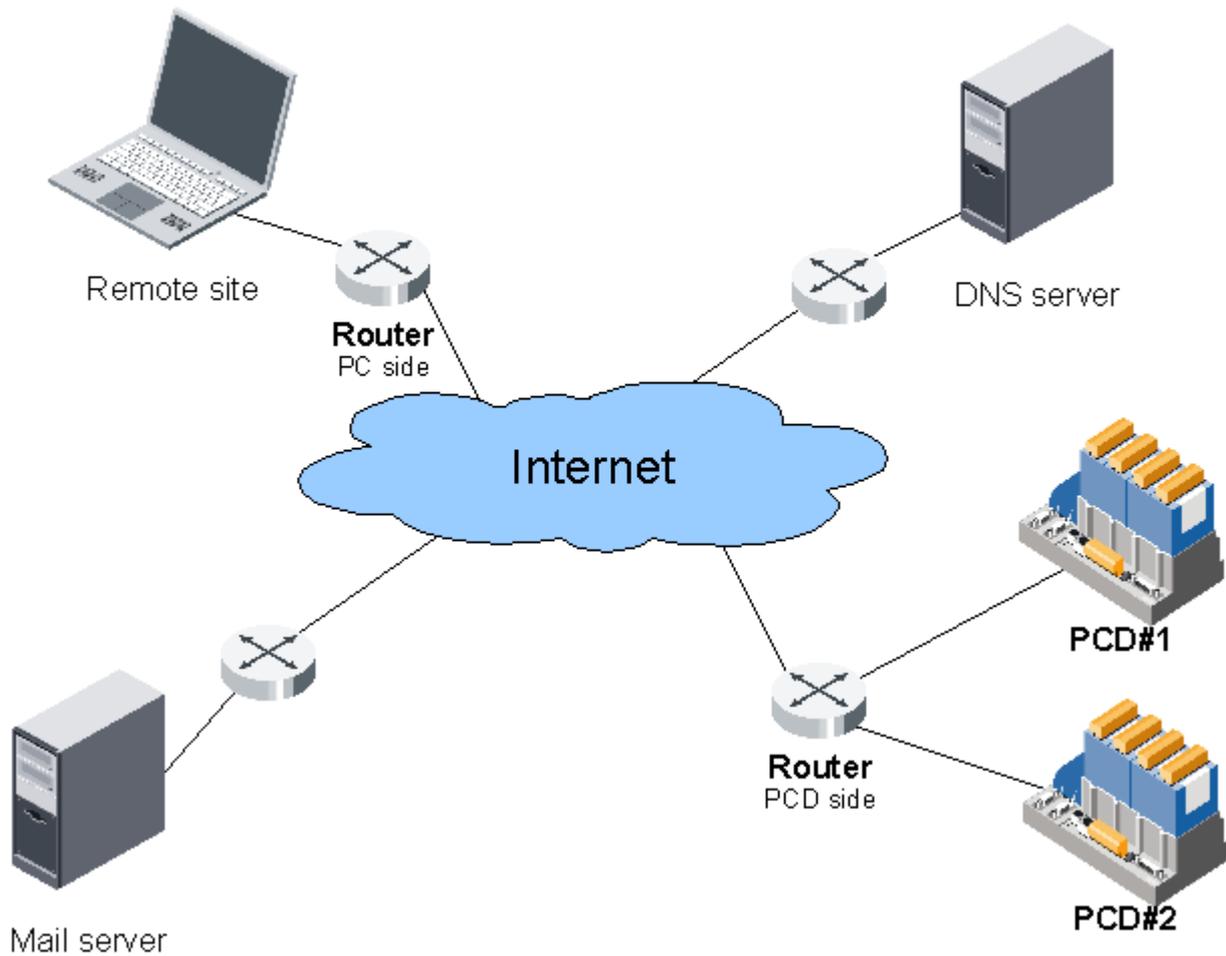


How to connect a PCD behind an ADSL router?



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Document history

| Date | Author | Modification |
|------------|----------|--|
| 20/08/2008 | TCS / cd | Creation of documentation (Version 1) |
| 04/09/2008 | TCS / cd | Added clarification regarding port mapping (Version 2) |

The last version of this document can be found in [FAQ 101007](#).

1 Introduction

As a PCD system does feature various „Internet communication features“ (Web Server, Ether-S-Bus SMTP etc.), it suggests itself to connect it to the Internet using e.g. an ADSL router. This document is aimed to explain some key-points to be considered for accessing a PCD over the Internet (as shown in the picture below).

First of all, the principal understanding of the functionality and tasks of a router need to be understood. Please refer to „Router Functionality“ for this explanation.

In a second step, the communication protocol for the connection is to be defined because every of the following protocols does require other configurations of the router.

- http direct (for accessing the Web Server of the PCD)
- Ether-S-Bus
 - for programming the PCD with PG5
 - for connecting a PCD which does not feature http direct with WebConnect)
- SMTP (for sending EMail from the PCD)

For each of these protocols, please refer to the corresponding chapter. FTP is not yet included in this document.

2 Router functionality

A router is a device which has the task to connect different logical IP subnets among each other (e.g. the IP network with address 192.168.1.0 with the network with address 81.6.54.0 in the picture below). It forwards telegrams which are received on the LAN (Local Area Network) interface to the WAN (Wide Area Network, in this case the Internet) interface.

The term „router“ is used for a broad range of devices. For connecting a PCD to a network, a so-called „Residential Gateway“ (also this term is becoming obsolete) is usually sufficient. The features required for connecting a PCD are in general:

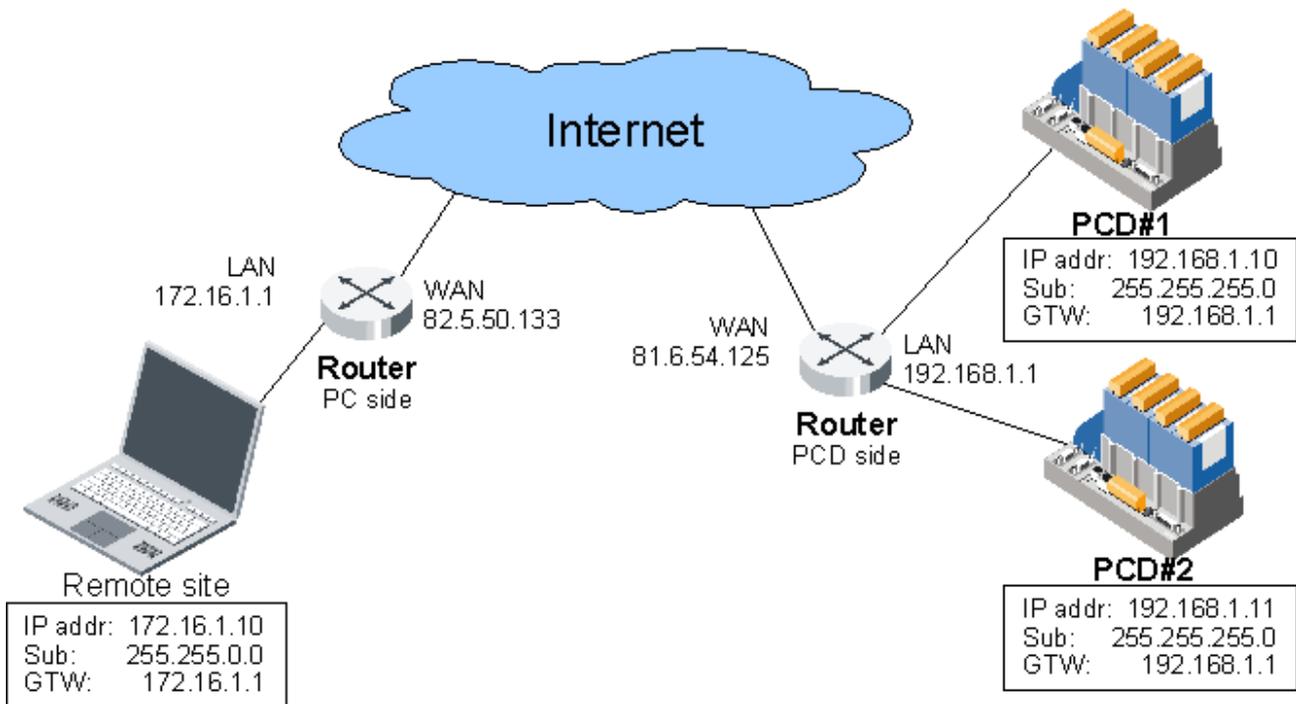
- IP address routing
- network address translation (NAT)
- DHCP functions
- firewall functions
- LAN connectivity like a network switch
- optionally „DynDNS client“ features (in case the PCD needs to be accessible over the Internet and no static IP address shall be bought)

2.1 Gateway functionality / IP address routing

Seen from a device on the LAN, the router acts as „Gateways“, meaning that it is the door to connect any other networks than the own. The router itself has again a Gateway on the WAN side (the Internet is a very large connection of different subnets and gateways).



As conclusion, the IP address of the router (LAN side) is to be configured as “Default Gateway” in the hardware settings of the PCD (192.168.1.1 in the example below).



While forwarding telegrams from the LAN to the WAN, a router “remembers” the originator of a request (from the LAN) for sending him the response which will be received from the WAN side. This feature is called IP address routing.

2.2 Port forwarding

A router can be configured in a way that specific telegrams from the WAN side are automatically forwarded to a specific IP on the LAN side (the port is not changed while forwarding). Port forwarding is a subset of NAT (Network address translation) functionality.

2.3 Port mapping

Some routers also support Port mapping. This is a special kind of port forwarding, with the additional possibility to change to destination port (on the LAN) of the telegram which is sent to the router on the WAN side.

Port mapping can e.g. be used to reach several PCD systems with Ether-S-Bus which are located behind the same router. This can be realized by addressing several UDP ports on the WAN side of the router, which are forwarded to different IP addresses on the LAN. While forwarding the telegram, its destination port is changed to UDP port 5050 on the LAN side (because PCD systems do only accept Ether-S-Bus telegrams on UDP port 5050).



Note that not every router does support Port mapping; some devices do only support Port forwarding.

2.4 Further features of a router

Beside this basic functionality, many routers (e.g. ADSL routers) feature other functionalities like:

- DHCP server
The **D**ynamic **H**ost **C**onfiguration **P**rotocol is used to provide IP addresses to devices on an IP network (without the user needs to know the allowed address).
- Firewall
A firewall blocks telegrams that are not intended to be sent to a device/network for security and performance reasons (before the telegrams „reach“ the router itself).
- DynDNS client
The **D**ynamic **D**omain **N**ame **S**ystem allows to connect a device on the Internet by using a „name“ (e.g. www.mypcd.dyndns.ch). This can be very useful as the IP address a router gets on the WAN side is usually distributed by DHCP (and therefore not known to the user).

3 Required configurations for specific access types

Requirements for a router in order to connect to a PCD. Please note that the column “DynDNS or static IP” is required in addition to the port forwarding or mapping.

| | | Router features | | |
|-----------------|-----------------------------|------------------------|--------------|---------------------|
| | | Port forwarding (only) | Port mapping | DynDNS or static IP |
| Functionalities | http direct (1 PCD) | ✔ | = | ✔ |
| | http direct (multiple PCDs) | ✘ | ✔ | ✔ |
| | Ether-S-Bus (1 PCD) | ✔ | = | ✔ |
| | Ether-S-Bus (multiple PCDs) | ✘ | ✔ | ✔ |
| | Sending Emails from PCD | = | = | = |



Required



Not supported



Not relevant

3.1 http direct connectivity

For accessing the S-Web Server of a PCD using http direct, the following configurations are to be made.

- The Firewall need to have a rule which „opens“ the http port from WAN to LAN. By default, this is the TCP port 80.
- There needs to be a port forwarding rule which defines the port 80 (WAN side) to be forwarded to the PCD IP address (LAN address).

In case several PCD systems need to be connected:

- Define the rules (firewall and port forwarding rule) mentioned above for several TCP ports (e.g. 81 for the second PCD to be connected).
- If your router supports port mapping to an other internal port:
 - map the WAN port 81 to the port 80 of the second PCD
 - Otherwise, map the WAN port 81 to the PCD port 81 and configure the PCD Web Server to listen on port 81 by editing the WebSocketConfig.txt file (see FAQ 100900 on www.sbc-support.ch/faq).
- For connecting this PCD, type the IP address or URL with a :81 at the end, e.g. <http://81.6.54.125:81/start.html> or <http://durrer.dyndns.tv:81> in your browser.
- Please consider that some proxy servers or firewalls (on the client-side) do not support traffic to ports other than 80 and 81.

3.2 Ether-S-Bus connectivity

For accessing the PCD for programming or with the Saia.Net WebConnect, an Ether-S-Bus connection is required. The way to connect a PCD over Ether-S-Bus is similar to the http connection, but the UDP port 5050 is used by Ether-S-Bus.

- The Firewall need to have a rule which „opens“ the UDP port 5050.
- There needs to be a port forwarding rule which defines the UDP port 5050 (WAN side) to be forwarded to the PCD IP address (LAN address).

In case several PCD systems need to be connected:

- Define the rules (firewall and port forwarding rule) mentioned above for several TCP ports (e.g. 5051 for the second PCD to be connected).
- Using **port mapping** of the router, map the UDP port 5051 to the port 5050 of the second PCD. Note that your router needs to support port mapping to another port (e.g. the SUA feature of Zyxel does not support this).
- For connecting this PCD, configure a higher timeout than the 250 ms by default in PG5.
- In case you are having a DynDNS address:
 - Connecting with PG5 resolve the IP address by opening the command prompt and typing:
 nslookup your.dyndns.url
 This command will inform you about the IP address of your router; enter this address in PG5 online settings for connecting your PCD.
 - In the Saia.Net WebConnect, just enter your URL instead of the IP address.

3.3 Sending Emails with the PCD

For sending Emails, there is no requirement for a remote access, as the PCD is connecting the server on the Internet. However, please note that the following points are to be considered:

- You need to have an Email Account (hosted by the „Email provider“ mentioned below)
- Your Email provider needs to support SMTP (Simple Mail Transfer Protocol)
- The authentication method „plain“ or „login“ needs to be supported.
- Your Email provider needs to allow sending Emails from the IP Address of your router (some providers do only allow sending Emails from their own modems/IP addresses)
- The „default Gateway“ in the Hardware Settings of your PCD need to be correct
- The IP address of your Email Server needs to be known and static.