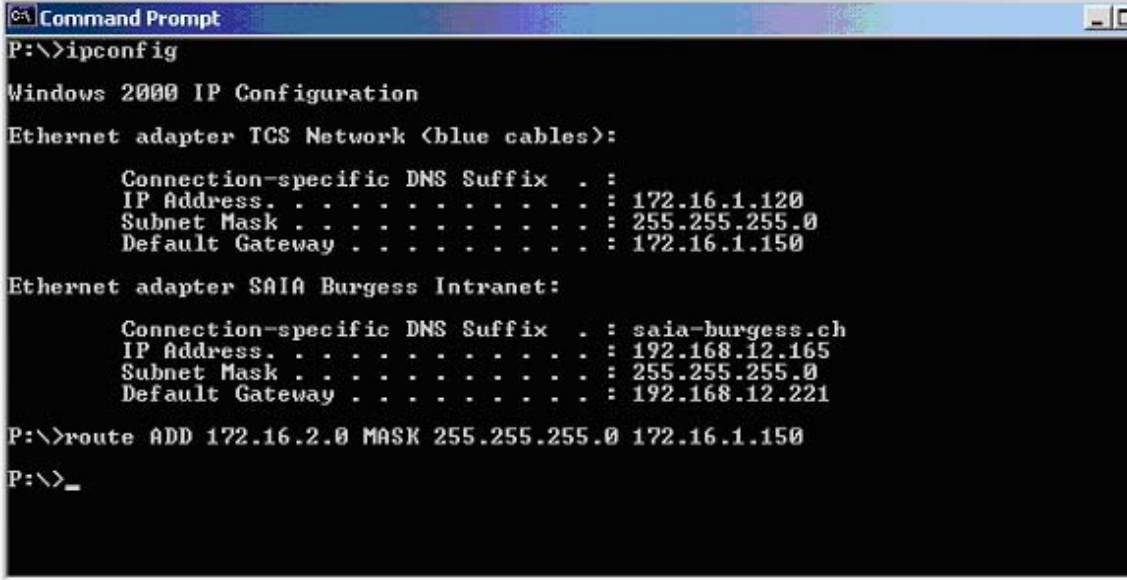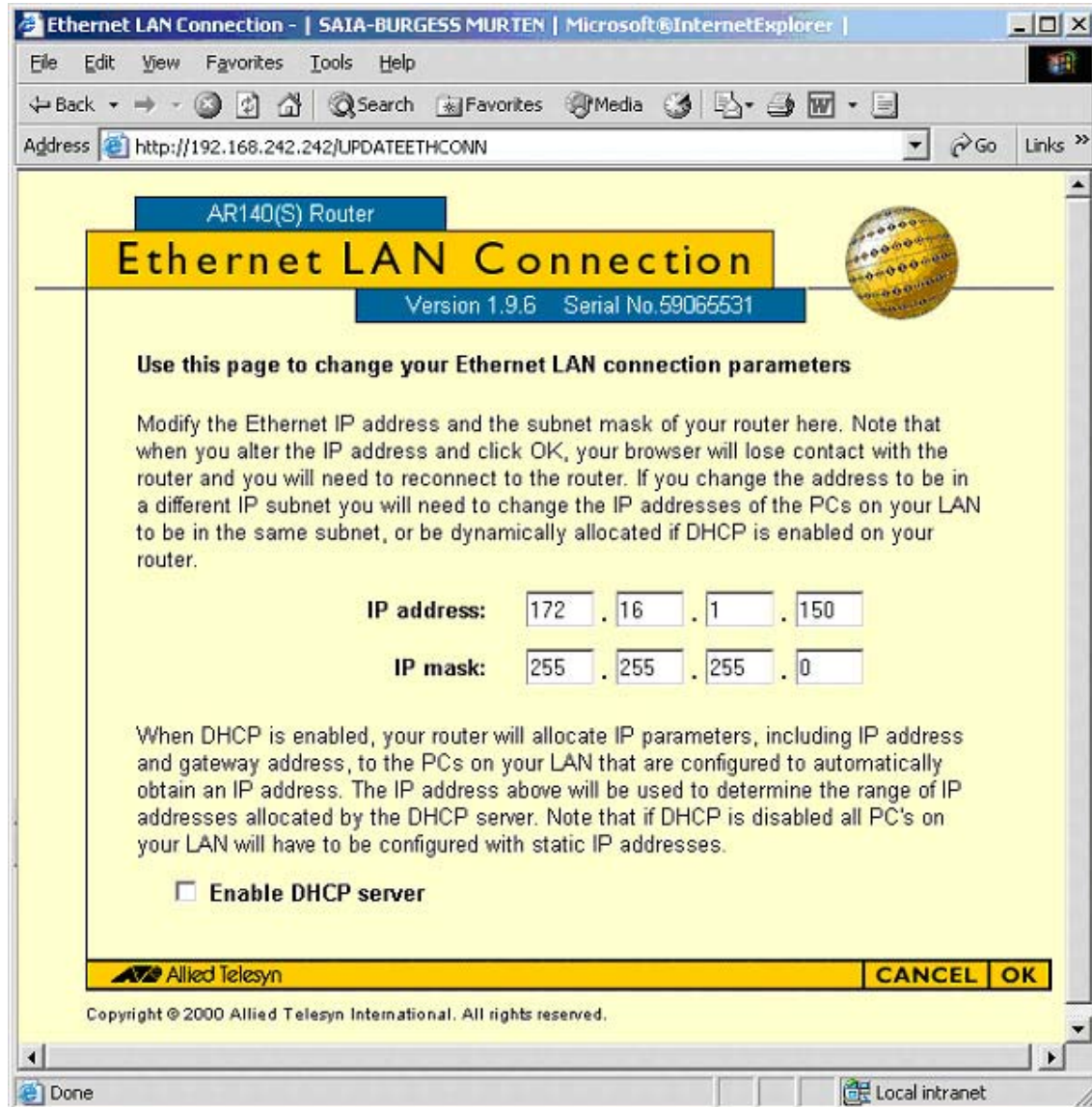

On this page, set the IP for the router in your local network and make sure the DHCP server is disable unless you need it for some reason. If so, make sure you also set the address range for the address distribution!

You have to repeat the whole procedure for configuring the router on the remote network. The only difference is that in this case you need to enter the IP-address of your remote network.

2.1.5 Configuring the PC and the software running on it

To tell your PC which interface and gateway it has to try if an IP telegram is sent to your remote network a route has to be configured. Therefore use the route command in the command prompt. Below there is an example for setting a route to the subnet 172.16.2.0 over the router 172.16.1.150.

```
Command Prompt                                                    _ |□|
P:\>ipconfig

Windows 2000 IP Configuration

Ethernet adapter TCS Network (blue cables):

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . : 172.16.1.120
        Subnet Mask . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . : 172.16.1.150

Ethernet adapter SAIA Burgess Intranet:

        Connection-specific DNS Suffix  . : saia-burgess.ch
        IP Address. . . . . . . . . . . : 192.168.12.165
        Subnet Mask . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . : 192.168.12.221

P:\>route ADD 172.16.2.0 MASK 255.255.255.0 172.16.1.150

P:\>_
```

Once this is done, you should be able to ping your remote ISDN router as well as your stations located in the remote network.

If the pinging was successful, try to download your ESA project to the terminal in the remote network and try to connect to the PCD in your remote network. If there is no connection established, it may occur to get a timeout on the first attempt (delayed by the routers establishing a connection).

2.1.6 Firewall

Since the routers do also have an integrated firewall (activated by default but no policiy configured) it might be possible that this has to be disabled for the first tests. If so, connect the firewall via Telnet as following:

- Open the command prompt and type **telnet <ip-address of router>**
- Enter the username **manager**
- Enter password **friend** >Manager should be displayed
- Check whether the firewall is enabled by typing **show firewall**
- To disable, select **disable firewall**
- To re-enable, select **enable firewall**
- For finishing the telnet connection type **logoff**

3. Connection with ISDN router and ISDN TA

3.1 Network structure

It is also possible to replace the router connected to the PC by an ISDN TA (terminal adapter). For establishing a connection over a TA, a Dial-up connection has to be configured. This Dial-up connection is similar to a connection to an internet provider but with the difference that we don't receive an IP but we define it for ourselves (→no DHCP but a statically configured IP interface of this TA).
In order to be able to set a route as described in the chapter above, we need to assign the IP of this TA as station of a subnet that doesn't already exist in the network environment.
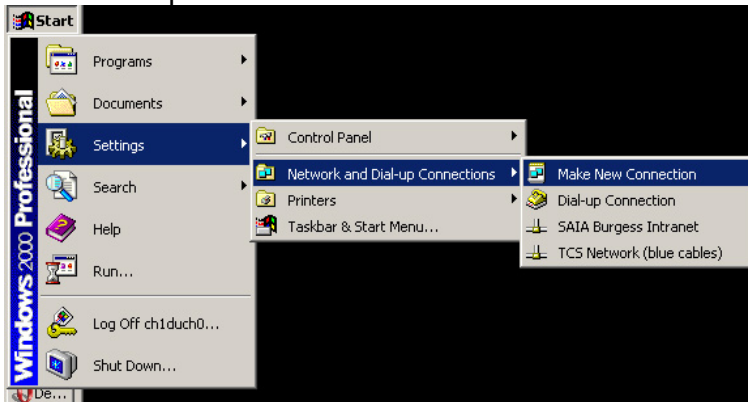

Network constellation with ISDN router and ISDN TA
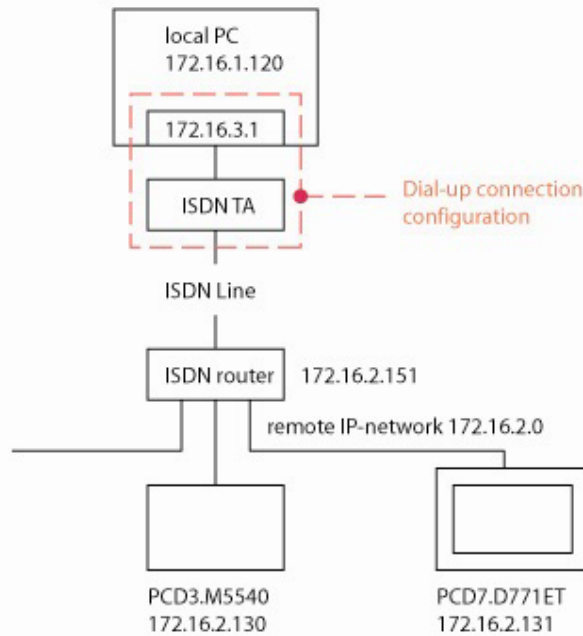
3.1.1 Configuring the Dial-up Connection
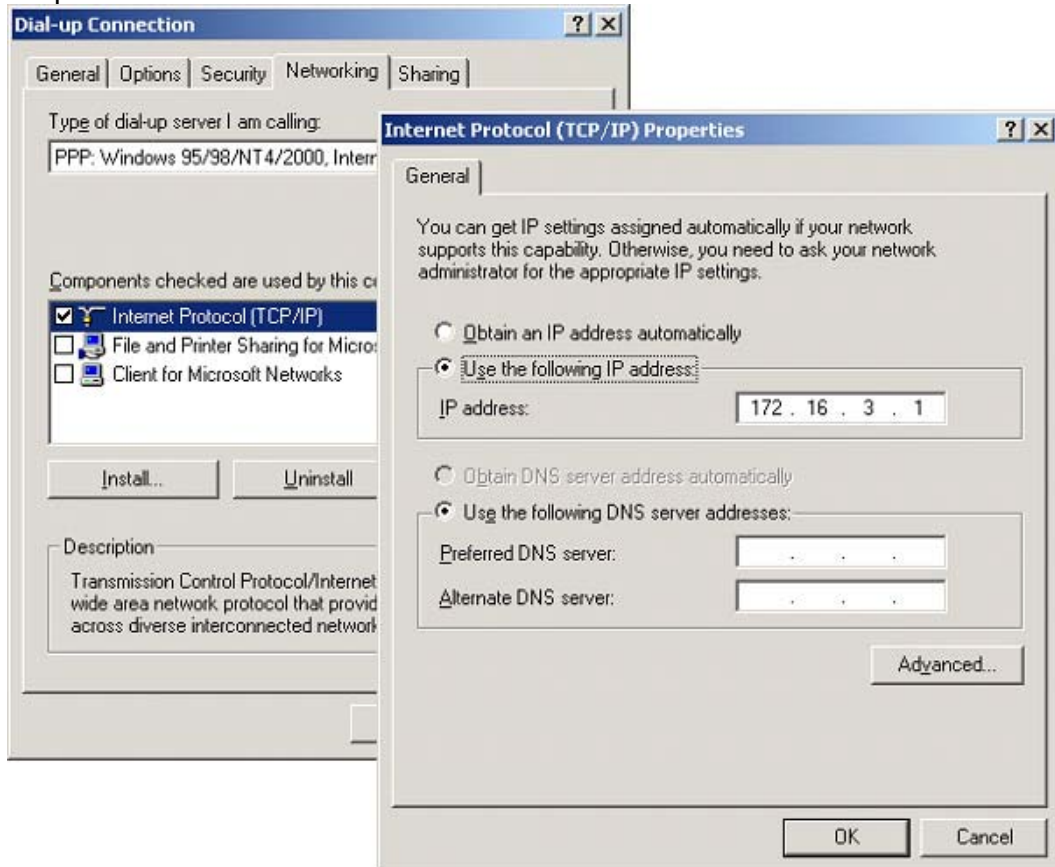
The required settings are shown below:

- Crate Dial Up connection:

- On the general tab of the Dial-up Connection window select the TA (previously installed) and enter the phone number of your router

- On the Networking tab of the Connection window only select the TCP/IP support and define an IP address (Subnet not already existing before!) under Properties.

- In the Sharing tab unselect the "Enable Internet Connection Sharing for this connection".
- Close the windows by selecting "OK" and dial in
- Make sure you add a route as described in the above windows. The TA is your gateway which means you have to enter the following route options:
  route ADD <remote network> MASK <remote subnet mask> <IP of TA>

It is possible that the routes needed in the test with two routers have to be deleted since they aren't valid any more!

4. Test results

These tests showed the following points:
- It is possible to download projects of the PCD8.D81W (VTWIN) to PCD7.D7xx equipped with an Ethernet interface without someone on site
- The connection is established automatically in case of the use of two ISDN routers
- It is possible to download PG5 projects to PCDs (Ether-S-Bus stations) having an Ethernet interface
- The connection can be established by first activating a connection and then adding a route (while the tests the added route over a Dial-up connection was removed disconnecting)
- The networks can be defined by the user (no DHCP is required) on either network constellation
- Proxy servers and already existing network functions aren't affected if properly configured (exception is the setup procedure of the ISDN routers due to the need of DHCP and set proxy addresses onto the routers!)
- All cables in the installation aren't crossed (since the internal hub of the routers do feature an uplink which has to be set to "Hub" in case the connection PC-Router is going over an hub (→hub-hub connection which would require a crossed cable if no uplink port were available))