X4000

User's Guide

Installation and Configuration

Version 1.3
Document #71000L
August 2000

Purpose

This manual explains the installation and initial configuration of **X4000** with software release 5.1.6. For up-to-the-minute information and instructions concerning the latest software release, you should always read our release notes, especially when carrying out a software update to a later release level. The latest release notes can always be found at www.bintec.de.

Liability

While every effort has been made to ensure the accuracy of all information in this manual, BinTec Communications AG cannot assume liability to any party for any loss or damage caused by errors or omissions or by statements of any kind in this document and is only liable within the scope of its terms of sale and delivery.

The information in this manual is subject to change without notice. Additional information, including changes and release notes for **X4000**, can be found at www.bintec.de.

As a multiprotocol router, **X4000** sets up WAN connections in accordance with the system configuration. To prevent unintentional charges accumulating, the operation of the product should be carefully monitored. BinTec Communications AG accepts no liability for loss of data, unintentional connection costs and damages resulting from unsupervised operation of the product.

Trademarks

BinTec and the BinTec logo are registered trademarks of BinTec Communications AG.

All other product names and trademarks mentioned are the property of the respective companies and manufacturers.

Copyright

Guidelines and standards

X4000 complies with the following guidelines and standards:

- Low voltage directive 73/23/EEC according to EN60950, complies with German equipment safety regulations

- Interference immunity according to EN50082 1/8.97
- Class B interference emissions according to EN55022/8.94 +A1/1995 +A2/1997, electromagnetic compatibility according to EU directive 89/336/EEC.
- CE marking for all EU countries

Registration:

- CE registration
- German TÜV inspection/GS safety regulations
- BAKOM (Switzerland) registration had not been completed at the time this manual went to print. For further information on this, see the latest release notes at www.bintec.de.

In addition to the CE directives, **X4000** also meets the ISDN requirements in France and can be connected to Euro-Numeris.

How to reach BinTec

By ...	At the telephone number or address
Telephone	+49 911 96 73 0
Fax	+49 911 688 07 25
Mail	BinTec Communications AG Südwestpark 94 D-90449 Nürnberg
Internet	www.bintec.de

Table of Contents

1 Welcome!

Congratulations on deciding to buy the **X4000** extendible multiprotocol router from the workgroup access series of BinTec Communications AG – an efficient and future-oriented router solution for use in small and medium-sized firms.

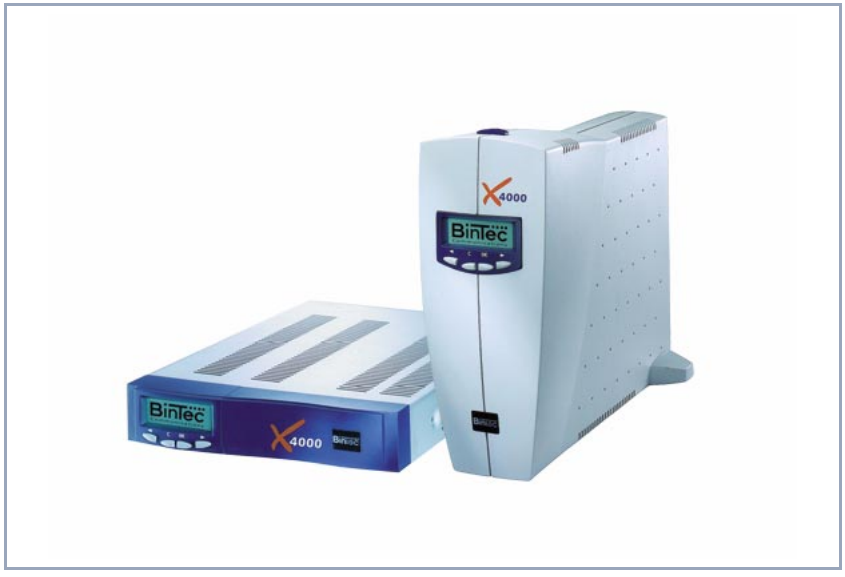


Figure 1-1: **X4000** - the workgroup access router for present and future applications

X4000 can provide various applications with only a basic unit:

- Router for leased lines with ISDN backup
- Central fax gateway for up to 30 connections
- Router for analog and digital connections
- VPN solution with data encryption and ISDN backup
- Remote access server for up to 62 connections

1.1 X4000 – The Workgroup Access Router for Present and Future Applications

The extension capability of **X4000** makes the multiprotocol router a future-oriented and flexible investment. **X4000** with its RISC CPU is extremely powerful and capable of meeting future requirements.

Basic unit The basic unit is obtainable as a desktop unit or as a 19-inch built-in unit. Both variants of the basic unit are already equipped with integrated 10/100 BT Ethernet interface, ISDN BRI interface, serial X.21/V.35/V.36 interface for leased lines, serial X.21bis interface and serial console interface.

Expansion cards A slot for externally inserting an expansion card enables **X4000** to grow in line with your requirements, so that you can use the same basic unit for various applications. A high degree of flexibility is assured by our motto: “Change the card, not the equipment!”

Resource cards Expansion cards with ISDN BRI or ISDN PRI interfaces can also be equipped with powerful resource cards with digital modems. This makes extremely high efficiency and high port or modem density possible.

Ergonomic design The well-proven BinTec "Setup Tool" for the router configuration interface and the "Configuration Wizard" for fast basic configuration ensure ergonomic and user-friendly design. The newly developed Man-Machine Interface (MMI) from BinTec Communications AG with its LC display, input keys and intuitive user guide – in several languages – also simplifies "getting to know" your router and provides fast access and display of the main settings. A wide-range mains unit without fans ensures quiet operation of **X4000** in office environments.

Multiprotocol router The flexible multiprotocol router can be used for WAN access, as well as for remote access server, fax gateway, remote CAPI server or LAN router. **X4000** supports the TCP/IP, IPX and X.25 (optional) protocols and is also suitable for bridging other protocols based on the spanning tree method.

Remote CAPI Using BinTec’s remote CAPI interface, applications based on the widely used CAPI interface can be used network-wide. This means the available ISDN connections can be used more effectively.

Security The features supplied include BinTec's well-tried security package SAFERNET^{TM}. This package contains security technologies such as filters, Network Address Translation (NAT) and access passwords. The security functions protect **X4000** and the network connected to it against unauthorized access.

The future New technologies and developments are vital for BinTec Communications AG. **X4000**'s flexible platform with an expansion slot and a powerful processor enable the rapid use of new WAN/LAN technologies and features. This makes **X4000** a future-oriented and migration-capable device. We'll keep working on it!

You can download BinTec's current software from the World Wide Web.

You can find detailed information about the individual subjects in the relevant parts of this manual and in the more detailed documentation (on the BinTec Companion CD).

1.2 Scope of Supply

1.2.1 Basic Unit

The **X4000** basic unit is obtainable as a desktop unit or as a 19-inch built-in unit.

The **X4000** basic unit is supplied with the following parts:

- Cable sets
  - Serial cable for the console port
  - IEC AC power cord
  - ISDN cable
- BinTec Companion CD
- Documentation
  - User's Guide
  - Release notes, if required
- Additional material
  - 19-inch mounting kit (only with 19-inch built-in unit)
  - License card with license information
  - Single user license for RVS-COM Lite
  - Leaflet with **X4000** guarantee information

1.2.2 Expansion Cards

The following expansion cards can be purchased for **X4000**:

- X4E-1/2PRI: WAN interface card for ISDN PRI and/or G.703
  - equipped as standard with hardware support for encryption and compression
  - to be optionally equipped with up to two resource cards with digital modems (XTR-S, XTR-M) or a resource card (XTR-L)

- X4E-2/3BRI: WAN interface card for ISDN BRI, to be optionally equipped with
  - a resource card with digital modems (XTR-S, XTR-M) and/or
  - a resource card for encryption and compression (XTR-ENC)
- X4E-2FE: LAN interface card for 10/100 Mbps, to be optionally equipped with
  - a resource card for encryption and compression (XTR-ENC)

1.3 BinTec Companion CD

You will find all the programs you need for the installation, configuration and administration of **X4000** on your BinTec Companion CD.

BRICKware

BRICKware for Windows contains the Windows utility programs:

- DIME Tools are for monitoring and administration of your **X4000**.
- The Configuration Wizard leads you step by step through the basic configuration of **X4000**.
- You gain access to **X4000** via the serial interface using the terminal program BRICK at COM1 or BRICK at COM2.
- The Configuration Manager allows you to configure and administrate all BinTec routers in the network via a graphic interface. Here you can view and edit all SNMP tables and variables.
- The Java Status Monitor allows you to request system information over an Internet browser.
- Remote CAPI Client:
  The Remote CAPI Client allows you to use communications applications based on the standard CAPI interface (e.g. RVS-COM Lite).
- Token Authentication Firewall (TAF) program (optional):
  This software package is required if you are using the Security Dynamics security system.
- The Activity Monitor enables you to monitor the utilization of **X4000** at a glance.

More detailed descriptions of all software programs can be found in our online manual BRICKware for Windows.

RVS-COM Lite

In addition to BRICKware, your BinTec Companion CD contains the RVS-COM Lite communications program that allows you to use all the usual communications applications on your PC, such as an answering machine, fax or file transfer.

Please note: The license for RVS-COM Lite is a single user license. You can purchase additional licenses from your dealer.

What else? The Companion CD also contains a range of other useful directories in which you can find the following, for example:

- The documentation in electronic form (see chapter 1.4, page 22)
- A copy of the router software
- UNIX Tools (administration)
- Adobe's Acrobat Reader
- Configuration examples

1.4 Documentation from BinTec

Together with **X4000**, you will have received part of the documentation in printed form and all of it in electronic form (PDF, HTML). The electronic versions of the different documents are included on the BinTec Companion CD. In addition to your Companion CD documentation, you can download all the very latest BinTec documentation from our WWW server at www.bintec.de. The following documentation is currently available:

- User's Guide (English)
  This manual.
- Benutzerhandbuch (German)
  This manual in German.
- Reference manuals (English, PDF/HTML).
  - Software Reference (PDF)
    Online reference with detailed information on functions described here, a reference for the internal SNMP table structures and the operation of the SNMP shell.
  - Extended Features Reference (PDF)
    Online reference for extra functions, some of which are only available with a separate license (e.g. VPN).
  - MIB Reference
    HTML document with short descriptions about all SNMP tables and variables for **X4000**.
- BRICKware for Windows (English, PDF)
  User's guide for Windows utility programs (BRICKware)
- Release notes (English, PDF and/or printed)
  Up-to-the-minute information and instructions concerning the latest software release, description of all changes undertaken since the previous release.
  In the Logic release notes, you will find instructions to help you upgrade BOOTmonitor and/or firmware logic.
- Release notes for router operation in UK (English, PDF)
  Instructions for the operation of BinTec routers in Great Britain.

1.5 System Requirements

X4000 can be configured from all conventional platforms. **X4000** is a stand-alone device that is independent of the PC or operating system to which it is connected. The router communicates with the PC over a LAN interface (10/100 Mbps) or a serial connection. Your router can therefore be used in many different operating system environments, such as DOS, Windows, UNIX, AS/400, Macintosh or Novell.

If you want to use the Configuration Wizard, however, you will require the following:

- PC with serial interface (V.24)
- Windows 95 or 98 or Windows NT 4.0
- Installed network card (10 Mbps Ethernet or 10/100 Mbps Fast Ethernet)
- Installed Microsoft TCP/IP protocol
- High-color monitor (more than 256 colors) for correct display of graphics.

1.6 Guarantee Terms

2 years **X4000** is guaranteed for 2 years from the date of purchase. Please contact your dealer for handling claims under the guarantee.

6 years You can extend the guarantee for **X4000** to 6 years by registering with BinTec Communications AG. To register, fill out the online form provided at www.bintec.de. You will then receive written confirmation by return. As a registered user, you not only have the advantage of an extended guarantee, but also receive regular information about new products, if you wish.

Please read the enclosed leaflet with detailed guarantee information for **X4000**.

Danger!

Live components are exposed when the equipment is open. There is a risk of electric shock!

It is not necessary to open the housing for connecting or operating, or for installing or removing the expansion card. If the housing is opened, this tears the guarantee label on **X4000**, which invalidates the guarantee.

➤ Never open the housing!

1.7 About this Manual

1.7.1 Contents

This manual is structured as follows:

Chapter	Contents
1: "Welcome!"	General introduction, scope of supply, guarantee terms, information about this manual.
2: "General Safety Precautions"	General safety precautions.
3: "Hardware Description and Installation"	Description of the hardware (basic unit, expansion cards, MMI, LEDs, connections). Instructions on how to install the 19-inch built-in unit in the rack, how to change over the display, how to install and remove an expansion card, and how to connect the equipment. Description of boot sequence.
4: "Configuration Requirements"	Description of access and configuration options. A basis for working with the Setup Tool. Procedure for initial configuration.
5: "Man-Machine Interface (MMI) – Display with User Guide"	How to use the MMI with display and input keys.
6: "Fast Configuration with the Configuration Wizard (Basic Unit)"	How to take **X4000** into operation in a few minutes using the Windows tool Configuration Wizard and how to install and set up other useful software.
7: "Basic Configuration of Basic Unit with Setup Tool"	How to take **X4000** into operation with the Setup Tool and set up a basic configuration (including configuration of the WAN interfaces).

Chapter	Contents
8: "Advanced Configuration of the Basic Unit with the Setup Tool"	How to carry out more advanced settings with the Setup Tool.
9: "Configuration of Expansion and Resource Cards with the Setup Tool"	How to configure an expansion card and any resource card(s) equipped
10: "Configuration of Security Functions and Firewall"	How to configure security mechanisms using SAFERNET, e.g. NAT (Network Address Translation) or filters.
11: "Configuration Management"	How to administrate configuration files and how to perform software updates.
12: "Troubleshooting"	Important tips on fault clearance.
13: "Technical Data"	**X4000** technical data.
14: "Important Commands"	A brief overview of the most important commands of the SNMP shell and BRICKtools for Unix.
15: "General Safety Precautions in 15 Different Languages"	General safety precautions in 15 different languages.

Table 1-1: List of chapters

1.7.2 Meaning

To help you locate and interpret information easily, this manual uses the following visual aids:

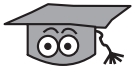
Symbol	Meaning
	Points out useful and relevant tips and tricks.
	Predicts potential pitfalls and explains how to avoid them.
	Brings to your attention general and important points.
	Explains required fundamental information.
	Brings your attention to important safety precautions. Levels of danger are in accordance with ANSI: ■ Caution (indicates possible danger that, if unheeded, could cause material damage) ■ Warning (indicates possible danger that, if unheeded, could cause bodily harm) ■ Danger (indicates danger that, if unheeded, could lead to serious bodily harm or death)

Table 1-2: List of visual aids

To help you find and interpret the information in this manual, the following typographical elements are used:

Typographical element	Meaning
➤	Here you are requested to do something.
■ – –	Lists including two levels.
MENU ➧ ***SUBMENU***	Indicates menus and submenus in the Setup Tool.
`Non-proportional (Courier), e.g. ping 192.168.1.254`	■ Indicates commands (e.g. in the SNMP shell) that you must enter as shown. ■ Used to display the Setup Tool.
`<IP address>`	Indicates inputs in which you enter a value for the term shown in the brackets. Do not enter the pointed brackets.
bold, italics, e.g. BigBoss	Indicates example terms.
bold, e.g. ➤➤ **MIB**	Indicates terms that you can find in the glossary (for online texts, click the double arrow).
bold, e.g. biboAdmLoginTable, Windows Start menu	■ Indicates fields in the Setup Tool and MIB tables and variables. ■ Indicates keys/key combinations and Windows terms.
italics, e.g. none	Indicates values that can be entered or set in the Setup Tool or MIB variables.

Table 1-3: Typographical elements

1.8 Feedback

As the BinTec Communications AG documentation team, we write manuals and other documentation for your use. We aim to supply documentation that is up to the high quality of **X4000** and meets your requirements. You as the user of BinTec products are the best person to judge whether we have succeeded with this manual.

So please let us know what is missing in this manual, what you don't like, what we should do better, what you like, what you think is especially successful, etc. Your constructive criticism is always welcome and will help us design the documentation for BinTec products to suit your wishes and needs.

Questionnaire

The last page of this manual contains a questionnaire we have prepared for your suggestions. Please fill out the questionnaire and return

- by fax to: +49 911 - 9673 1498
- by post to:
  BinTec Communications AG
  Keyword: Docu Feedback
  Südwestpark 94
  90449 Nürnberg
- or just send us an e-mail to:
  doku_feedback@bintec.de

We look forward to receiving your feedback. Thanks for your support.

1 Welcome!

2 General Safety Precautions

The following sections contain safety precautions you are strongly advised to heed when working with your equipment.

Transport and storage

- Only transport and store **X4000** in its original packaging or use other appropriate packaging to protect against knocking and shaking.

Installation and operation

- Read the information on the ambient conditions (see Technical Data) before installing and operating **X4000**. Place the equipment on a firm flat base.
- Electrostatic charges may cause damage to the equipment. You should therefore wear a grounded wrist strap or touch a grounded surface before you touch sockets or extension cards of **X4000**. Only grip extension cards at the edges and do not touch components or conductor tracks.
- Keep the unused extension slot covered with the dummy cover to prevent objects getting inside the equipment. Foreign bodies located in the equipment during operation create a danger of electric shock and short-circuits.
- Ensure that no sharp objects can damage the window of the display module. Protect the display module against knocks and dropping and only connect it to the RJ11 socket provided for this purpose on **X4000** to prevent damage to **X4000** and the display module.
- Make sure the cables do not cover the ventilation slots of the equipment or interfere with ventilation. Obstructing the ventilation of **X4000** may cause damage to the equipment. Damage caused by lack of ventilation invalidates the guarantee.
- Never open the basic unit or tamper with the mains unit in any way, as this can create a lethal danger through electric shock. Don't remove any fixing screws on the basic unit.
- Condensation may occur externally or internally if the equipment is moved from a colder room to a warmer room. When moving the equipment under such conditions, allow ample time for the equipment to reach room

temperature and to dry out completely before operating. Observe the ambient conditions under Technical Data.

- Make sure the local mains voltage is the same as the nominal voltages of the mains unit. The equipment may only be operated under the following conditions.
  - 100 - 240 V AC
  - 50 - 60 Hz
- Make sure the safety mains socket in the building is freely accessible. You must remove the mains plug to disconnect the equipment completely from the mains.
- Make sure you follow the correct cabling sequence, as described in the manual. Use only the cables supplied with the equipment or cables that meet the specifications in this manual. If you use other cables, BinTec Communications AG cannot accept liability for any damage occurring or for any adverse effects on operation. The equipment guarantee is invalidated in such cases.
- Connect the equipment as described in the manual.
- Arrange the cables so that they are not in the way and cannot be tripped over or damaged.
- Do not connect, disconnect or touch the data lines during lightning storms.

Operation according to the regulations

- **X4000** is intended for use in offices. As an ISDN multiprotocol router, **X4000** establishes WAN connections depending on the system configuration. To avoid extra charges, you should carefully monitor the product.
- **X4000** meets the relevant safety standards for information technology equipment for use in offices.
- Operation of the system according to IEC 950/EN 60950 is only guaranteed when the top of the housing is fitted (cooling, fire protection, RFI suppression).
- Ambient temperature should not exceed 50 °C. Avoid exposure to direct sunlight.

- Make sure no foreign objects (e.g. paper clips) or liquids get into the equipment (risk of electric shock, short-circuit). Make sure the equipment is sufficiently cooled.
- **X4000** contains no components for the user to replace or any switches or jumpers that need to be set by the user.
- In an emergency (e.g. damaged housing or operating element, entry of liquid or foreign bodies), immediately disconnect the power supply and notify customer service.

Cleaning and repair

- The equipment should only be opened by service centers authorized by BinTec. Always disconnect the power cord before opening the equipment. Unauthorized opening and improper repairs can result in serious danger for the user (e.g. electric shock). Ensure that repairs are only carried out by service centers authorized by BinTec. Your dealer will tell you where the service centers are situated. Failure to observe the above instructions invalidates the guarantee and no claims can be accepted.
- Never use water to clean this equipment. Water spillage can result in serious danger for the user (e.g. electric shock) and cause considerable damage to the equipment.
- Never use scouring or abrasive alkaline cleaning agents on this equipment.

2 General Safety Precautions

3 Hardware Description and Installation

This chapter contains the following information, which you will need for the installation of **X4000**:

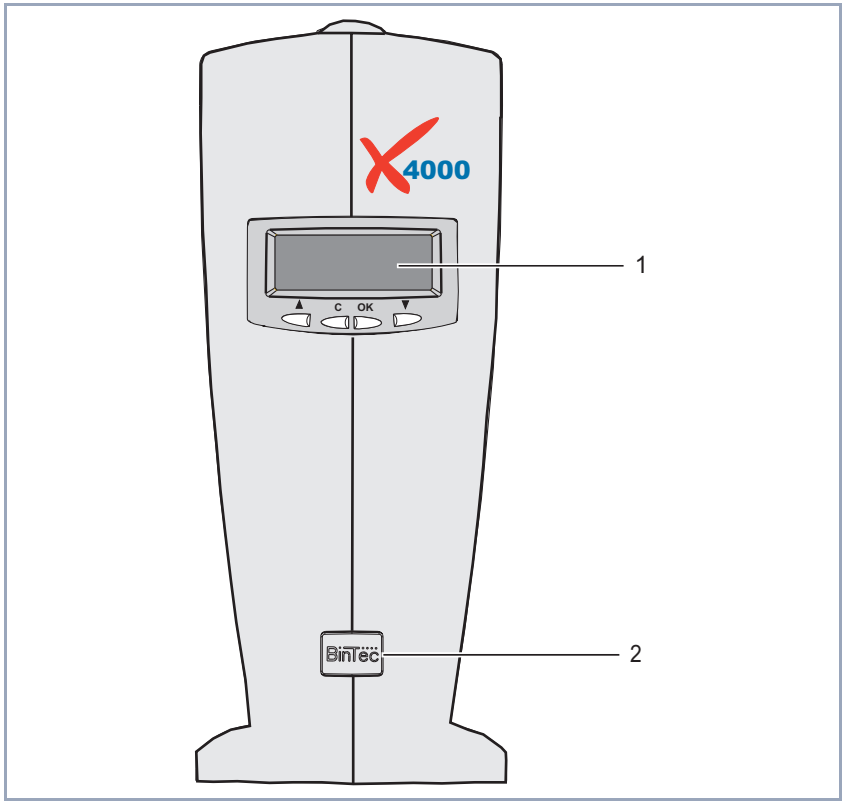
3.1 Basic Unit

BinTec Communications AG offers you **X4000** in two variants:

- Desktop unit for setting up in the office
- Built-in unit for 19-inch cabinet

The **X4000** basic unit is not fitted with an expansion card in the ex works state. The expansion slot provided for the expansion card at the rear of the equipment is closed by a dummy cover. This dummy cover is unscrewed when the expansion card is fitted. The slot is automatically covered by the backplane of the expansion card when the card is fitted.

3.1.1 Desktop Unit



1	Display with input keys	2	Power LED (blue)

Figure 3-1: Front view of desktop unit

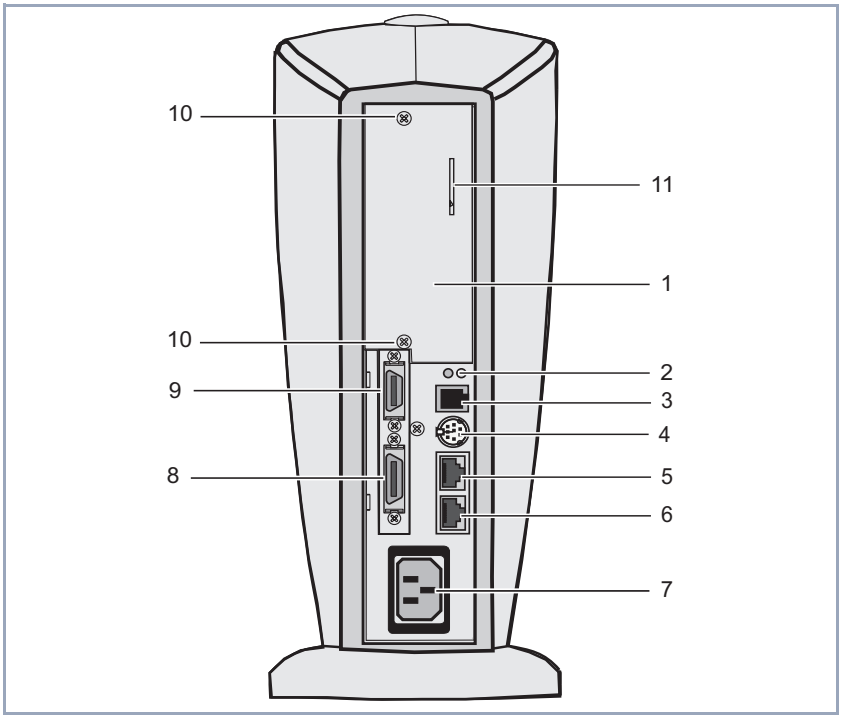
Display and Input Keys

BinTec's Man-Machine Interface (MMI), a convenient user guide with display and input keys, guides the user through a number of basic functions of **X4000**. You will find a detailed description of the MMI in chapter 5, page 93.

Display unit on 19-inch built-in unit

The display unit on the 19-inch built-in unit can be mounted on the front or back of **X4000**. The instructions for changing the position are contained in "Step 2 Changing over the display", page 46.

Rear view of desktop unit:



1	Expansion card slot (with dummy cover)	7	IEC AC socket of mains unit
2	Status LEDs (red and green)	8	X.21/V.35/V.36 interface
3	RJ11 socket for display	9	X.21bis interface
4	Mini DIN socket (console)	10	Fixing screws for expansion card and dummy cover
5	Ethernet/LAN 10/100 Base-T Fast Ethernet interface	11	Plastic strip for activating the buffer battery for the real-time clock (RTC)
6	ISDN BRI interface		

Figure 3-2: Rear view of desktop unit

For connecting your desktop unit, go to chapter 3.3, page 59.

3.1.2 19-Inch Built-In Unit

Installing in a 19-inch cabinet

BinTec offers **X4000** as a 19-inch built-in unit for installation in a 19-inch cabinet.

How to install your 19-inch unit in the 19-inch cabinet is described below. **X4000** is flexible and can be installed as follows:

- with its front panel towards the front and the connections towards the back in your 19-inch cabinet (cf. "Installation with Front Panel Towards the Front", page 41 and Figure 3-6, page 44).
- with the connections towards the front in your 19-inch cabinet. In this case, the display can be changed over so that it can be seen from the front (cf. "Installation with Connections Towards the Front and Changing Over the Display", page 45).

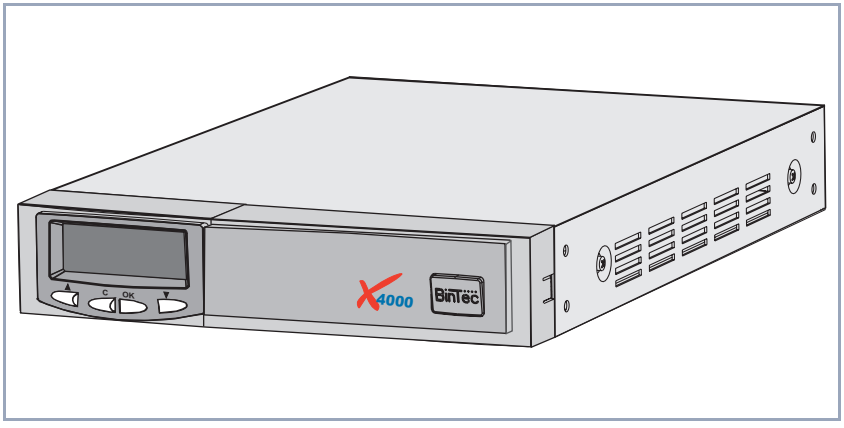


Figure 3-3: 19-inch built-in unit

Installation with Front Panel Towards the Front

Caution!

It is not necessary to open the housing for connecting or operating, or for installing or removing the expansion card.

If the housing is opened, this tears the guarantee label on **X4000**, which invalidates the guarantee.

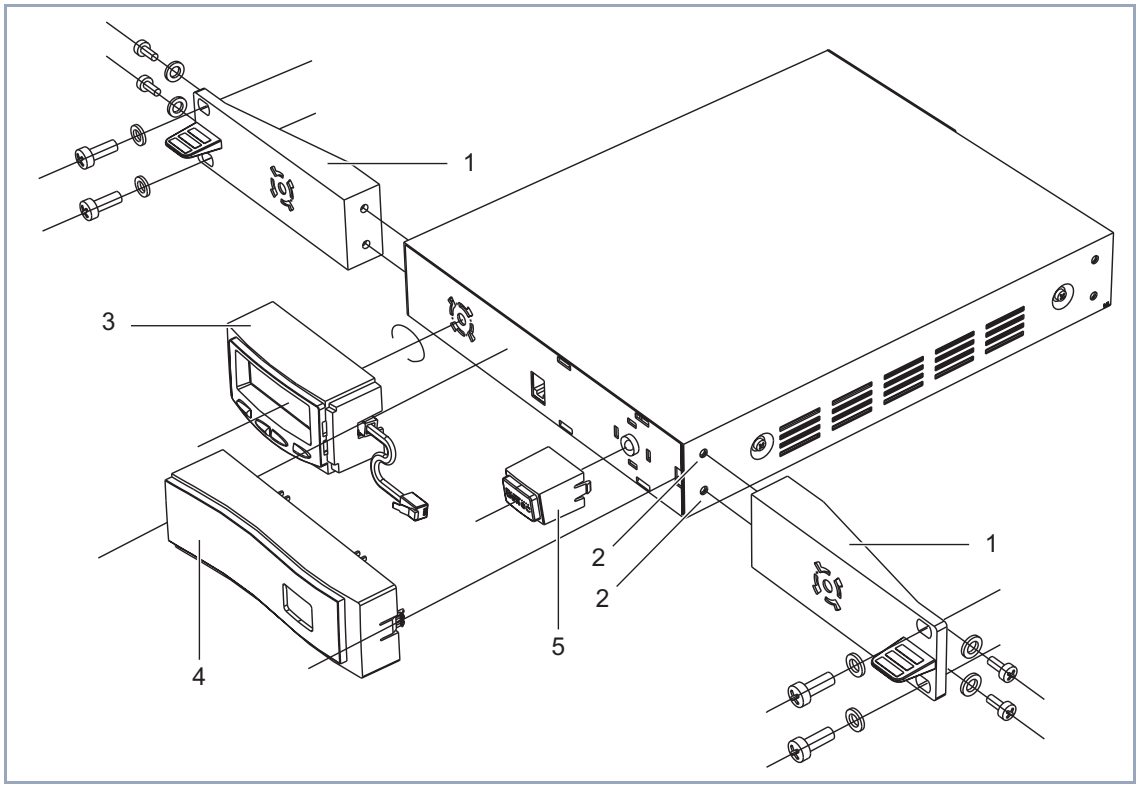
➤ Never open the housing!

Danger!

Live components are exposed when the equipment is open. There is a risk of electric shock!

➤ Never open the housing!

The following components and fixing parts are required for installation in a 19-inch cabinet:



1	Mounting bracket	4	Cover
2	Fixing holes	5	Power LED housing
3	Display unit		

Figure 3-4: Exploded drawing showing the main components and mounting parts for the installation of **X4000** in a 19-inch cabinet

Proceed as follows:

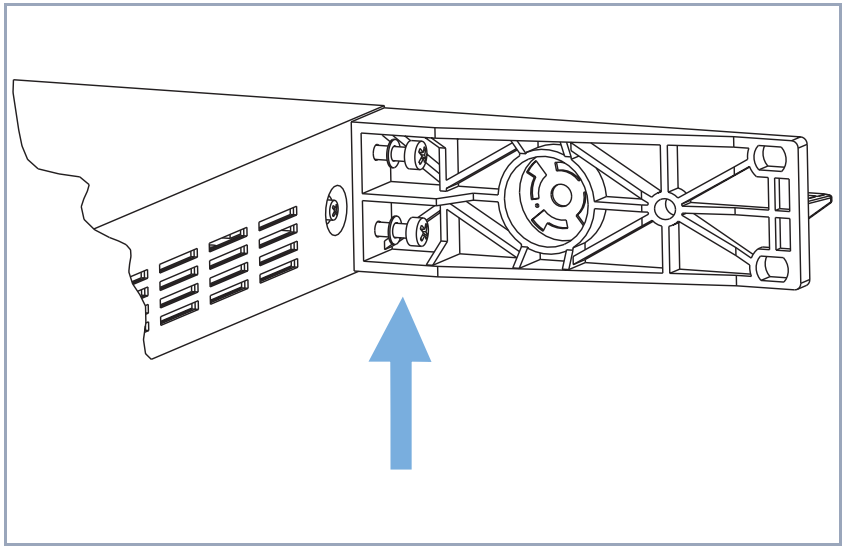


Figure 3-5: Screwing the bracket to the fixing holes

Step 1 ➤ Using the two brackets and screws supplied with **X4000**, screw the brackets to the front fixing holes provided on the side of **X4000**, see Figure 3-5, page 43. Always use the screws supplied. Other screws may not withstand the mechanical loads or may damage the equipment.

Step 2 ➤ Connect the necessary interface cables to the sockets provided (cables must already be installed if your cabinet is not accessible from the rear!).

Step 3 ➤ Slide this preassembled unit with the two brackets screwed to it into the cabinet and screw the preassembled unit to the longitudinal sections of the cabinet (these screws are not supplied with **X4000**, but are included with the cabinet.)

This is what **X4000** should look like on completion of installation.

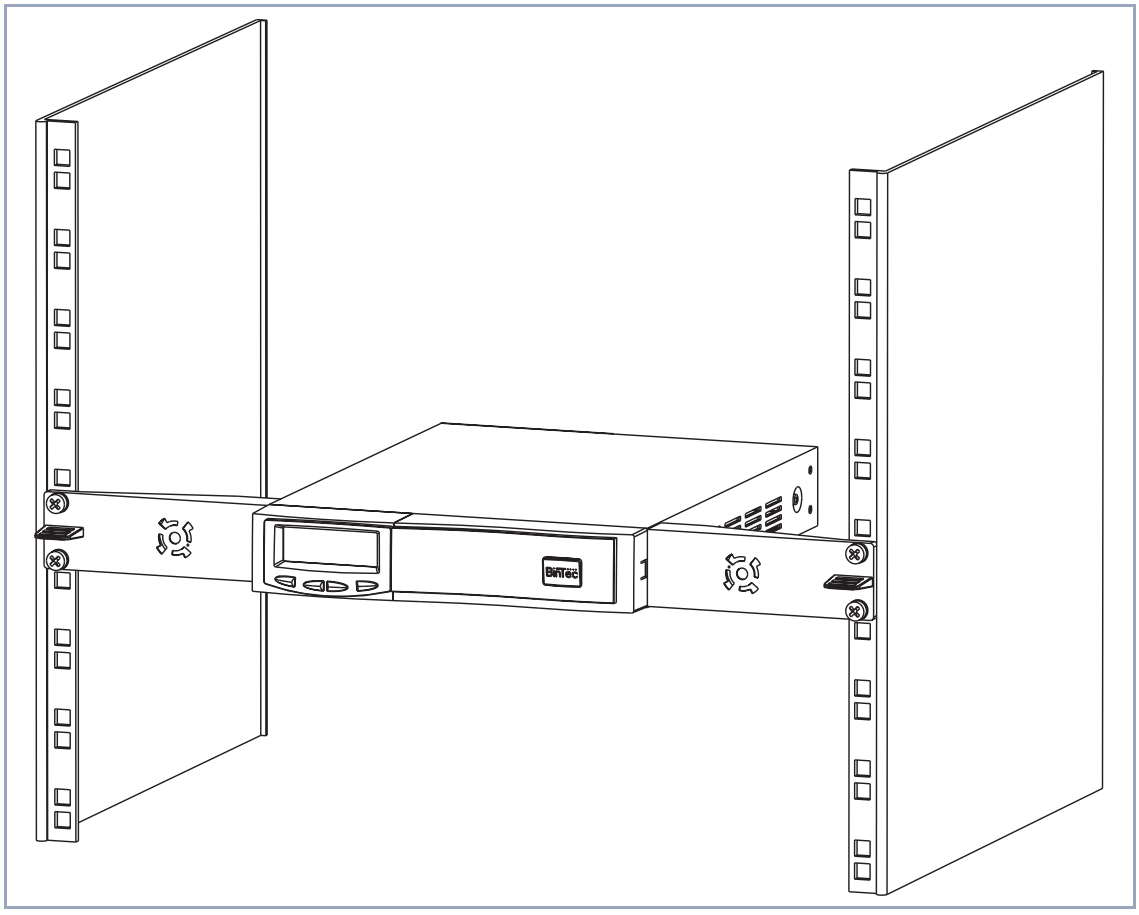


Figure 3-6: **X4000** installed in a 19-inch cabinet

For connecting your 19-inch built-in unit, go to chapter 3.3, page 59.

Removal from 19-inch cabinet

To remove **X4000** from the 19-inch cabinet (e.g. for replacing or installing an expansion card, installing a fan unit, etc.), carry out the steps described above in the reverse order.

Installation with Connections Towards the Front and Changing Over the Display

Caution!

It is not necessary to open the housing for connecting or operating, or for installing or removing the expansion card.

If the housing is opened, this tears the guarantee label on **X4000**, which invalidates the guarantee.

➤ Never open the housing!

Danger!

Live components are exposed when the equipment is open. There is a risk of electric shock!

➤ Never open the housing!

Caution!

X4000 must be switched off before changing over the display unit. Changing over the display unit with the equipment switched on may damage both the display and the basic unit.

➤ Switch off **X4000** before changing over the display unit!

Proceed as follows:

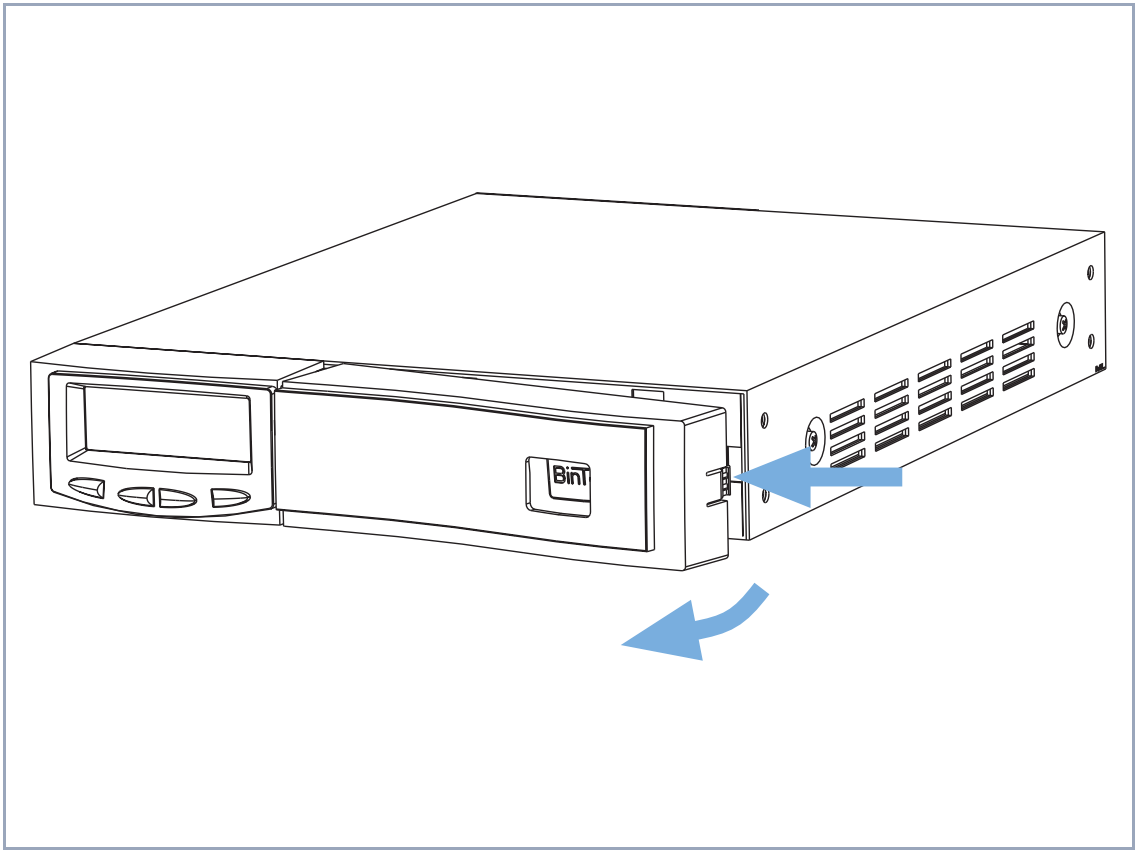


Figure 3-7: Removing the plastic cover

Step 1 ➤ Remove the plastic cover of **X4000** from the metal housing.
This is done by pressing the edge of the housing on the narrow side of the front panel (marked with a grip) slightly towards the display, see Figure 3-7, page 46.

This releases the plastic cover, which can be removed from the front. The blue Power LED with the BinTec logo is still visible after removing the front panel.

Step 2 Changing over the display ➤ Disconnect the display cable from the RJ11 socket on the metal housing (Caution: The plug is locked to the socket; make sure you free the plug).

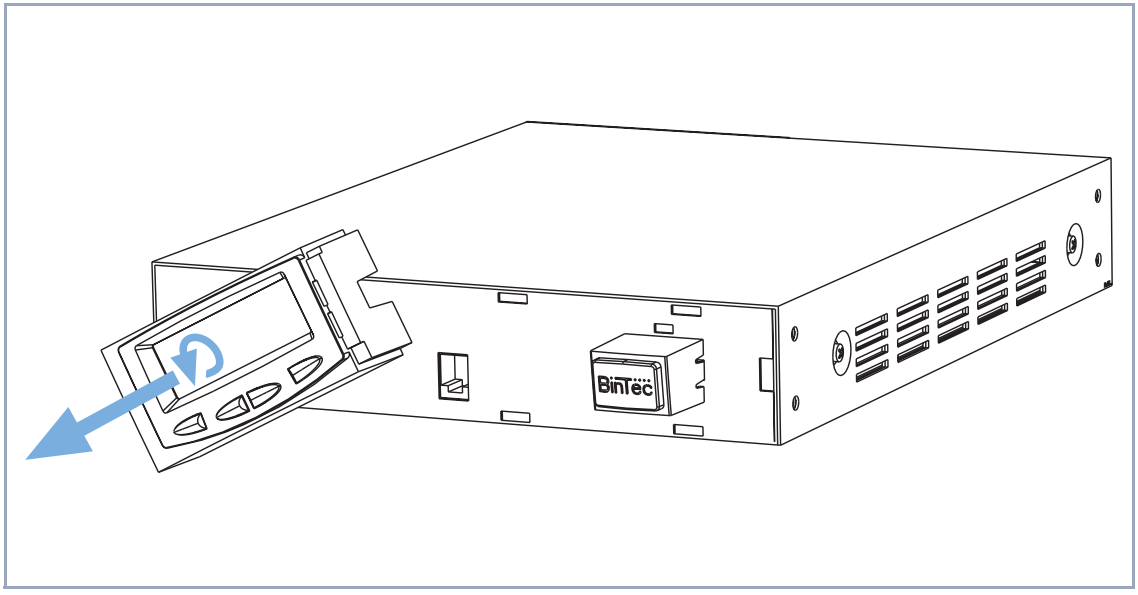
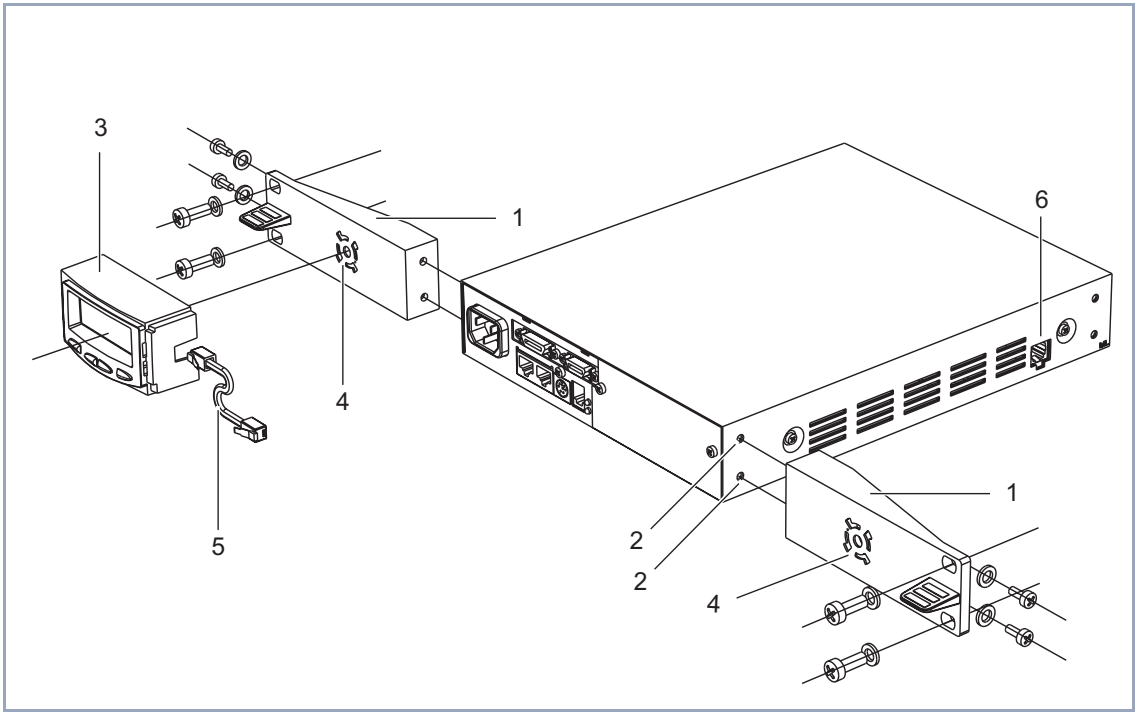


Figure 3-8: Removing the display

Step 3 ➤ Turn the display unit by approx. 40 ° to the left and remove the display unit to the front away from the metal housing (bayonet connection), see Figure 3-8, page 47.

The following components and fixing parts are required for installation in a 19-inch cabinet with the **X4000** connections to the front:



1	Mounting bracket	4	Bayonet connection for fixing the display unit
2	Fixing holes	5	Display cable
3	Display unit	6	Power supply for external fan unit (for 19-inch built-in unit only).

Figure 3-9: Exploded drawing showing the main components and mounting parts for the installation of **X4000** in a 19-inch cabinet

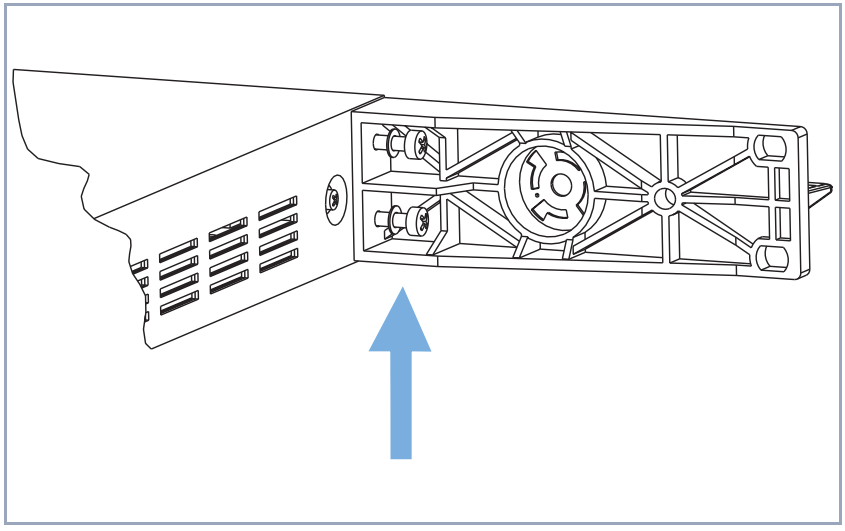


Figure 3-10: Screwing the bracket to the fixing holes

Step 4 ➤ Using the two brackets and screws supplied with the equipment, screw the brackets to the rear fixing holes provided on the side of **X4000**, see Figure 3-10, page 49. Always use the screws supplied. Other screws cannot withstand the mechanical loads or may damage the equipment.

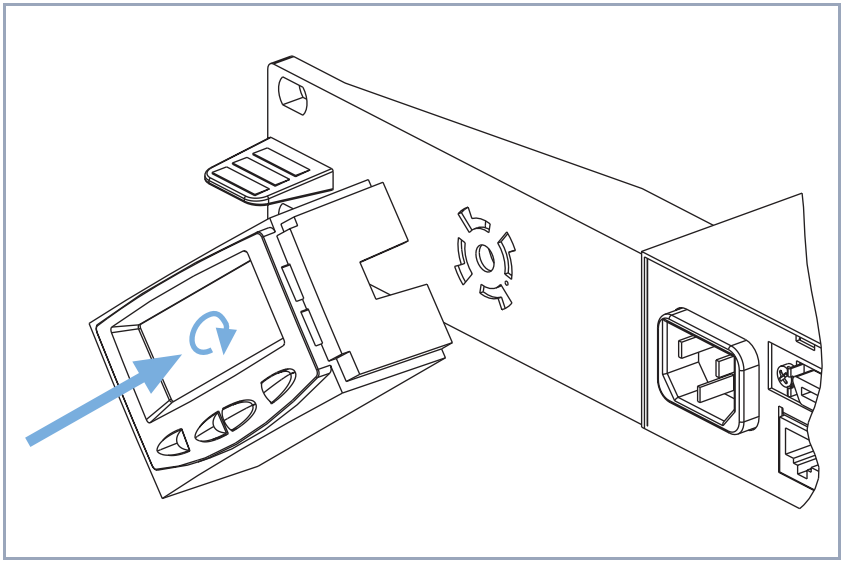


Figure 3-11: Mounting the display on a fixing bracket

Step 5 ➤ Mount the display unit on one of the two fixing brackets. Make sure that the display unit engages properly, see Figure 3-12, page 51.

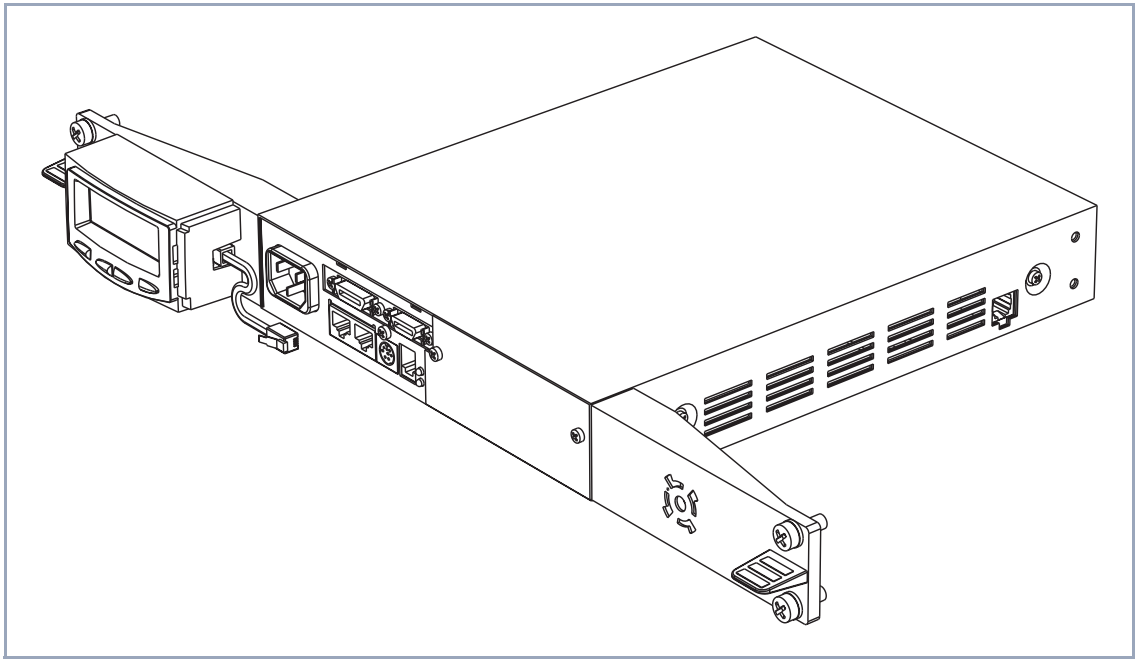


Figure 3-12: Mounting the display on one of the side brackets

Step 6 ➤ Slide this preassembled unit with the two brackets screwed to it into the cabinet and screw the preassembled unit to the longitudinal sections of the cabinet (these screws are not supplied with **X4000**, but are included with the cabinet), see Figure 3-13, page 52.

Step 7 ➤ Connect the plug of the display cable to the RJ11 socket provided.

This is what **X4000** should look like on completion of installation.

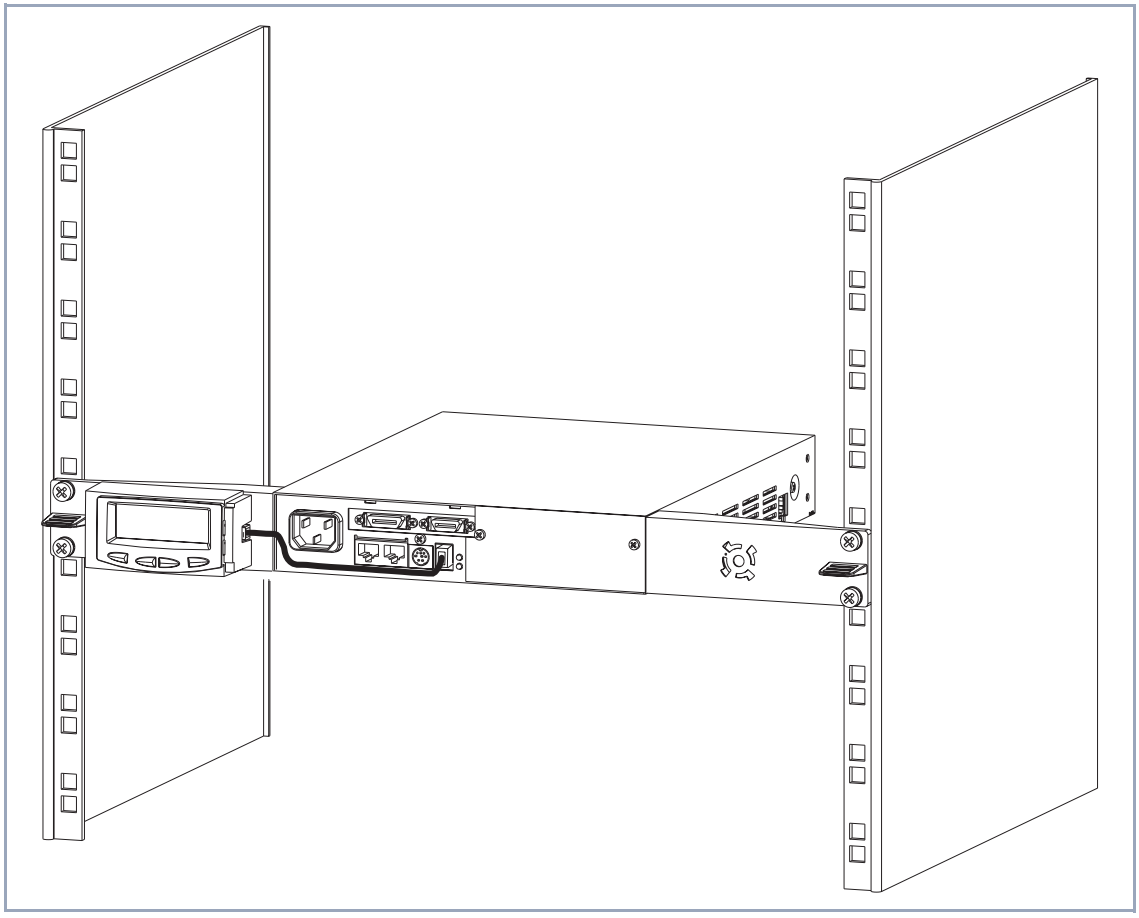


Figure 3-13: **X4000** installed with connections at the front

For connecting your 19-inch built-in unit, go to chapter 3.3, page 59.

Removal from 19-inch cabinet

To remove **X4000** from the 19-inch cabinet (e.g. for installing a fan unit, etc.), carry out the steps described above in the reverse order.

3.2 Expansion and Resource Cards

You can extend your basic unit by adding an **X4000** expansion card.

The following expansion cards are offered by BinTec for integration in **X4000**:

- X4E-1/2PRI: WAN interface card for ISDN PRI and/or G.703
  - equipped as standard with hardware support for encryption and compression
  - can be optionally equipped with up to two resource cards with digital modems (XTR-S, XTR-M) or a resource card (XTR-L)
- X4E-2/3BRI: WAN interface card for ISDN BRI, can be optionally equipped with
  - a resource card with digital modems (XTR-S, XTR-M) and/or
  - a resource card for encryption and compression (XTR-ENC)
- X4E-2FE: LAN interface card for 10/100 Mbps, can be optionally equipped with
  - a resource card for encryption and compression (XTR-ENC)

For configuration of expansion and resource cards, please refer to chapter 9, page 277. The technical data (including pin assignment of interfaces) can be found in chapter 13.3, page 406.

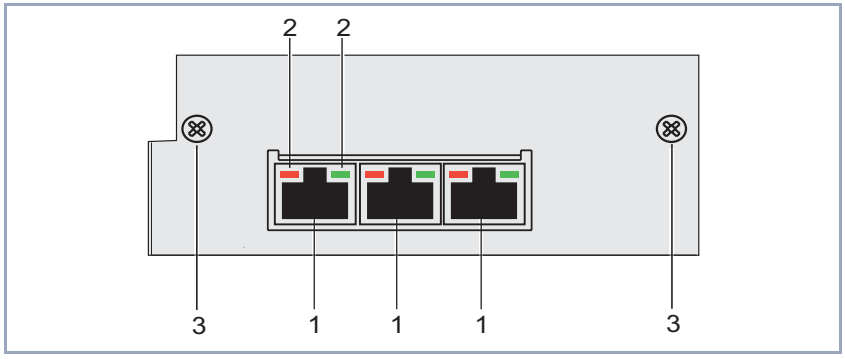
3.2.1 Design of Expansion Cards

Rear views of the expansion cards with their respective interfaces and LEDs are shown below.

The meaning of the LEDs is given in chapter 3.4.2, page 64.

If you are using an expansion card with resource card(s) in the **X4000** built-in unit, BinTec Communications AG recommends that you use the fan unit obtainable as optional equipment.

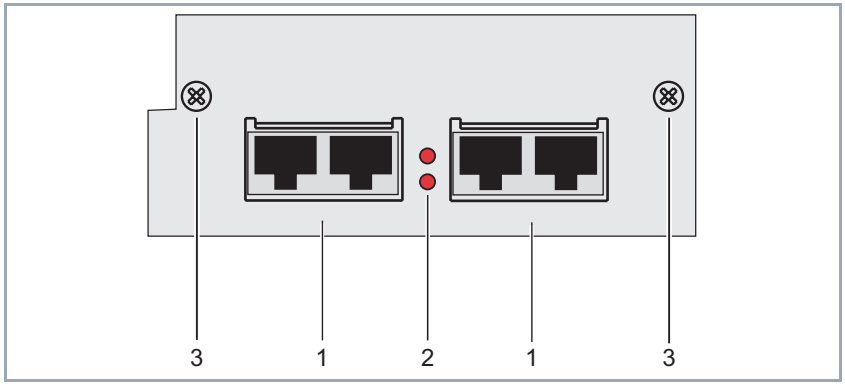
BRI Expansion Card X4E-2/3BRI



1	ISDN BRI port	2	LEDs
3	Screws		

Figure 3-14: Rear view of a BRI expansion card

PRI/G.703 Expansion Card X4E-1/2PRI



1	ISDN PRI/G.703 port with IN and OUT socket	2	LEDs
3	Screws		

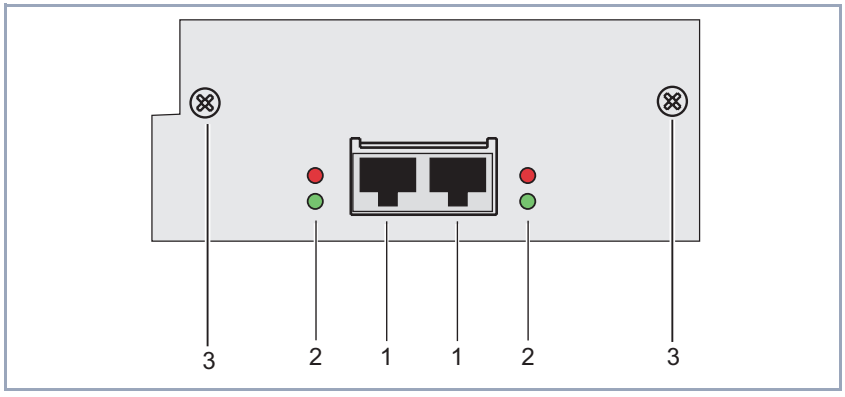
Figure 3-15: Rear view of a PRI/G.703 expansion card

Two RJ45 sockets – IN and OUT – are available per interface on the PRI/G.703 expansion card.

Connect the expansion card by connecting the cable to the IN socket. You can connect a backup router via the OUT socket as an option, which can then take over the function of the first router if this is switched off or fails.

By connecting a loopback plug to the OUT socket, it is also possible to prevent the provider's exchange disconnecting the line if the expansion card fails.

LAN Expansion Card X4E-2FE



1	Fast Ethernet port	2	LEDs
3	Screws		

Figure 3-16: Rear view of a LAN expansion card

3.2.2 Installation and Replacement of Expansion Card

Now you can find out how to equip the **X4000** basic unit with an expansion card or replace this with one of the other **X4000** expansion cards. Make sure you also follow the installation guide supplied with the expansion and resource cards.

Caution!

An expansion card must not be installed or replaced during operation. **X4000** must always be disconnected from the power supply first, otherwise there is a risk of damaging both **X4000** and the expansion card.

- Always disconnect the power cord of **X4000** and all connecting cables on the expansion card before you insert or replace the expansion card.
- Do not connect **X4000** to the power supply until the equipment is completely closed and you have rechecked the installation.

Danger!

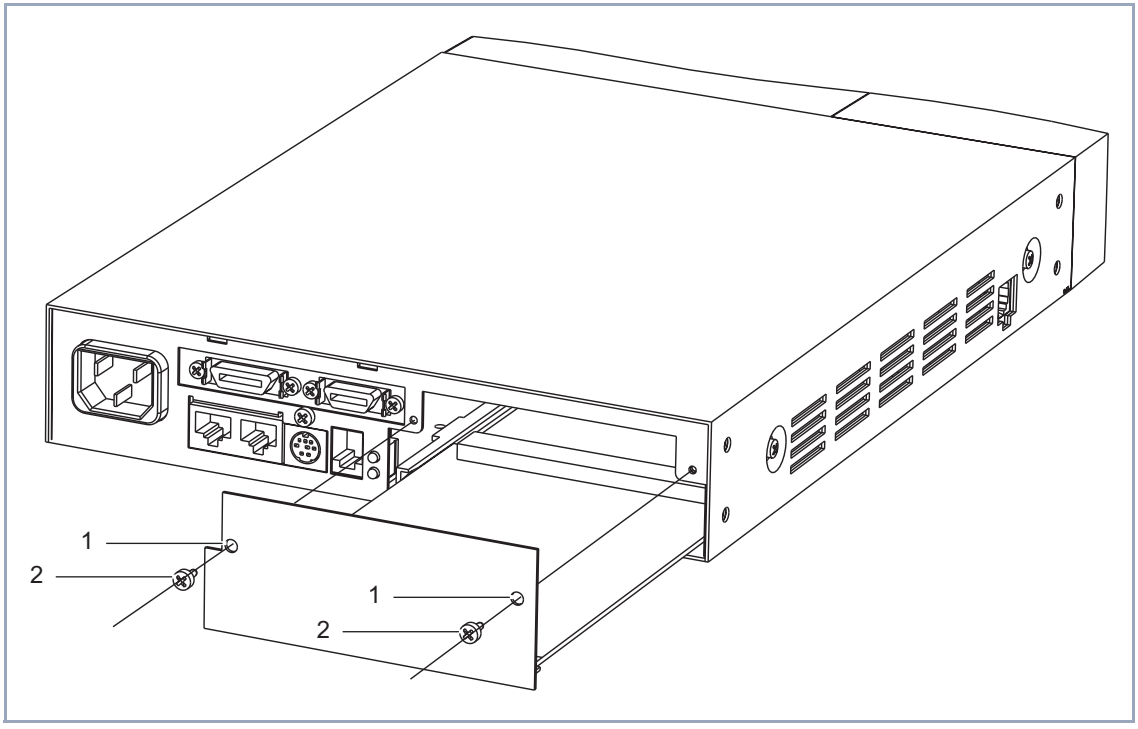
Do not touch any parts inside the expansion slot when installing or replacing the expansion card. There is a risk of electric shock!

- Do not touch any parts inside the expansion slot of **X4000**!

Caution!

Electrostatic charges can damage electronic components. Please observe the following precautions to avoid damaging components:

- Ground yourself before unpacking components and before carrying out installation work on the equipment.
- Only grip boards at the edges and do not touch cables or components.



1, 2	Hole and screw for fixing the expansion card

Figure 3-17: Installing an expansion card

Installation / replacement

Proceed as follows to install or replace an expansion card.

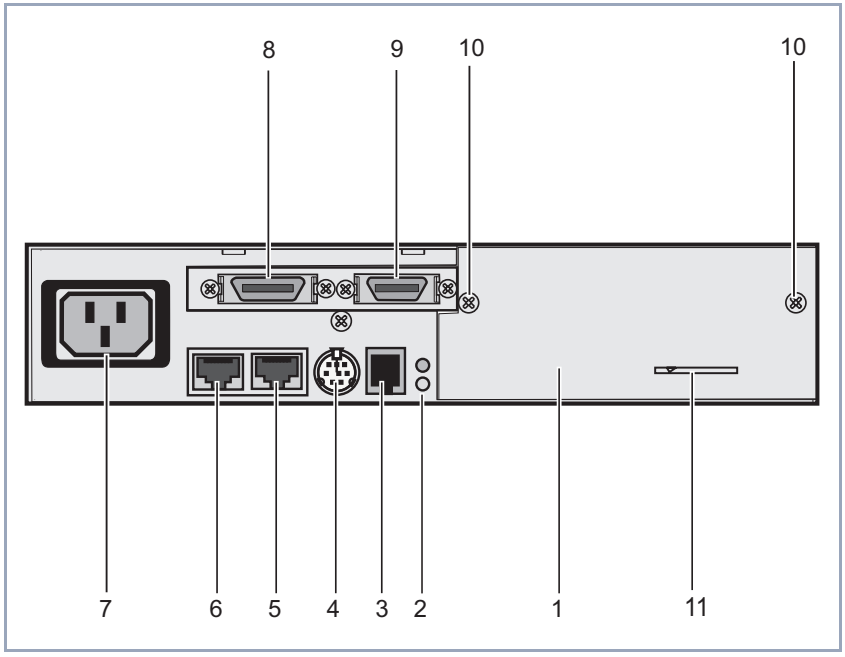
- Undo the screws of the dummy cover or the expansion card installed in the slot. Remove the dummy cover or withdraw the existing expansion card from the slot.
  Keep the two screws of the dummy cover, as these are used for fixing the expansion card.
- Mount the resource card(s) on the expansion card, if applicable. Follow the installation guide supplied with the resource card.
- Push the expansion card into the slot provided in the housing until it engages in the slot connector. Card guides ensure that the expansion card

is reliably plugged in. Once the expansion card engages in the connector, fix it to the housing with the two screws you previously unscrewed from the dummy cover or the expansion card to be replaced (see Figure 3-17, page 57).

If you are using an expansion card with resource card(s) in the **X4000** built-in unit, BinTec Communications AG recommends that you use the fan unit obtainable as optional equipment.

Removal To remove an expansion card, carry out the installation steps described above in the reverse order.

3.3 Setting Up and Connecting



1	Expansion card slot (with dummy cover)	7	IEC AC socket of mains unit
2	Status LEDs (red and green)	8	X.21/V.35/V.36 interface
3	RJ11 socket for display	9	X.21bis interface
4	Mini DIN socket (console)	10	Fixing screws for expansion card and dummy cover
5	Ethernet/LAN 10/100 Base-T Fast Ethernet interface	11	Plastic strip for activating the buffer battery for the real-time clock (RTC)
6	ISDN BRI interface		

Figure 3-18: **X4000** rear view

Caution!

Incorrect cabling of ISDN or LAN interfaces can cause your router to malfunction!

➤ Only connect the LAN interface of **X4000** to the LAN interface of the hub and the ISDN interface of **X4000** to the ISDN connection.

Make the connections in the following order:

➤ Place **X4000** on a firm level surface.

Connecting X4000 to PC or terminal

➤ Connect the serial port of your PC (COM1 or COM2) to the console interface of your **X4000**. Use only the serial cable supplied with the equipment.
You only need to connect **X4000** to the console interface (no. 4, see Figure 3-18, page 59) if you want to carry out your initial configuration serially via the console port, e.g. with the Configuration Wizard (cf. chapter 6, page 109).

No serial connection is necessary if you only want to quickly assign **X4000** the IP address and netmask. You can assign the IP address quickly and easily using the input keys and the display (cf. chapter 5, page 93).

Connecting X4000 to LAN

➤ Connect the LAN interface (no. 5, see Figure 3-18, page 59) of **X4000** to your hub. Use only LAN cables suitable for CAT5. A poorer quality cable can cause malfunctions of **X4000**.

Connecting X4000 to WAN

If you want to use the ISDN BRI interface in your applications scenario:

➤ Connect the ISDN BRI interface (no. 6, see Figure 3-18, page 59) of **X4000** to your ISDN connection using the cable (RJ-45) supplied with the equipment.

If you want to use the X.21/V.35/V.36 or X.21bis interface(s) in your application scenario:

➤ Connect the X.21/V.35/V.36 or X.21bis (no. 8 or no. 9, Figure 3-18, page 59) of **X4000** to your connection via a cable (not supplied with the equipment).

We recommend you use original BinTec cables, which you can buy from your dealer.

The use of other cables may cause damage to your equipment and invalidates the guarantee!

Real-time clock

Finally, you must activate the buffer battery of the real-time clock:

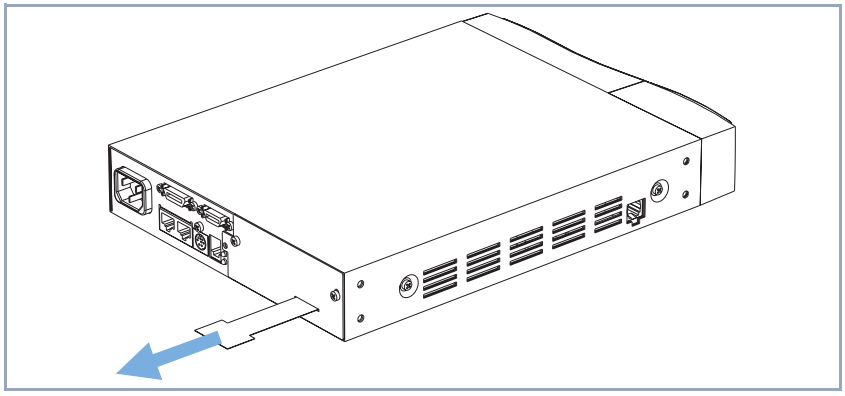


Figure 3-19: Removing the plastic strip for activating the buffer battery

➤ Remove the plastic strip (see Figure 3-19, page 61) from the dummy cover.

Expansion card

To connect your expansion card:

➤ Plug the necessary interface cables of your expansion card into the sockets provided.

Two RJ45 sockets – IN and OUT – are available per interface on the PRI/G.703 expansion card.

Connect the expansion card by connecting the cable to the IN socket. You can connect a backup router via the OUT socket as an option, which can then take over the function of the first router if this is switched off or fails.

Connecting X4000 to power supply

➤ If you want to use the display, make sure that the display cable is connected to the appropriate socket on the 19-inch built-in unit.

➤ Connect **X4000** to a mains socket or to the power supply of the 19-inch cabinet using the IEC AC power cord supplied with the equipment.

X4000 selftest

X4000 carries out a selftest; see chapter 3.5, page 66. If you have connected all the cables correctly, the red LED of the C key on the display

and the red LED on the back of **X4000** go out at the end of the selftest. The blue Power LED lights as long as **X4000** is supplied with power.

The status messages displayed by (LEDs) are described in chapter 3.4, page 63.

Hardware basic settings

➤ Make the necessary hardware basic settings via the keyboard and display (a detailed description is contained in chapter 5, page 93):

– Select interactive language in the MMI.

– Enter any IP address and netmask so that further configuration can be carried out via the LAN and not via the console port.

3.4 Status Messages via LEDs

The three different types of LED used by the **X4000** basic unit for indicating status messages and the meaning of the LEDs on the expansion cards are given below.

3.4.1 Basic Unit

Power LED

The blue Power LED inside the BinTec logo on the front of **X4000** (see Figure 3-1, page 37) lights as soon as **X4000** is supplied with power.

Illuminated input keys

The display input keys illuminated during operation guide you through the MMI.

Key	On	Flashes	Off
C	Press this key to leave the menu level	–	No meaningful entry possible
▲	Press this key to move backwards in the menu level	–	No meaningful entry possible
▼	Press this key to move forwards in the menu level	–	No meaningful entry possible
OK	Confirmation of entry or selection is possible	–	No meaningful entry possible

Table 3-1: Status message via input keys

LEDs on the back of X4000

One red and one green LED on the back of the **X4000** basic unit (see Figure 3-2, page 39) indicate the general status of each of the individual interfaces.

If the green LED flashes or lights, this always means fault-free operation. If the red LED flashes or lights, this indicates a fault.

You can obtain more detailed status information via the display, the Setup Tool or an SNMP Management Tool.

3.4.2 Expansion Cards

The expansion cards are equipped with LEDs, which respond as described below if the cables are connected.

BRI Expansion Card X4E-2/3BRI

The BRI expansion card has six LEDs, which are assigned in pairs (red and green) to each port.

The LEDs indicate the following status messages:

	LED lights	LED flashes	Meaning
green LED	X	–	1 B-channel is used
	–	X	2 B-channels are used
	–	–	None of the B-channels used
red LED	X	–	D-channel missing or autoconfiguration failed
	–	X	Layer 1 not stable

Table 3-2: LED status messages of a BRI expansion card

PRI/G.703 Expansion Card X4E-1/2PRI

The PRI/G.703 expansion card has two LEDs. The top LED is assigned to the first port (Unit 0) and the bottom LED to the second port (Unit 1).

The LEDs indicate the following status messages:

LED lights	LED flashes	Meaning
–	–	Port is not activated by license
X	–	Port is in G.703 Mode (license for G.703 or PRI is activated and *G.703* is selected under **ISDN Line Framing**)
–	X	Port is in PRI Mode (license for PRI is activated and *G.703* is not selected under **ISDN Line Framing**)

Table 3-3: LED status messages of a PRI/G.703 expansion card

LAN Expansion Card X4E-2FE

The LAN expansion card has four LEDs. The two LEDs on the left side (red and green) are assigned to the first port (Unit 0) and the two LEDs on the right side (red and green) to the second port (Unit 1).

The red LEDs light up if Ethernet collisions occur and the green LEDs indicate activity on the Ethernet:

	LED flashes	LED lights	Meaning
green LED	–	X	100 Mbps Mode (Fast Ethernet)
	X	–	10 Mbps Mode (Ethernet)
	–	–	Port is not available
red LED	–	X	Ethernet collision
	–	–	No Ethernet collision

Table 3-4: Status messages of LEDs on a LAN expansion card

3.5 Boot Sequence

X4000 passes through various functional states on booting:

- Start Mode
- BOOTmonitor Mode
- Normal Operation Mode

After several selftests have been performed successfully in Start Mode, **X4000** changes to the BOOTmonitor Mode. The BOOTmonitor prompt is displayed if you are connected to **X4000** via a terminal program.

BOOTmonitor

Press **Space** within four seconds of the display of the BOOTmonitor prompt if you want to use the BOOTmonitor functions. If you do not make an entry within four seconds, **X4000** changes back to normal operation mode.

Functions

The BOOTmonitor makes the following functions available, which you select by entering the relevant digit (for more detailed information, refer to Software Reference):

- (1) Boot system:
  X4000 loads the compressed boot file from the flash memory to the RAM memory. This happens automatically when started.
- (2) Software update via TFTP:
  X4000 performs a software update via a TFTP server.
- (3) Software update via XMODEM:
  X4000 performs a software update over a serial interface with XMODEM.
- (4) Delete configuration:
  X4000 is reset to the unconfigured ex works state. All configuration files are deleted and the BOOTmonitor settings are set to the default values.
- (5) Default BOOTmonitor parameters:
  You can change the default settings of **X4000**'s BOOTmonitor, e.g. the baud rate for serial connections.

If you change the baud rate (the preset value is 9600 baud), make sure the terminal program used also uses this baud rate. If this is not the case, you will not be able to establish a serial connection to **X4000**!

4 Configuration Requirements

This chapter tells you how to carry out the following tasks:

- How to access **X4000** (chapter 4.1, page 70)
- How to log in to **X4000** (chapter 4.2, page 76)
- Which methods of configuration are available to you (chapter 4.3, page 78)
- How the ➤➤ **Setup Tool** is constructed (chapter 4.3.2, page 79)
- How to carry out an initial configuration of **X4000** (chapter 4.4, page 91)

4.1 Connection Methods

Before you can configure your **X4000**, you must connect **X4000**. There are various ways of doing this:

- Over the Man-Machine Interface (MMI)
- Over the serial interface
- Over your ➤➤ **LAN**
- Over an ➤➤ **ISDN** connection

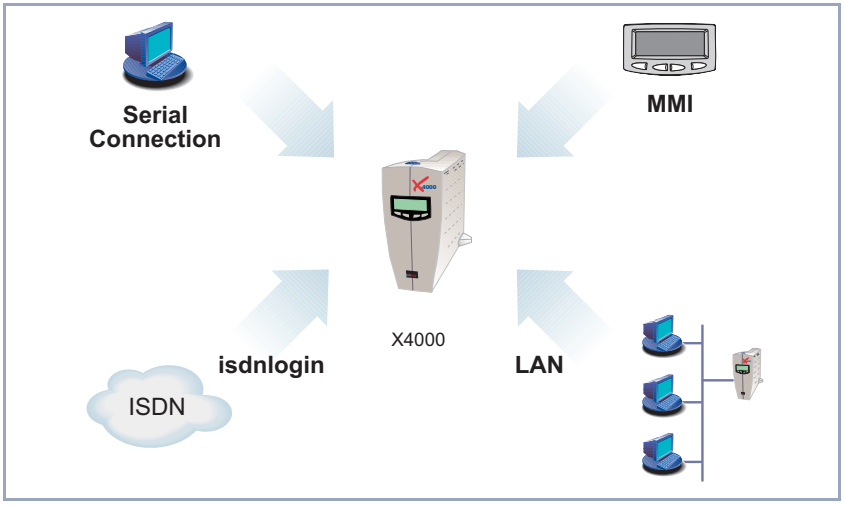


Figure 4-1: Possible connections to **X4000**

The various connection methods are presented below, so that you can choose the best method for your needs.

4.1.1 Man-Machine Interface (MMI)

Initial steps

The MMI with its display and input keys is a good method for establishing “initial contact” with **X4000**. You should carry out the following initial steps with the MMI:

- set the desired display language
- enter the IP address and netmask

You can then carry out further configuration steps using the Configuration Wizard or Setup Tool.

4.1.2 Connecting Over the Serial Interface

Initial configuration

Connecting over the serial interface is very suitable if you carry out an initial configuration on **X4000** before you have entered an IP address and netmask. To connect **X4000** to your computer over the serial interface, connect the serial interface on the basic unit of **X4000** to the serial interface of your computer.

Windows

If you are using a Windows PC, you will need a terminal program, e.g. **HyperTerminal**, for the serial connection. How to install this assistant and **BRICKware for Windows** is described in chapter 6.2, page 112).

To do

- Click the Windows Start button and then **Programs** ➧ **BRICKware** ➧ **BRICK at COM1** (or **BRICK at COM2** if you use the COM2 port of your PC) to start **HyperTerminal**.
- Press **Return** (at least once) after the **HyperTerminal** window opens.

  A window with the login prompt appears. You are now in the SNMP shell of **X4000.**
- Continue with chapter 4.2, page 76.

If the login prompt does not appear after pressing **Return** several times, the connection to **X4000** has not been set up successfully. Check the COM1 or COM2 settings on your PC.

- Click **File** ➧ **Properties**.
- Click **Configure**.... in the **Connect to** tab.
  The following settings are necessary:
  - Bits per second: 9600
  - Data bits: 8
  - Parity: none
  - Stop bits: 1
  - Flow control: none
- Enter the values and click **OK**.
- Set in the **Settings** tab:
  - Emulation: VT100
- Click **OK**.

The changes to the terminal program settings do not take effect until you disconnect the connection to **X4000** and set up the connection again.

You can also use any other terminal program that can be set to 9600 bps, 8N1 (8 data bits, no parity, 1 stop bit), software handshake (none) and VT100 emulation.

If you use the Configuration Wizard for configuration, you also connect to **X4000** over the serial interface, but you do not access the SNMP shell. The start window of the Configuration Wizard appears in this case (see Figure 6-1, page 113).

Unix If you are using a Unix PC, you cannot use **HyperTerminal**. You will require a terminal program such as **cu** (under System V), **tip** (under BSD) or **minicom** (under Linux). The settings for these programs are the same as listed above.

Example of a command line for using **cu**: `cu -s 9600 -c/dev/ttyb`

Example of a command line for using **tip**: `tip -9600 /dev/ttyb`

4.1.3 Connecting Over a LAN

You can reach **X4000** from the LAN over the ➤➤ **telnet** service. Telnet is normally available on every PC. To be able to reach your **X4000** over the LAN, it should already have an ➤➤ **IP address** and ➤➤ **netmask**. If this is not the case and **X4000** has therefore not yet been configured, you have two options:

- Enter the IP address and netmask via the input keys of the MMI (see chapter 5, page 93).
- If you are using Windows, you can assign **X4000** an IP address by using the ➤➤ **DIME Tools** assistant. If you have not yet installed **DIME Tools** together with **BRICKware for Windows**, proceed as explained in chapter 6.2, page 112.

To do

➤ Connect **X4000** to the LAN.

Assigning IP addresses

To assign your **X4000** an IP address (if necessary) with the **DIME Tools** program, proceed as follows:

➤ Click the Windows Start button and then ***PROGRAMS*** ➧ ***BRICKWARE*** ➧ **DIME Tools**.

➤ If the ➤➤ **BootP** server is not started as standard, you must start it.

The BootP server window will appear after a short time if **X4000** is still unconfigured.

➤ Enter the name and IP address of your **X4000** in the window under **BRICK Parameter**.

➤ Click **OK**.

➤ Close **DIME Tools**.

Running telnet

Now establish a connection to **X4000** with telnet:

Windows

➤ Click the Windows Start button and then **Run**....

➤ Type `telnet <IP address of X4000>`.

➤ Click **OK**.

A window with the login prompt appears. You are now in the SNMP shell of **X4000**. Continue with chapter 4.2, page 76.

Unix

➤ Type `telnet <IP address of X4000>` into a terminal.

A window with the login prompt appears. You are now in the SNMP shell of **X4000**. Continue with chapter 4.2, page 76.

4.1.4 Connection Over ISDN

Remote configuration

Connection over ➤➤ **ISDN** with ➤➤ **ISDN login** is especially recommended if **X4000** is to be configured or administrated remotely (remote LAN in Figure 4-2, page 74). This is also possible even if **X4000** has not been initially configured, i.e. is still in the ex works state. Connection is then obtained by means of a BinTec router that is already configured or an ISDN card in the remote LAN, using a number of **X4000**'s ISDN connection in your own LAN (e.g. 1234).

It is thus possible for the administrator at a remote LAN to configure **X4000** in a home office which is hundreds of kilometers away. The **X4000** in the home office (e.g. your LAN) merely has to be connected to an ISDN line and turned on.

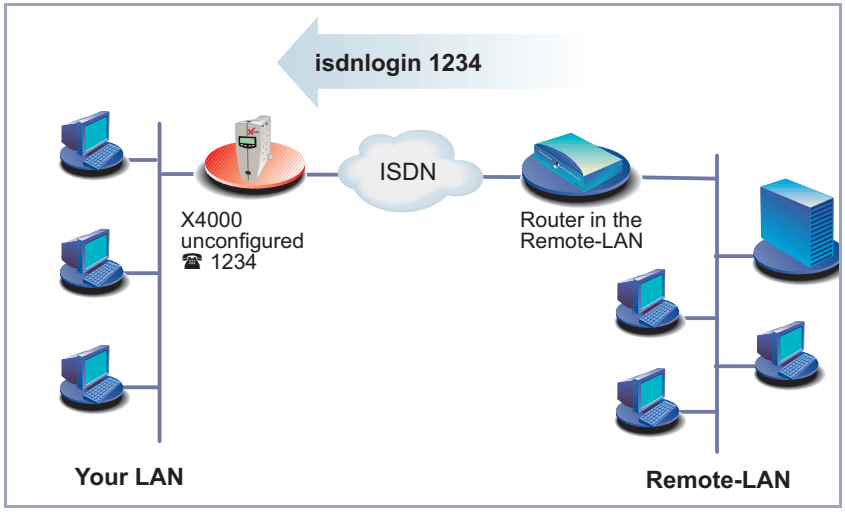


Figure 4-2: Connection over ISDN login for remote maintenance

Access over ISDN costs money. If **X4000** and the PC are in the same LAN, it is cheaper to access **X4000** over the LAN or the serial interface.

To do

➤ Connect **X4000** to the ISDN.

To reach **X4000** over ISDN login, proceed as follows:

➤ Log in on your BinTec router in the remote LAN in the usual way.

➤ In the SNMP shell, type in `isdnlogin <number of the ISDN connection of X4000>`, e.g. `isdnlogin 1234`.

The login prompt will appear in the window. You are now in the SNMP shell of **X4000**. Continue with chapter 4.2, page 76.

4.2 Logging In

Regardless of how you access **X4000**, the ➤➤ **SNMP shell** of **X4000** with the login prompt always appears first. Exceptions to this rule are the Configuration Wizard and Configuration Manager under Windows and the MMI.

In order to log in, you need to know the user name and password. In its ex works state, **X4000** is provided with the following user names and passwords:

User name	Password	Permission
`admin`	bintec	Read and change system variables, save configurations, use the Setup Tool.
`write`	public	Read system variables (changes are lost when **X4000** is turned off).
`read`	public	Read system variables.
`http`	bintec	Call up HTTP status page and Java status monitor from **X4000**, read system variables, no login.

Table 4-1: User names and passwords in ex works state

As you can see, it is only possible to change and save configurations when you log in with the user name `admin`.

Access information (user names and passwords) can also only be changed if you log in with the user name `admin`. For security reasons, passwords are not normally shown on the Setup Tool screen in plain language, but only as asterisks. The user names appear in plain language. The security concept of **X4000** enables you to read all the other configuration settings with the user name `read`, but not the access information. It is therefore impossible to log in with `read`, read the password of the `admin` user and subsequently log in with `admin` and make changes to the configuration.

To do This is how you log in:

➤ Type in your user name (e.g. `admin`) and press **Return**.

➤ Type in your password (e.g. `bintec`) and press **Return**.

Your router then issues an input prompt, e.g. `X4000:>`. The login was successful.

Caution!

To prevent unauthorized access to **X4000**, you should change the passwords right away. How to change the passwords is described in "Changing the password", page 85.

➤ Change the passwords as described in chapter 7.1.2, page 123.

Closing the SNMP shell

To leave the SNMP shell after completing the configuration, enter `exit` and press **Return**.

4.3 Configuration Options

Before you set to work with the configuration, you must select a method. For this reason, we would first like to give you an overview of the different configuration methods and an introduction to using the Setup Tool. This manual explains how to configure **X4000** by means of the Setup Tool.

4.3.1 Methods of Configuration

Methods of configuring **X4000**:

- Man-Machine Interface (MMI)
- Configuration Wizard
- Setup Tool
- ➤➤ **SNMP** shell commands
- Configuration Manager and other SNMP managers

MMI

The easy-to-use and intuitive Man-Machine Interface (MMI) gives you the possibility of displaying information about **X4000** on the display and entering a number of basic settings (e.g. IP address and netmask) with the input keys. You can do this quickly and easily without having to log in. The MMI cannot be used to set up a comprehensive configuration. You should use the Setup Tool or Configuration Wizard for this purpose. You can find detailed information about the MMI and the complete menu architecture in chapter 5, page 93.

Configuration Wizard

You will learn about configuration using the Configuration Wizard in chapter 6, page 109. It is useful for quick, basic configuration of **X4000** and can be used if you have a Windows PC. This usually covers most standard configurations. However, if you need additional settings or wish to use other WAN interfaces of **X4000** than the ISDN BRI interface of the basic unit, you can use one of the other configuration options stated above. You could first configure **X4000** with the Configuration Wizard and subsequently extend or change this initial configuration with one of the other tools. In many cases, the Configuration Wizard alone will be sufficient!

Setup Tool

The Setup Tool is a menu-driven tool for the configuration and administration of **X4000**. Configuration with the Setup Tool is much easier and clearer than configuration with SNMP commands, although not all settings can be made with the Setup Tool. Besides the Configuration Wizard, this manual mainly explains how to configure with the Setup Tool. The Setup Tool is independent of the operating system of your PC. If a configuration step is only possible in isolated cases with the help of an SNMP command, the procedure for this is also explained.

SNMP

➤➤ **SNMP** (Simple Network Management Protocol) is a ➤➤ **protocol** that defines how you can access the configuration settings. All configuration settings are stored in the ➤➤ **MIB** (Management Information Base) in the form of MIB tables and MIB variables. You can access these directly via the SNMP shell.

Configuration Manager and other SNMP managers

The Configuration Manager is a Windows-based SNMP manager provided by BinTec Communications AG. You can use its interface based on Windows Explorer to access all MIB tables and variables of **X4000**. You can also use other SNMP managers, such as SNM, HP Open View or Transview, to access and modify the MIB tables and variables. However, more detailed knowledge of the structure and interrelations of the tables and subsystems of **X4000** would be a prerequisite for handling SNMP shell commands and SNMP managers; this method is therefore suitable for experienced users. Handling MIB tables and MIB variables is not described in this manual. You can find this information in the Software Reference and MIB Reference.

4.3.2 Using the Setup Tool

You can call up the Setup Tool once you have logged in to **X4000**:

➤ Type `setup` after the input prompt and press **Return**.
The main menu of the Setup Tool appears.

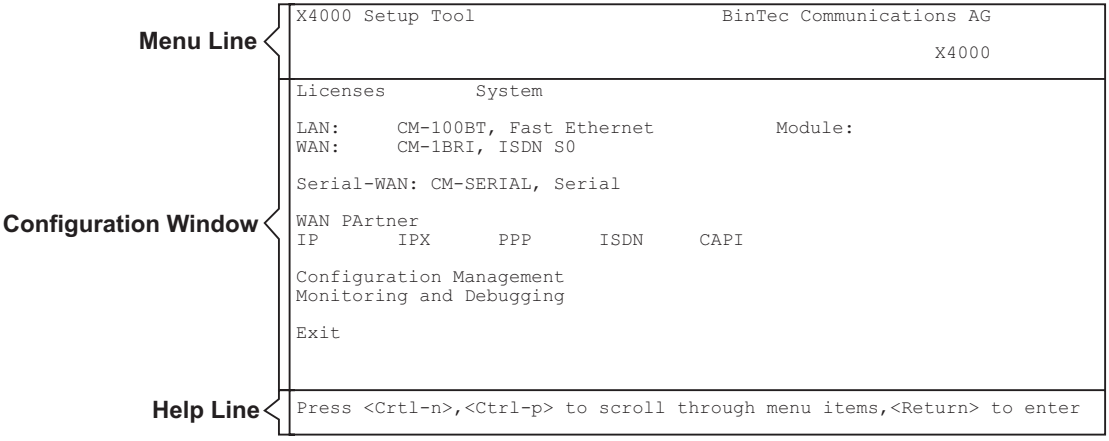


Figure 4-3: Setup Tool menu layout

To use the Setup Tool, you must log in with the user name `admin`! If you don't know the corresponding password, you cannot open the Setup Tool (see chapter 4.2, page 76).

The Setup Tool is easy to use. After a few minutes, you will have no problem finding your way around. Nevertheless, you should first familiarize yourself with the facilities offered by the Setup Tool. By way of introduction, we would first like to point out a few things you should be aware of when using the **X4000** Setup Tool.

Menu layout

Every Setup Tool menu consists of three parts (see Figure 4-3, page 80):

The menu line contains a navigation aid to show you where you currently are in the Setup Tool menu system. The system name of **X4000** is also displayed. This is especially helpful if you are using several BinTec routers with different system names.

The configuration window is where the actual entries are made and the respective settings displayed. The field in which the cursor is currently located is also marked.

The help line tells you how to move around in the menu currently displayed or which entries you can change.

Menu navigation You can use the following keys or key combinations to navigate the various menus in the Setup Tool:

Key combination	Meaning
Tabulator	To move to the next item in a menu.
Return	To open a submenu or activate a menu command (e.g. **SAVE**).
up or **down**	To move forwards or backwards between menu fields (functions with VT 100 emulation when using a terminal program).
left or **right**	To scroll backwards or forwards in the same field to reveal a list of possible entries (functions with VT 100 emulation when using a terminal program).
Esc Esc	**Esc** twice in succession: To return to the previous menu. Cancels any changes made.
Space	To toggle the delete flag for list entries that are to be deleted. The tagged entries are marked with D. Pressing **Space** again removes the tag marking.
Ctrl - **l**	To redraw the screen.
Ctrl - **n**	To move to the next item in a menu.
Ctrl - **p**	To move to the previous item in a menu.
Ctrl - **f**	To scroll forward a page in a long list. An "=" sign at the bottom right indicates the end of the list or a "∨" indicates more to come.
Ctrl - **b**	To scroll back a page in a long list. An "=" sign at the top right indicates the start of the list or a "∧" indicates more to come.
Ctrl - **c**	Leave the Setup Tool.

Table 4-2: Navigation in the Setup Tool

Menu commands

When you start moving around in the Setup Tool, you will notice that some menus have special command options, such as **DELETE**, **SAVE** and **CANCEL**. There are a few slight differences between these commands that you should be aware of.

Schaltfläche	Meaning
ADD	To create or add an item to a list. A submenu appears for entering the desired settings.
CANCEL	To discard all changes made in the current menu.
DELETE	To delete all entries tagged with the **Space** bar for deletion from a list. These changes become effective immediately.
OK	To confirm the changes in the current menu. These changes do not become effective until **SAVE** is pressed in the next menu.
SAVE	All variables set in the current menu and all its submenus are saved to memory. These changes become effective immediately.
EXIT	To leave the current menu and return to the previous menu. Any entries made are lost.

Table 4-3: Buttons in the Setup Tool

Searching lists

Some Setup Tool menus contain lists of items, e.g. the ***WAN PARTNER*** menu, which lists all ➤➤ **WAN partners** currently configured.

```
X4000 Setup Tool                                BinTec Communications AG
[WAN]: WAN Partners                                             MyRouter


Current WAN Partner Configuration

    Partnername          Protocol             State

    BigBoss              ppp                  dormant      ^
    T_ONLINE             ppp                  dormant      |
    Partner1             ppp                  dormant      |
    Partner2             ppp                  dormant      |
    PROVIDER             ppp                  dormant      =

ADD             DELETE               EXIT

Press<Ctrl-n>,<Ctrl-p>toscroll,<Space>tag/untag DELETE,<Return>to edit
Search: p
```

These lists are in alphabetical order according to the contents of the first field. An incremental search function is provided, which is very useful for searching for an item in long lists.

Proceed as follows:

- Enter the first letter of the item you are looking for, with the cursor located on an item in the list. Entries can be made in upper or lower case.
- As long as the search is active, you can enter more characters to refine the search.
- The **Backspace** or **Delete** key can be used to edit the search string.

  The cursor automatically jumps to the first match it finds in the list.

The characters entered for the search are displayed in the help line at the bottom of the menu.

Do not enter invisible characters, such as **Tabulator** or **Space**, as they stop the search and could lead to a function being executed.

If the search does not work, make sure that the cursor is located in a list field. The search cannot run if the cursor is located in a command field, e.g. **ADD** or **DELETE**.

Example:

In the ***WAN PARTNER*** menu shown above, the entries provide the following search results:

Entry	Cursor moves to entry
p or P	**Partner1**
pr, Pr, pR, PR	**PROVIDER**
p a r t n e r 2	**Partner1**, on entering 2 to **Partner2**

Table 4-4: Search results

Changing the password

The procedure described below for changing the password applies to all **X4000** passwords: the access passwords for the user names **admin**, **read** and **write**, the HTTP password, the RADIUS password, the PPP password, the provider password and the CAPI user passwords.

Any character may be used for entering a password. Passwords are only displayed as asterisks, even during password changes. The number of asterisks is the same as the number of characters in the password.

To start the **X4000** Setup Tool in a mode in which the passwords are displayed in plain language and can be changed once by editing, you must enter the command `setup -p`. This option only exists if you have logged in on **X4000** under the user name `admin`.

To change a password, proceed as follows:

In the password field, the **Backspace** key always deletes the complete entry and not just one character.

- Select the password field and enter the new password.
  The field changes to the change mode and the message `Change Password` appears in the help line.
- Now press **Return**, **Tabulator** or a **Cursor key** to confirm.
  The field changes to the confirm mode and `Confirm Password` is displayed in the help line.

➤ Now enter the new password again and confirm by pressing **Return**, **Tabulator** or a **Cursor key**.
If you have entered the repeat password correctly, the password is changed. The new password is saved on leaving the menu with the **SAVE** button. If you leave the menu by pressing **CANCEL** or **Esc Esc**, the password change is not saved.
If the two passwords you entered were not the same, the field is reset to the old password and `Password doesn't match Try again.` is displayed in the help line.

Menu structure The main menu of the Setup Tool looks like this:

```
X4000 Setup Tool                                  BinTec Communications AG
                                                                  MyRouter

Licenses                 System

LAN:         CM-100BT, Fast Ethernet          Module:

WAN:         CM-1BRI, ISDN S0

Serial WAN:  CM-SERIAL, Serial

WAN Partner
IP      IPX      PPP      ISDN     CAPI

Configuration Management
Monitoring and Debugging
Exit
```

The menu structure of the Setup Tool looks like this:

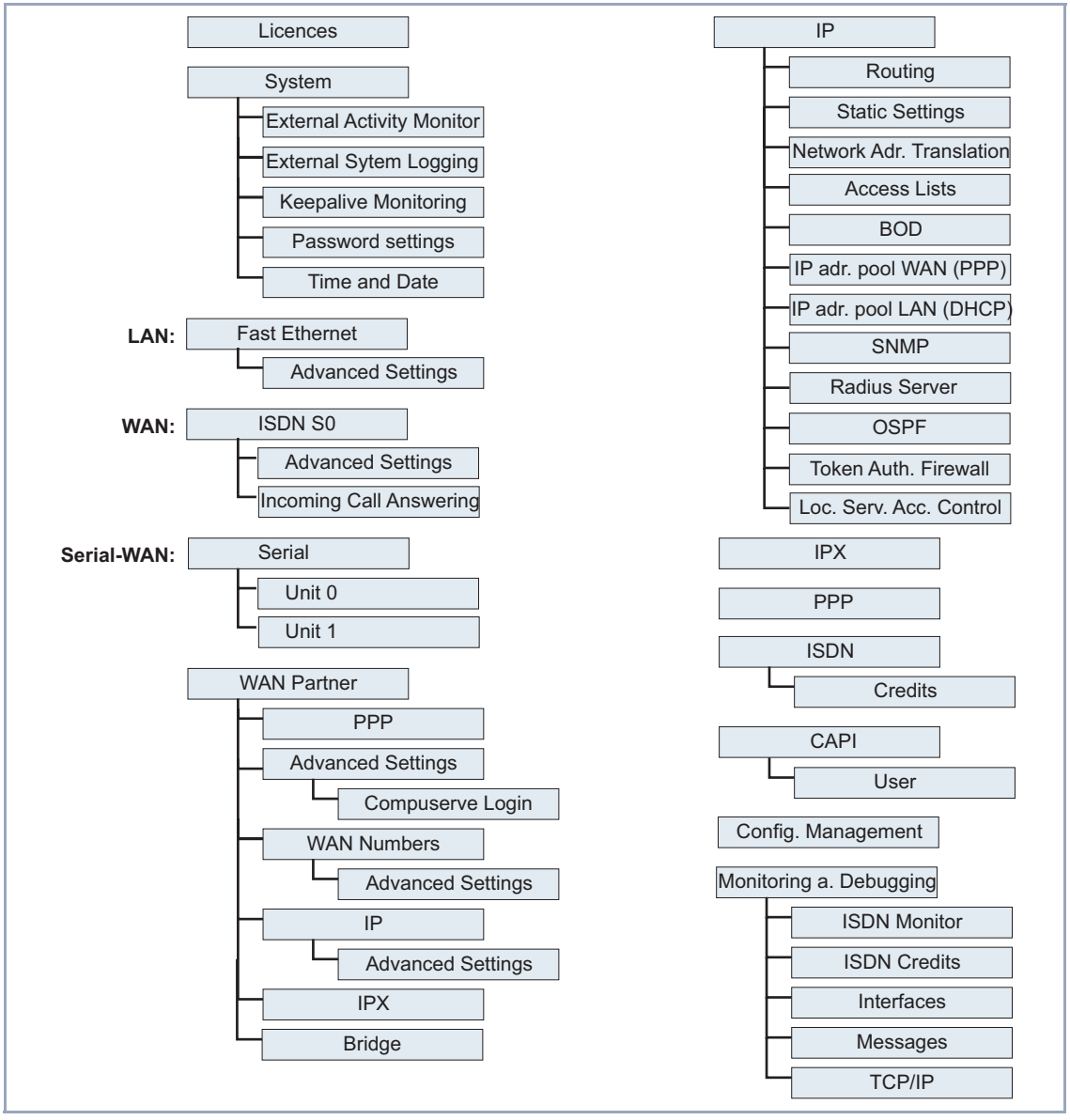


Figure 4-4: Setup Tool menu structure (basic unit)

Figure 4-4, page 87 shows the Setup Tool menus available on **X4000**. When you activate the necessary license, **X4000** detects this and displays the corresponding menus (for entering license, see chapter 7.1.1, page 121).

Summary To help you find your bearings during configuration, the menus are briefly explained below.

Menu	Function
LICENSES	This menu is for entering the license information printed on the license card supplied with the equipment. This menu is also used for activating extra licenses.
SYSTEM	In this menu, you enter the basic system settings of **X4000**, e.g. system name and passwords.
FAST ETHERNET	This menu is for configuring the ➤➤ **LAN** interface of **X4000**. Here you enter data such as the IP address and netmask of **X4000**.
ISDN S0	This menu is for configuring the ISDN interface of **X4000**. Here you enter data such as the type of ISDN connection to which **X4000** is connected. The submenu ***ISDN S0*** ➧ ***INCOMING CALL ANSWERING*** is for assigning the available ISDN numbers to the desired services (e.g. PPP routing, ➤➤ **CAPI**, ➤➤ **ISDN Login**).
SERIAL	This menu is for configuring the serial WAN interfaces of **X4000**.
WAN PARTNER	Here you define all your WAN partners, e.g. your ➤➤ **Internet** Service Provider (➤➤ **ISP**). All the WAN partners entered are displayed in a list that includes the name of partner, protocol used and current status of each.

Menu	Function
IP	Here you enter the settings for the ➤➤ **IP** protocol. This menu consists of several submenus: ***IP*** ➧ ***ROUTING*** includes **X4000**'s IP routing table. Here you enter routes to your partners (e.g. default routes, network routes), which ensure that your **X4000** sends all the ➤➤ **data packets** to the correct addresses. ***IP*** ➧ ***STATIC SETTINGS*** is for entering important settings, e.g. the domain name of **X4000**, the IP addresses of additional ➤➤ **servers** (e.g. Domain Name Server) and system time specifications. ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** is for configuring the interfaces to the partners for which you want to use the Network Address Translation function (➤➤ **NAT**). ***IP*** ➧ ***ACCESS LISTS*** is for defining ➤➤ **filters** to allow or deny access from or to the different hosts in the connected networks. You can thus prevent your **X4000** from establishing unintended connections to the ISDN. ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** is for defining filters for the Bandwidth on Demand and AO/DI (Always On/Dynamic ISDN) functions. ***IP*** ➧ ***IP ADDRESS POOL WAN (PPP)*** is for setting up a pool of IP addresses that your **X4000** as a dynamic IP address server can assign to WAN partners, who can then dial in. ***IP*** ➧ ***IP ADDRESS POOL LAN (DHCP)*** is for configuring **X4000** as a ➤➤ **DHCP** server. As a DHCP server, **X4000** assigns the IP addresses to the hosts in the LAN dynamically. ***IP*** ➧***SNMP*** is for changing the basic ➤➤ **SNMP** settings. ***IP*** ➧ ***RADIUS SERVER*** is for configuring RADIUS servers. ***IP*** ➧ ***DNS*** is for defining the procedure for name resolution in **X4000**. ***IP*** ➧ ***LOCAL SERVICES ACCESS CONTROL*** is for controlling access to the local UDP and TCP services in **X4000**.
IPX	Here you make the entries for the IPX protocol. ➤➤ **IPX** is used especially in Novell networks.

Menu	Function
PPP	Includes generally valid ➤➤ **PPP** settings, e.g. authentication protocol, that do not just refer to particular WAN partners. With these settings, the router can perform an authentication procedure for incoming calls, even if the calling line number cannot be identified (e.g. because the call is made from an analog line that does not transfer the calling line number).
ISDN	Here you administrate **X4000**'s Credits Based Accounting System.
CAPI	Includes the settings for BinTec's ➤➤ **CAPI** user concept. You can use this to assign user names and passwords to users of the **X4000**'s CAPI applications. This makes sure that only authorized users can receive incoming calls and make outgoing calls via CAPI.
CONFIGURATION MANAGEMENT	Here you can administrate **X4000**'s configuration files. You can save them either locally on **X4000** or on your PC, for example.
MONITORING AND DEBUGGING	Includes submenus that enable you to locate problems in your network and monitor activities, e.g. at **X4000**'s WAN interface.
EXIT	Quit the Setup Tool with **Exit**. You can save the configuration file to the flash memory with **Exit** ➧ **Save as boot configuration and exit**; this file is loaded after **X4000** is restarted. If you select **Exit** ➧ **Exit without saving**, all the settings made since **X4000** was last started are lost.

Table 4-5: Setup Tool menus

4.4 Procedure for Initial Configuration

We recommend the following procedure for initial configuration of **X4000**:

- Carry out the first configuration steps using the MMI (see chapter 5, page 93). **X4000** should not yet be connected to the LAN for this work, only the power cord must be connected:
  - set the desired display language
  - enter the IP address and netmask
- Connect **X4000** as explained in chapter 3.3, page 59.
- Create a basic configuration, using either the
  - Configuration Wizard (see chapter 6, page 109) or
  - Setup Tool (see chapter 7, page 119).
- You can then carry out the following:
  - Configure further functions with the Setup Tool (see chapter 8, page 187.
  - Configure security functions with the Setup Tool (see chapter 10, page 307).
  - Configure your expansion card with the Setup Tool (see chapter 9, page 277).

5 Man-Machine Interface (MMI) – Display with User Guide

BinTec's Man-Machine Interface (MMI) with display and input keys simplifies "getting to know" your **X4000** and provides easy access to status information.

Figure 5-1: MMI with display and input keys (logo)

This chapter contains the following information:

- An overview of the MMI facilities (chapter 5.1, page 94)
- A description of how to use the display and input keys (chapter 5.2, page 96)
- A diagram of the MMI menu architecture, which is helpful for the initial steps (chapter 5.3, page 99)
- Useful short-cuts (chapter 5.4, page 107)

When you have made the initial settings with the MMI, continue the configuration of **X4000** using the Configuration Wizard (see chapter 6, page 109) or the Setup Tool (see chapter 7, page 119).

5.1 Overview

Getting started

You can use the MMI to enter **X4000**'s IP address and netmask without first having to set up a serial connection to **X4000**. This simplifies the initial configuration, as you can first assign an IP address to **X4000** and then set up the equipment and connect it in the planned location. The configuration is then carried out from your PC via your network (e.g. using the Setup Tool).

Status information

The display of status information in the MMI enables you to monitor **X4000** activities without having to log in. This provides an additional diagnostic tool, which can display information such as the current version of the system software or the activities of the **X4000** interfaces.

User guide

Illuminated input keys and navigation bars simplify operation of the MMI and guide you through the menu architecture so that you can make settings in each menu without having to search for each menu individually. You can still open a certain menu if you wish.

Logo

After switching on, **X4000** first performs a few selftests and then shows the **X4000** logo on the display (see Figure 5-1, page 93). Press any input key to use the MMI. If no more inputs are made for a long period of time, the MMI returns to the logo. You can set this period of time in the "Display Idle Timer" menu.

X4000's logo is normally shown on switching on **X4000** or on expiry of the display idle timer.

To use another MMI menu instead of this, show the desired menu on the display and then press **C** and **OK** simultaneously. The corresponding menu then appears instead of the logo when the idle timer expires.

This enables you, for example, to display a certain default interface of **X4000** for monitoring purposes.

Access protection

The MMI is operated in Configuration Mode as the default mode and all MMI functions can be used. In Monitoring Mode, each menu can be displayed, but entries are only possible to a limited extent. For example, the IP address entered can be displayed in Monitoring Mode, but not changed.

You can change from Monitoring Mode to Configuration Mode and vice versa in the main menu "Display Settings", see chapter 5.3.1, page 100.

5.2 Display and Input Keys

How to use the display and input keys of the MMI is described below.

5.2.1 Using the Input Keys

To explain the use of the input keys, Figure 5-2, page 96 shows an extract of the menu system:

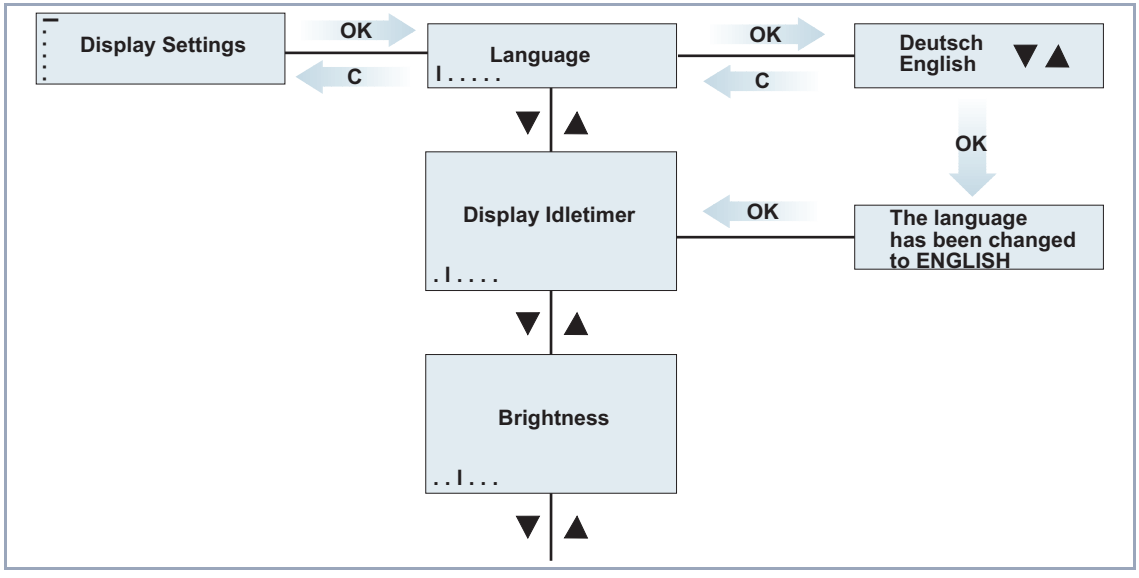


Figure 5-2: Using the input keys (extract from menu system)

Navigating with ▼ and ▲

The arrow keys enable you to move up and down in the menu system. You always move on one level only, e.g. changing from one main menu to another.

Selecting a menu with OK

To select a menu item, press **OK**. You then change to the next lower level, in which you can also navigate by means of ▼ and ▲.

In the menu

You can execute the following actions in a menu:

- Select a value (e.g. display brightness) with ▼ and ▲ and then confirm with **OK**.

- Enter numbers (e.g. IP address or PIN) with ▼ and ▲ and then confirm with **OK**.
- Display a value (e.g. serial number of **X4000**) and then leave the menu with **OK**.

Leaving the menu with C

To leave a menu and change to the next higher menu level without changing a setting, just press **C**.

5.2.2 Meaning of LEDs

User guide

The four input keys of the MMI are equipped with LEDs (see Table 5-1, page 97) to provide simple, convenient operation. Keys are only illuminated if they can be used. Pressing keys that are not illuminated has no effect.

Key	On	Flashes	Off
C	Press this key to leave the menu level	–	No meaningful entry possible
▲	Press this key to move backwards in the menu level	–	No meaningful entry possible
▼	Press this key to move forwards in the menu level	–	No meaningful entry possible
OK	Confirmation of entry or selection is possible	–	No meaningful entry possible

Table 5-1: Illumination of input keys

5.2.3 Navigation Bars

Navigation bars for guidance

The display shows two navigation bars, which indicate your present level in the menu system.

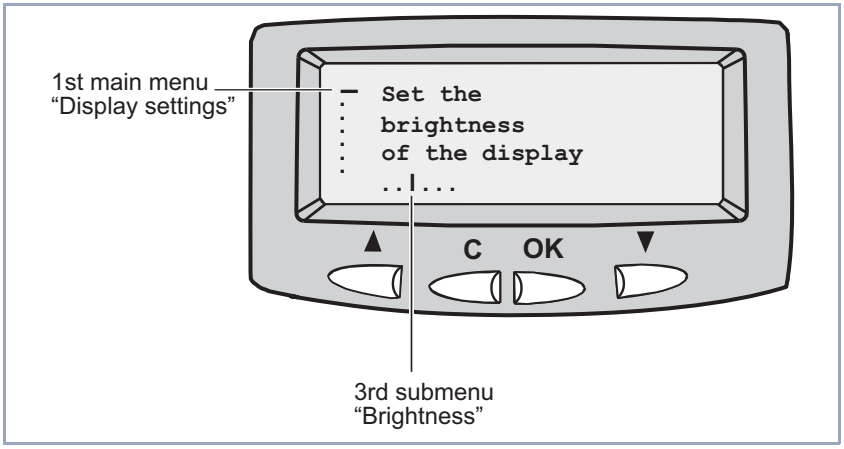


Figure 5-3: Navigation bars (example)

The vertical navigation bar at the left edge of the display is for the main menus. The horizontal navigation bar at the bottom edge indicates in which menu of the second level of the corresponding main menu you are located.

The following figures of the menu architecture also show the associated navigation bars.

5.3 Menu Architecture

The MMI offers the following menus at the top level (main menus):

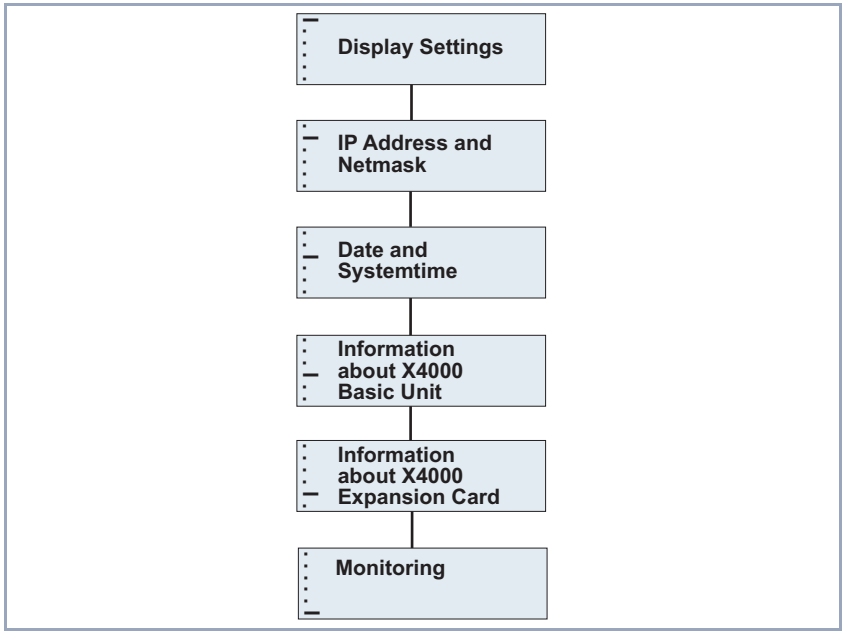


Figure 5-4: Main menus (with navigation bars)

- **Display Settings** (see chapter 5.3.1, page 100)
- **IP Address and Netmask** (see chapter 5.3.2, page 102)
- **Date and System Time** (see chapter 5.3.3, page 103)
- **Information about X4000 Basic Unit** (see chapter 5.3.4, page 104)
- **Information about X4000 Expansion Card** (see chapter 5.3.5, page 105)
- **Monitoring** (see chapter 5.3.6, page 106)

The following figures show the architecture of the individual menus. Running through these is a good opportunity to carry out your first steps with the MMI.

5.3.1 Display Settings

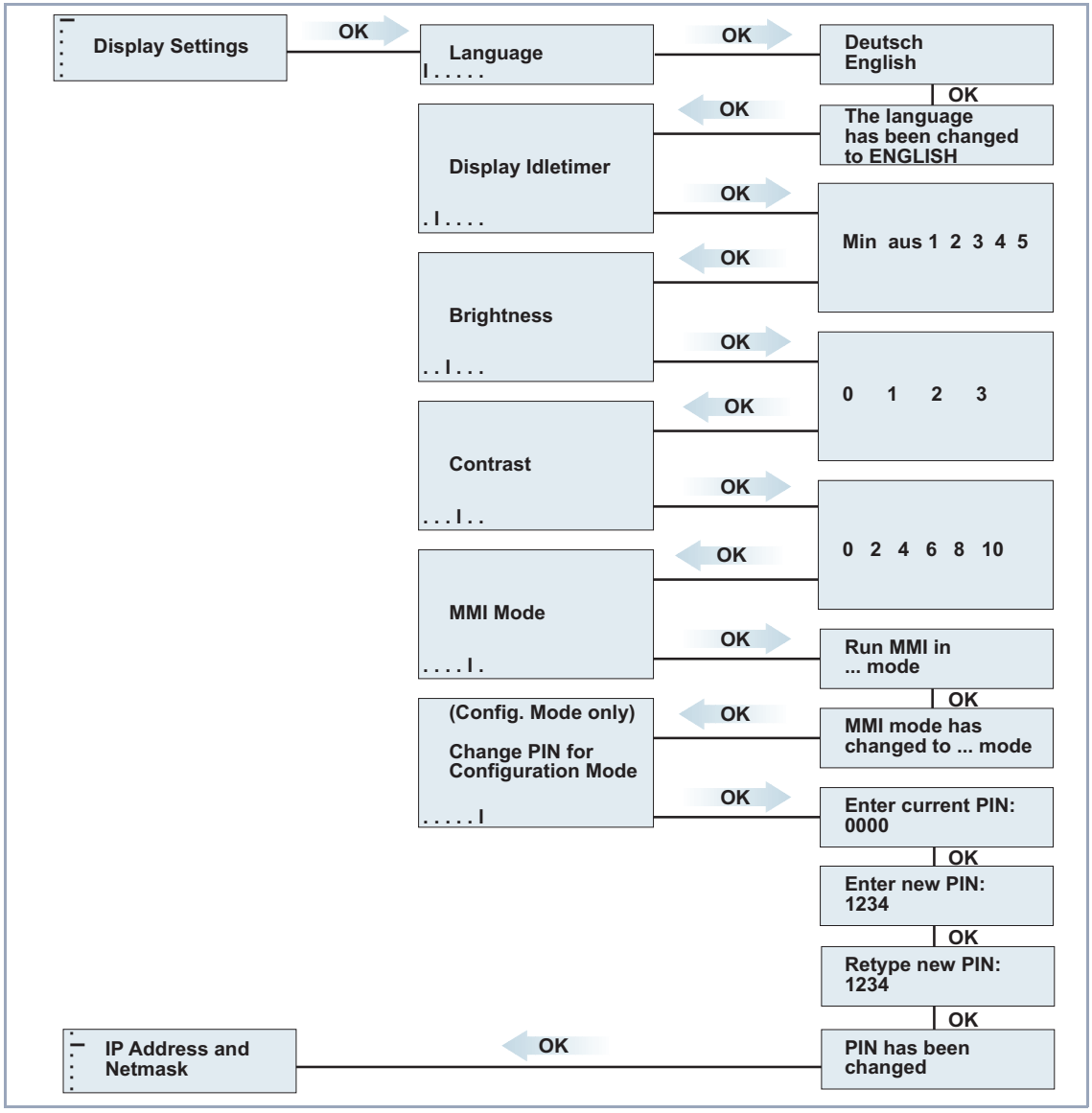


Figure 5-5: Menus for selecting the display settings (with navigation bars)

The main menu "Display Settings" offers the following options for modifying the display characteristics:

- **Language**
  For setting the display language. English is initially preset as default.
- **Display Idle Timer**
  For enabling and disabling the display idle timer (1 ... 5 minutes). On expiry of this time, the logo appears in the display if no input key has been used for the set period of time.
- **Brightness**
  For setting the display brightness.
- **Contrast**
  For setting the display contrast.
- **MMI Mode**
  For changing from Configuration Mode to Monitoring Mode and vice versa. To change to Configuration Mode, you need the set PIN.
- **Changing the PIN for Configuration Mode**
  Here you can change the PIN (Personal Identification Number) for Configuration Mode.
  Configuration Mode is protected by a four-digit PIN. The default setting of the PIN is **0000** in the ex works state. When you use the MMI for the first time, you should change the PIN to prevent entries by unauthorized users. For technical reasons, the PIN is shown on the display in plain language. Make sure the display is not visible to other persons when you enter the PIN.
  Users who do not know the set PIN cannot change from Monitoring Mode to Configuration Mode.

5.3.2 IP Address and Netmask

The main menu "IP Address and Netmask" offers the following options:

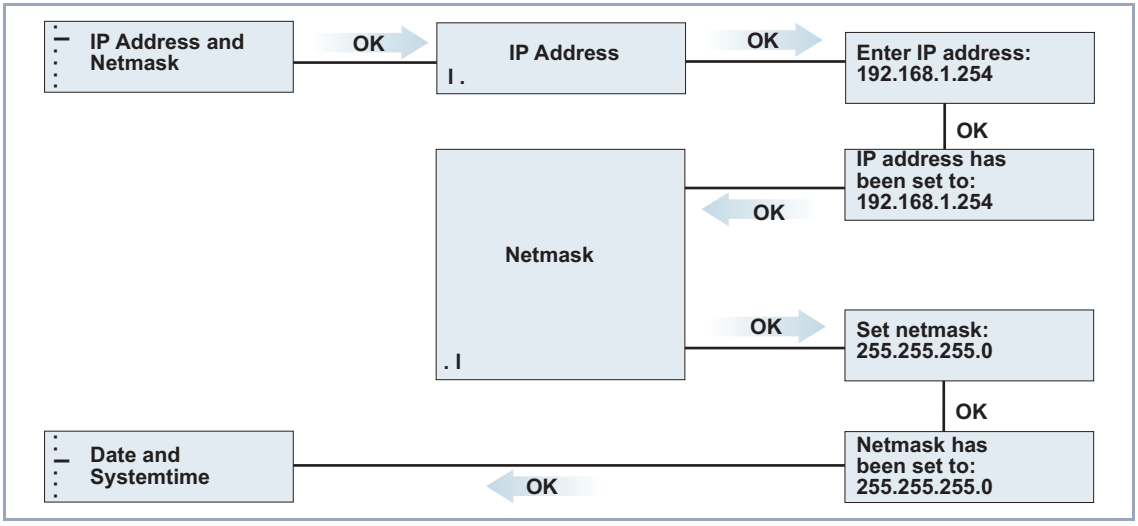


Figure 5-6: Menus for entering the IP address and netmask (with navigation bars)

- **IP Address**
  Enter the IP address of **X4000**. This is done by selecting each digit with ▼ and ▲ and confirming each by pressing **OK**. The IP address is saved after confirming the last digit.

- **Netmask**
  Enter the netmask of the network in which **X4000** is located. This is done by pressing ▼ and ▲ as often as necessary until the correct netmask appears. Save the netmask by confirming with **OK**.

5.3.3 Date and System Time

The main menu "Date and System Time" offers the following options:

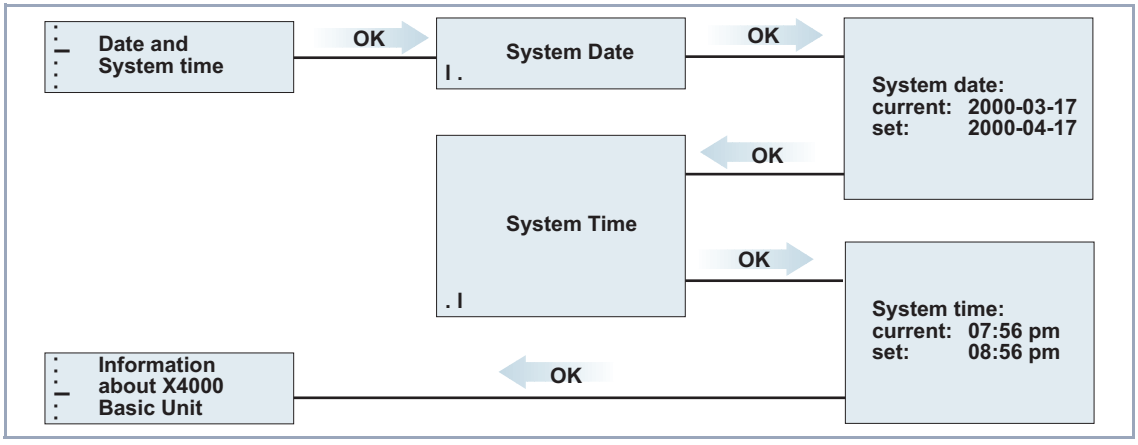


Figure 5-7: Menus for entering date and system time (with navigation bars)

- **System Date**
  For setting the current date in **X4000**. This is done by selecting the day, month and year in succession with ▼ and ▲ and confirming each by pressing **OK**.

- **System Time**
  For setting the current time in **X4000**. This is done by selecting the hours and minutes in succession with ▼ and ▲ and confirming each by pressing **OK**.

5.3.4 Information about X4000 Basic Unit

The main menu "Information about X4000 Basic Unit" offers the following options for displaying system information:

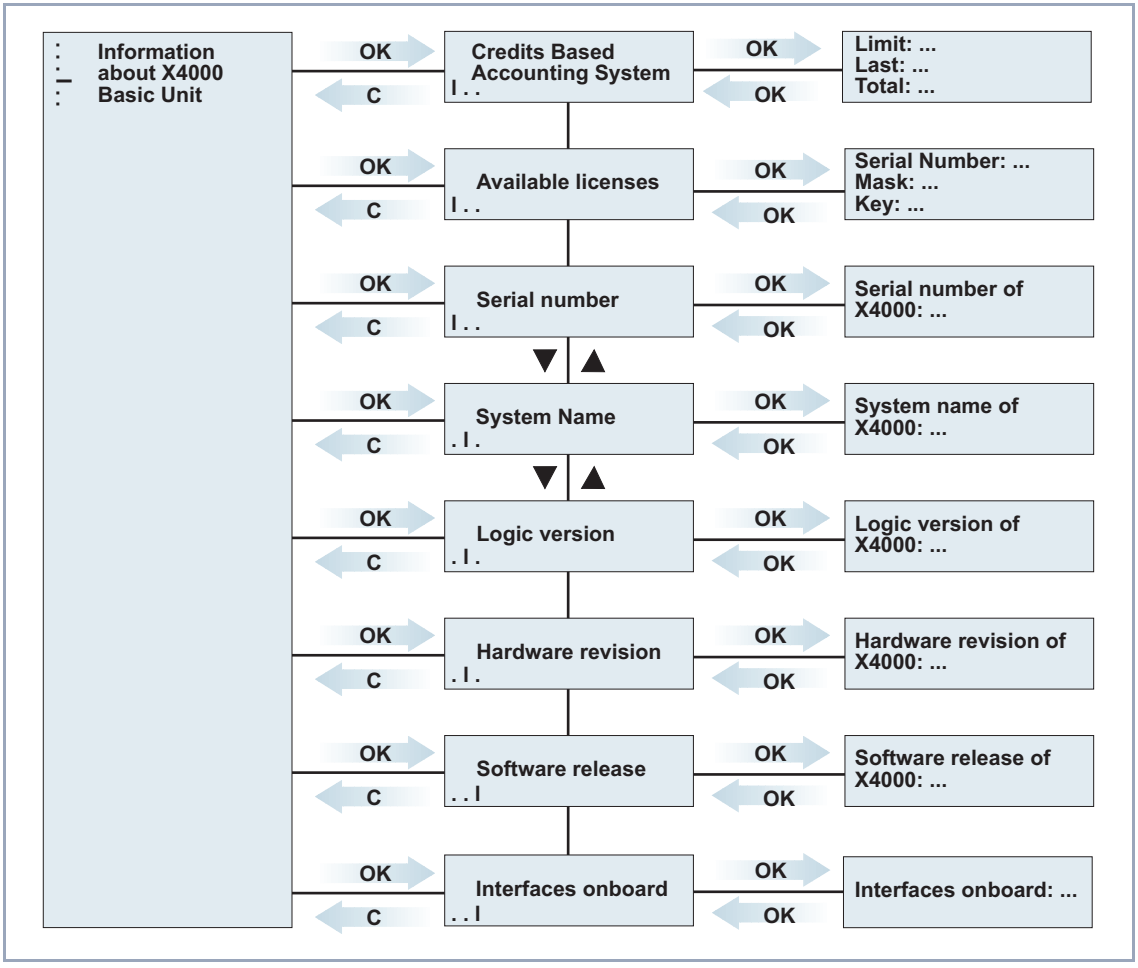


Figure 5-8: Menus for monitoring the basic unit (with navigation bars)

- **Credits Based Accounting System**
  Displays the settings for the Credits Based Accounting System (see chapter 10.1.3, page 316).
  Limit: selected limit for charges.
  Last: cost of last connection.
  Total: total costs charged to date.
- **Available Licenses**
  Displays the licenses entered in **X4000** (see chapter 7.1.1, page 121).
- **Serial Number**
  Displays the serial number of **X4000**.
- **System Name**
  Displays the system name of **X4000** (see chapter 7.1.2, page 123).
- **Logic Version**
  Displays the version of **X4000**'s firmware logic.
- **Hardware Revision**
  Displays the hardware version of **X4000**.
- **Software Release**
  Displays the system software version used by **X4000**.
- **Onboard Interfaces**
  Displays the status of the **X4000** hardware interfaces available with the basic unit.

5.3.5 Information about X4000 Expansion Card

Data for the interfaces on the optional expansion card can only be displayed if the relevant card is installed. Please observe subsequent software releases and the corresponding release notes.

5.3.6 Monitoring

The main menu "Monitoring" offers a facility for monitoring the operating temperature of **X4000**:

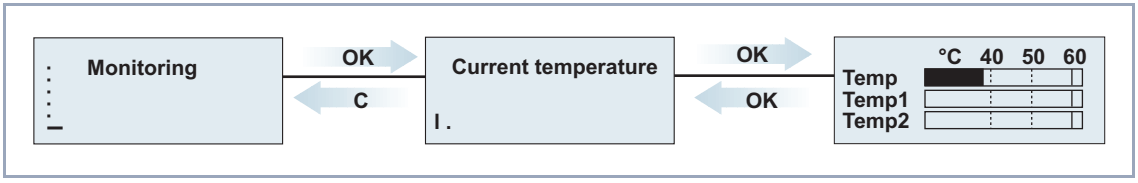


Figure 5-9: Menus for monitoring **X4000**

- **Current Temperature**
  Displays the current operating temperature of **X4000** in °C.
  The current operating temperature is always indicated by a black bar. **Temp** shows the temperature measured by a sensor in the basic unit, **Temp1** and **Temp2** show the temperature measured on the expansion card. A PRI expansion card is equipped with two temperature sensors and a BRI or LAN expansion card with one sensor (**Temp1**).
  The current maximum permissible temperature is 60 °C and is indicated by a continuous line on the display. The maximum permissible temperature can be changed by editing the MIB variable **sysX4ConfigTempAlarmTrap** for the basic unit (Temp) and the MIB variables **sysX4ConfigTempAlarmTrapMod1** / **sysX4ConfigTempAlarmTrapMod2** for the expansion cards (Temp1 and Temp2). If this temperature is exceeded, **X4000** generates traps, which can be evaluated over the network.

5.4 Useful Short-Cuts

You can carry out a number of actions using the input keys:

5.4.1 Defining Default Screen

The logo is displayed as standard on the screen when the idle timer expires. If you want to use another screen as default screen for the MMI, proceed as follows:

- Use the input keys to indicate the desired screen.
- Keep the **C** key pressed for three seconds.

  New default screen has been selected

- Confirm with **OK**.

  The selected screen is shown and used as default screen.

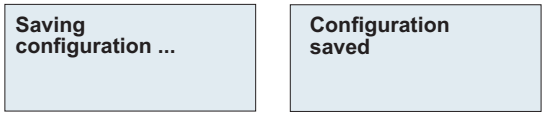
5.4.2 Saving the Configuration

Proceed as follows to save the current configuration of **X4000** using the input keys.

- Keep the **OK** key pressed for three seconds.

  Do you want to save the current configuration?

➤ Press **OK**.

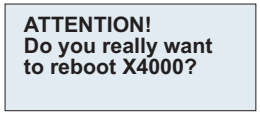


➤ Press **OK**.

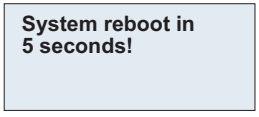
5.4.3 Restarting X4000

Proceed as follows to restart **X4000** using the input keys:

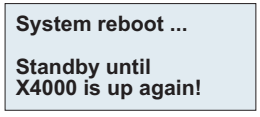
➤ Keep the **OK** key and **C** key pressed for three seconds.



➤ Press **OK**.



The restart is executed after 5 seconds.



6 Fast Configuration with the Configuration Wizard (Basic Unit)

With the Configuration Wizard on your BinTec Companion CD, BinTec Communications AG offers you a quick and convenient way to start running your **X4000**. You can perform basic configuration via the serial connection of your Windows PC. This basic configuration includes all the important settings of the router, access to the Internet via an Internet Service Provider (ISP), as well as connection to a WAN partner (e.g. to a corporate headquarters). As the Configuration Wizard guides you step by step through the configuration, detailed knowledge of networking technologies is not necessary. Graphic illustrations and a detailed online help system you can access at any time during the configuration give you additional support.

The Configuration Wizard is one of several possible ways of configuring your **X4000**. Access to your **X4000** in this case is via the serial interface. Please note that you can only use the Configuration Wizard to configure your ISDN BRI interface on the basic unit. For configuration of WAN connections over the X.21/ V.35/V.36 or X.21bis interface, you must use the Setup Tool. Advanced configuration (chapter 8, page 187) and setting up the security functions (chapter 10, page 307) are done after this using the Setup Tool.

This chapter tells you how to carry out the following tasks:

- In advance of configuration (chapter 6.1, page 110)
- Install Windows software:
  - Install BRICKware for Windows (chapter 6.2, page 112)
  - Configure **X4000** with the Configuration Wizard (chapter 6.3, page 113)
- Make possible additional settings on your PC (chapter 6.4, page 115)
  - Configure the Remote CAPI interface ("Remote CAPI configuration", page 115)
  - Install RVS-COM Lite ("RVS-COM Lite installation", page 115)
  - Set up PC for WAN access ("Internet access with X4000", page 115)

You can test your configuration at the end of the chapter.

6.1 In Advance of Configuration

Router settings

Before you start to configure your **X4000**, make sure you know the following information about your ISDN connection and your network environment. Write down your values in the table below so that you can quickly find the necessary information while you are performing the configuration. Examples are shown.

- ISDN extensions: The extension numbers of your ISDN connection.
- IP address and netmask of **X4000**: If you are installing a new network, simply use the example values given.

Access data	Example	Your value
ISDN extensions	***10***, ***11***, ***12***	
IP address of **X4000**	***192.168.1.254***	
Netmask of **X4000**	***255.255.255.0***	

Internet access

For access to the Internet via your Internet Service Provider (ISP), you will need access information that should be provided by your ISP.

Access data	Example	Your value
Provider name	***GoInternet***	
Dial-in number	***1234567***	
User account	***MyName***	
Password	***TopSecret***	

Corporate network connection (LAN-LAN)

For connection to a corporate network or another WAN partner, you must know the following information about the opposite terminal.

Access data	Example	Your value
Partner's name	***BigBoss***	
Dial-in number	***0911987654321***	
Local name	***LittleIndian***	

Access data	Example	Your value
Password	***Secret***	
Partner's network address(es)	***10.1.1.0***	
Partner's netmask(s)	***255.255.255.0***	

Agree on the data with your WAN partner: You must both use the same password; your entry for "local name" and your partner's entry for "partner's name" must be identical; your entry for "partner's name" and your partner's entry for "local name" must also be identical.

TCP/IP protocol testing and installation

➤ Make sure the TCP/IP protocol is installed on the PC before you start the configuration.

6.2 Installing BRICKware

BRICKware for Windows contains the Configuration Wizard and other Windows utility programs.

- Place your BinTec Companion CD in the CD-ROM drive of your PC. The Start window appears automatically after a short time. If the Start window does not open automatically, click your CD-ROM drive in Windows Explorer and double-click **setup.exe**.
- Click **BRICKware**. The setup program starts.
- Specify the directory in which BRICKware should be installed.

The DIME Tools, which are part of BRICKware for Windows, contain mainly assistants for configuration, administration and diagnosis of your **X4000**. For the basic operation of **X4000**, it is not necessary to have DIME Tools started automatically by Windows.

- Start the Configuration Wizard at the end of the installation.

You will find a detailed description of the BRICKware installation and a description of the individual components in BRICKware for Windows on BinTec's WWW server under "Solutions & Products" and then "Download".

6.3 Basic X4000 Configuration with the Configuration Wizard

Configuration of the basic settings of **X4000** is quick and easy with the Configuration Wizard. Please note: If you have already created a configuration with the Configuration Wizard, the Wizard may assume the preset values. At the end, the configuration is transferred to the router and saved on the PC.

You can carry out the configuration in either Quick Mode or Expert Mode. If you are unfamiliar with networking technologies, choose Quick Mode.

If you have installed BRICKware and activate the Configuration Wizard, the following start window appears (if not, see chapter 6.2, page 112):

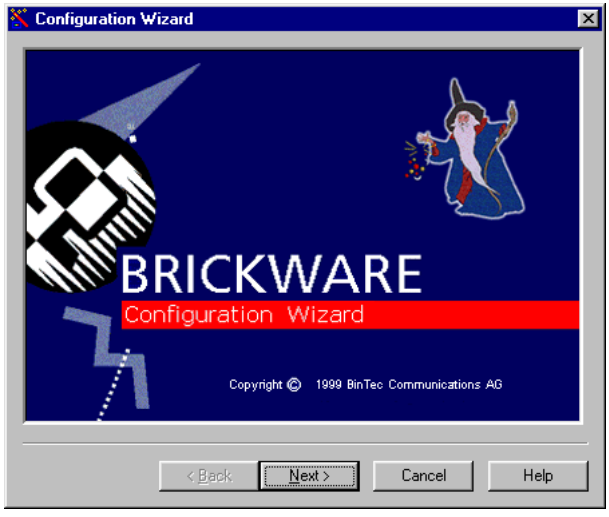


Figure 6-1: Configuration Wizard start window

You can select from the following configuration items:

- Basic router configuration
- Internet access
- Corporate network connection (LAN-LAN connection).

The basic router settings are essential. They integrate **X4000** in your local network and enable the use of communications applications (CAPI).

➤ Select the desired items and follow the instructions on the screen.

Caution!

All BinTec routers are shipped with the same user names and passwords. As long as the password remains unchanged, they are not protected against unauthorized use.

➤ You must therefore change your system password when requested to do so.

➤ Click **Finish**. You have now completed the basic configuration with the Configuration Wizard.

If you have configured **X4000** as a DHCP server with the Configuration Wizard, the PCs must be assigned an IP address at the end of the configuration. This happens automatically under Windows NT. Under Windows 95 or 98, the Configuration Wizard starts the program WINIPCFG:

➤ Click **Yes** to start WINIPCFG. Click **Renew** and then **OK**.

6.4 Configuring a PC

If you have selected communications applications (CAPI) during the configuration, you will be asked to carry out CAPI configuration now. Among other things, CAPI allows you to send and receive fax messages and to use an answering machine.

Remote CAPI configuration

➤ Click **Yes** to start configuration. In the **Remote CAPI** tab, enter the IP address of your **X4000** and the user name and password of users of communications applications set up previously with the Configuration Wizard, if these have not already been entered. Click **Use these values**. Click **OK**.

RVS-COM Lite

To be able to use fax services on your PC, you must install a CAPI application such as RVS-Com Lite. RVS-Com Lite is included on your BinTec Companion CD.

Please note: The license for RVS-COM Lite is a single user license. You can purchase additional licenses from your dealer.

COM port driver

If you want to use your data communications network with BinTec's Remote CAPI, RVS-Com Lite will provide you with the necessary COM port driver.

RVS-COM Lite installation

➤ To install RVS-COM Lite, click **RVS-Com Lite** in the setup program and follow the instructions. An online help system is also available.

Internet access with X4000

You can set up WAN access over **X4000**, e.g. to the Internet, for all PCs located in a network with **X4000**. In order to do this, you must enter **X4000** as gateway and as DNS for all those PCs that were not configured as DHCP clients. Proceed as follows:

➤ In the start menu click **Settings** ➧ **Control Panel**. Double click **Network**.

➤ Select **TCP/IP** in the network components list (for Windows NT it is in the **Protocol** tab) and click **Properties**.

➤ Enter the IP address of **X4000** in the **Gateway** tab under **New Gateway**. Click **Add**. (Windows NT: Click the **IP Address** tab and enter the IP address of **X4000** under **Standard Gateway**).

➤ Click the **DNS Configuration** tab and enter the IP address of **X4000** under **DNS Server Search Order**. Click **Add** and then **OK**. Follow the instructions on the screen.

6.5 Testing your Configuration

Once you have removed the serial cable of **X4000**, your configuration is complete. Now let's make sure everything works.

Caution!

Incorrect configuration of the devices in your LAN may result in unintended connections and increased charges! Monitor your **X4000** and make sure that the system does not establish unwanted ISDN connections (and charges).

- To avoid unnecessary charges, check whether the filters set in the Configuration Wizard are sufficient for your needs. If not, you can configure filters with the Setup Tool (chapter 10.2.8, page 335).
- Watch the LEDs on your **X4000** (cf. chapter 3.4, page 63), use the monitor function of the Setup Tool (cf. chapter 10.1, page 308), call up your settings in the display (cf. chapter 5, page 93) or check your settings with an SNMP Management Tool.

LAN connection testing

- Test the connection to your **X4000**. In the start menu of your PC, click **Run** and enter `ping`, followed by a space and the IP address of **X4000**, e.g. `ping 192.168.1.254`. A window appears with the response **"Reply from...**".

Testing Internet access

- Now test your Internet access by entering www.bintec.de in the browser. BinTec's WWW site offers you the latest news, updates, and documentation.

7 Basic Configuration of Basic Unit with Setup Tool

This chapter tells you how to carry out the basic configuration steps for taking your **X4000** basic unit into operation using the Setup Tool.

This chapter is broken down as follows:

- Basic router settings (chapter 7.1, page 120)
  This chapter describes the steps you must always carry out for taking **X4000** into operation, irrespective of the environment or applications for which you use **X4000**.
  You can also carry out the steps described here using the Configuration Wizard (see chapter 6, page 109).
- Where do we go from here? (chapter 7.1.6, page 136)
  This chapter tells you what to do next after you have completed the basic router settings.
- Configuring the WAN interfaces (chapter 7.2, page 137)
  Description of how to configure the WAN interfaces integrated in the **X4000** basic unit.
  - ISDN-BRI Interface (chapter 7.2.1, page 137), including the distribution of incoming calls to subsystems and users ("Incoming call answering", page 141)
  - Serial interfaces (X.21, V.35, V.36, X.21bis) (chapter 7.2.2, page 148)
  - LAN interface for using ADSL (chapter 7.2.3, page 155)
- Configuring WAN Partners
  - Basic procedure (chapter 7.3, page 159)
  - Example configurations (chapter 7.3.2, page 182)
- Saving the configuration (chapter 7.4, page 186)

7.1 Basic Router Settings

The configuration of the basic router settings concerns only your **X4000** and your local network.

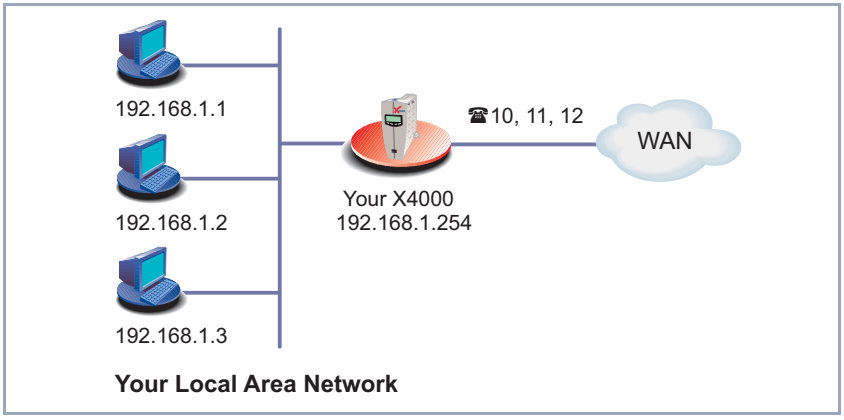


Figure 7-1: Basic router settings – **X4000** in the LAN

The following steps are necessary:

- Entering a license (chapter 7.1.1, page 121)
- Entering system data (e.g. passwords) (chapter 7.1.2, page 123)
- Configuring the LAN interface (chapter 7.1.3, page 126)
- Configuring **X4000** as a DHCP server (optional) (chapter 7.1.4, page 129)
- Setting NetBIOS filters (optional) (chapter 7.1.5, page 132)

The necessary preparatory measures can be found in chapter 6.1, page 110.

The work to be done on your network and PCs can be found in chapter 6.4, page 115.

Off we go:

7.1.1 Entering License(s)

License card

After you have logged in to your **X4000** with the user name `admin` and called up the Setup Tool with `setup`, as described in chapter 4.2, page 76, enter the license information. This information is printed on the license card supplied. Entering this information activates the functions of **X4000**.

➤ Go to ***LICENSES:***

```
X4000 Setup Tool                                BinTec Communications AG
[LICENSE]: Licenses                                             MyRouter

Available Licenses:

IP (builtin), STAC (valid), CAPI (valid), BRIDGE (valid)
IPX (valid)

Serialnumber         Mask         Key          State
101546               55           88PNUPZ      ok

ADD                        DELETE                        EXIT

Press<Ctrl-n>,<Ctrl-p>to scroll,<Space>tag/untagDELETE,<Return>to edit
```

Listed under **Available Licenses** are all subsystems available to **X4000**, as well as their current state (*builtin* - always available, *valid* - activated, *not_valid* - not activated).

The license entries are shown under (**Serialnumber**, **Mask**, **Key**).

If you have not yet entered your license data, the subsystem list will be almost empty. Only **IP**, i.e. ➤➤ **IP** routing, is available (*builtin*).

Subsystems The following subsystems can be activated on your **X4000**:

Subsystems	Meaning
IP	IP routing
OSPF	Open Shortest Path First (only with extra license)
TAF	Token Authentication Firewall (only with extra license)
TUNNEL	Virtual Private Networking VPN (only with extra license)
STAC	➤➤ **STAC** ➤➤ **data compression**
CAPI	➤➤ **Remote CAPI** interface makes communications applications possible on your PC, e.g. sending and receiving faxes.
BRIDGE	Bridging
X25	X.25 (only with extra license)
FRAME RELAY	Frame Relay (only with extra license)
IPX	➤➤ **IPX** routing

Table 7-1: Subsystems

To do To enter your license, proceed as follows:

- ➤ Add a new entry with **ADD**.

  Another menu window opens.

- ➤ Enter **Serial Number**, **Mask** and **Key** as shown on your license card.

- ➤ Press **SAVE.**

  You have returned to the ***LICENSES*** menu. The subsystems activated by your license data are now listed. The license entered is displayed with the state *ok*.

If *not ok* is shown as the state, you have probably made a typing error.

➤ Try again.

7.1.2 Entering System Data

System name, ... Now you should enter the basic system data for your **X4000**.

➤ Go to ***SYSTEM:***

```
X4000 Setup Tool                                BinTec Communications AG
[SYSTEM]: Change System Parameters                                MyRouter

System Name                                     MyRouter
Local PPP ID (default)                          BigBoss
Location                                        3rd floor
Contact                                         admin@BigBoss.com

Syslog Output on Serial Console                 no
Message Level for the Syslog Table              info
Maximum Number of Syslog Entries                20

External Activity Monitor>
External System Logging>
Keepalive Monitoring>
Password Settings>
Time and Date>

            SAVE                                CANCEL

Enter string, max. length = 34 chars
```

The following parts of the menu are relevant for this configuration step:

Field	Meaning
System Name	Defines the system name of **X4000**, is also used as PPP host name. Appears as input prompt when logging in to **X4000**. If no system name is set, a warning appears on logging in with the user name `admin`.
Local PPP ID	This entry is necessary for identification of **X4000**, if ➤➤ **PPP authentication** (e.g. ➤➤ **PAP** or ➤➤ **CHAP**) is carried out that is not specific to a partner (see chapter 8.1.3, page 194).
Location	Indicates where **X4000** is located (optional).
Contact	States the contact person responsible (optional). If the person is to be reached from **X4000**'s HTTP status page (see chapter 10.1.4, page 320), a valid e-mail address must be entered here.

Table 7-2: ***SYSTEM***

Passwords

Enter the passwords for **X4000** in the submenu ***SYSTEM*** ➧ ***PASSWORD SETTINGS***:

Field	Meaning
admin Login Password	Password for user name admin.
read Login Password	Password for user name read.
write Login Password	Password for user name write.
HTTP Server Password	Password for the HTTP status page of **X4000**.

Table 7-3: ***SYSTEM*** ➧ ***PASSWORD SETTINGS***

Caution!

All BinTec routers are shipped with the same user names and passwords. As long as the password remains unchanged, they are not protected against unauthorized use. How to change the passwords is described in "Changing the password", page 85.

➤ Change the passwords to prevent unauthorized access to **X4000**.

The permission rights of the possible user names and passwords can be found in chapter 4.2, page 76.

To do

Proceed as follows to enter the relevant system data and passwords:

➤ Enter **System Name** of **X4000**, e.g. ***MyRouter***.

➤ Enter the **Local PPP ID**. The entry can be the same as the **System Name**.

➤ Enter your **Location**, e.g. ***Europe***.

➤ Enter **Contact**, e.g. ***SysAdmin***.

➤ Go to ***System*** ➧ ***Password settings***.

➤ Enter **admin Login Password**.

➤ Enter **read Login Password**.

➤ Enter **write Login Password**.

➤ Enter **HTTP Server Password**.

➤ Press **SAVE**.

➤ Press **SAVE**.

You have returned to the main menu and the entries have been saved.

Advanced configuration

The menu ***System*** ➧ ***External Activity Monitor*** contains the settings necessary for monitoring **X4000** with the Windows Activity Monitor Tool (see chapter 10.1.6, page 322 and BRICKware for Windows).

The menu ***System*** ➧ ***External System Logging*** contains the settings for syslog messages (see chapter 10.1.1, page 308).

The menu ***System*** ➧ ***Keepalive monitoring*** contains the settings for the keepalive monitoring function (see chapter 8.2.11, page 236).

The menu ***SYSTEM*** ➧ ***TIME AND DATE*** contains the settings for manually entering the time and date in **X4000** (see chapter 8.3.1, page 242).

7.1.3 Configuring the LAN Interface

➤➤ **IP address,**
➤➤ **netmask,**
➤➤ **Encapsulation**

Now configure the LAN interface (10/100 Base-T Ethernet) of **X4000**. The LAN interface is the physical interface to the local network. In the following menu, enter the address where your router can be reached in the LAN. As long as your router does not have this entry, it cannot be recognized by other hosts in the network.

If your **X4000** is connected to a LAN that consists of two subnets, you should enter a **Second Local IP Number** and a **Second Local Netmask** for it for the second subnet. This is explained in the following example:

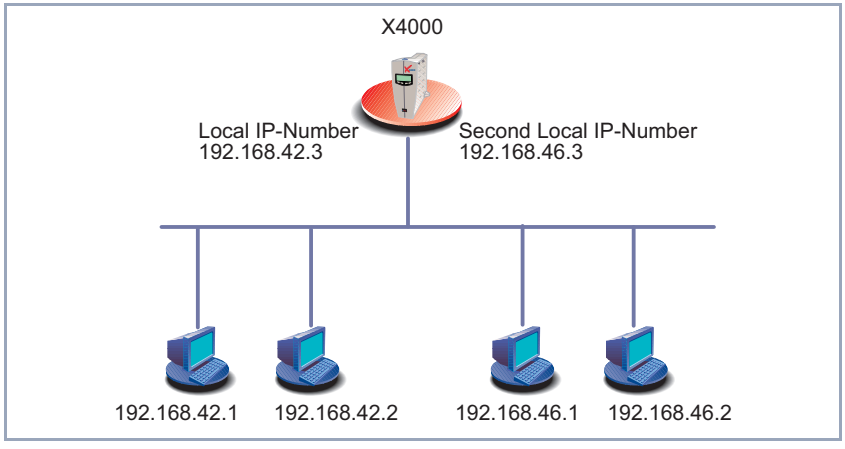


Figure 7-2: **X4000** with two different local IP addresses

The first subnet has two hosts with the IP addresses 192.168.42.1 and 192.168.42.2 and the second subnet has two hosts with the IP addresses 192.168.46.1 and 192.168.46.2. To be able to exchange data packets with the first subnet, **X4000** uses the IP address 192.168.42.3, for example, and 192.168.46.3 for the second subnet. The netmasks for both subnets must also be indicated.

You have probably entered the IP address and netmask in **X4000** with the MMI before the basic configuration. Even if you have, you should still check the entries in the following menu.

➤ Go to ***CM-100BT, FAST ETHERNET***.

```
X4000 Setup Tool                                BinTec Communications AG
[LAN]: Configure LAN Interface                                  MyRouter

IP Configuration
    Local IP Number          192.168.1.254
    Local Netmask            255.255.255.0
    Second Local IP Number
    Second Local Netmask
    Encapsulation            Ethernet II
    Mode                     Auto

IPX Configuration
    Local IPX Netnumber  0
    Encapsulation        none

Bridging                 disabled

Advanced Settings>

            SAVE                          CANCEL

Enter IP address (a.b.c.d or resolvable host name)
```

Entries are possible in this menu for IP configuration, ➤➤ **IPX configuration** and ➤➤ **bridging**. This chapter explains only the configuration of the ➤➤ **IP**. Retain the preset values under **IPX Configuration** and **Bridging**.

The following parts of the menu are relevant for this configuration step:

Field	Meaning
Local IP Number	IP address of **X4000** in the LAN.
Local Netmask	Netmask of the network in which **X4000** with **Local IP Number** is located.
Second Local IP Number	Second IP address of **X4000** in the LAN.
Second Local Netmask	Netmask of the network in which **X4000** with **Second Local IP Number** is located.
Encapsulation	Defines the kind of header added to the IP packets that run over this LAN interface. Possible values: ■ *Ethernet II* (conforms to IEEE 802.3) ■ *Ethernet SNAP* You can generally retain the default value *Ethernet II*. The LAN interface is called en1 for *Ethernet II* and en1-snap for *Ethernet SNAP*.
Mode	Defines the mode in which the LAN interface is operated. Possible values: ■ *Auto* (default value) Automatic detection of the LAN parameters is activated and the LAN interface is operated in the appropriate mode. ■ *10 Mbps Half Duplex* ■ *10 Mbps Full Duplex* ■ *100 Mbps Half Duplex* ■ *100 Mbps Full Duplex* You should normally leave the default value at *Auto*.

Table 7-4: ***CM-100BT, FAST ETHERNET***

To do

Proceed as follows to configure **X4000**'s LAN interface:

- Enter **Local IP Number** of **X4000**, e.g. ***192.168.1.254***.
- Enter **Local Netmask**, e.g. ***255.255.255.0***.
- If applicable, enter **Second Local IP Number** and **Second Local Netmask**.
- Select **Encapsulation**, e.g. ***Ethernet II***.
- Select **Mode**, e.g. ***Auto***.
- Press **SAVE**.

  You have returned to the main menu and the entries have been saved.

Advanced configuration

If you wish to use the IPX ➤➤ **protocol**, you will find an explanation of how to configure the LAN interface for IPX in chapter 8.4, page 268.

Information about bridging can be found in the Software Reference.

The menu ***CM-100BT, FAST ETHERNET*** ➧ ***ADVANCED SETTINGS*** contains settings for the Routing Information Protocol RIP (see chapter 8.2.8, page 229), IP Accounting, Proxy ARP (see chapter 8.2.10, page 234) and Back Route Verification (see chapter 10.2.10, page 352).

How to use the LAN interface for ADSL connections over the T-DSL connection of Deutsche Telekom is described in chapter 7.2.3, page 155.

7.1.4 Configuring X4000 as DHCP Server

IP addresses in the LAN

Each PC in your ➤➤ **LAN** and **X4000** requires its own IP address. If you configure **X4000** as a ➤➤ **DHCP** (Dynamic Host Configuration Protocol) server, **X4000** automatically assigns ➤➤ **IP addresses** from a defined IP address pool to requesting PCs in the LAN. A PC sends out an ARP request and in turn receives its IP address assigned by **X4000**. You do not need to assign fixed IP addresses to PCs, which reduces the amount of configuration work in your network. To do this, you set up a pool of IP addresses, from which **X4000** assigns IP addresses to hosts in the LAN for a defined period of time. A DHCP server also transfers the addresses of the Domain Name Server entered

statically or by PPP negotiation (➤➤ **DNS**), ➤➤ **NetBIOS** name server (WINS) and standard ➤➤ **gateway**.

➤ Go to ***IP*** ➧ ***IP ADDRESS POOL LAN (DHCP)*** ➧ **ADD:**

```
X4000 Setup Tool                                BinTec Communications AG
[IP][DHCP][ADD]: Add Range of IP Addresses                      MyRouter


    Interface                              en1
    IP Address                             192.168.1.1
    Number of Consecutive Addresses        8
    Lease Time (Minutes)                   120
    MAC Address

    Gateway
    NetBT Node Type                        not specified

                 SAVE                           CANCEL

Use <Space> to select
```

The menu contains the following fields:

Field	Meaning
Interface	An interface to which the next address pool is assigned. When an address request is received over **Interface**, one of the addresses in the address pool is assigned.
IP Address	First IP address in the address pool.
Number of Consecutive Addresses	Total number of IP addresses in the address pool, including the first IP address (**IP Address**).
Lease Time (Minutes)	Specifies the length of time an address from the pool can be assigned to a host. After the **Lease Time (Minutes)** expires, the address can be assigned elsewhere.
MAC Address	(optional) Only for **Number of Consecutive Addresses** = *1:* **IP Address** is only assigned to the device with **MAC Address**.
Gateway	Defines which IP address is assigned to the DHCP client as gateway. If no IP address is entered here, the IP address of **X4000** is also given.
NetBT Node Type	Defines how and in what order the assignment of NetBIOS names to IP addresses is attempted for the hosts of an address pool. You can accept the default value *not specified*. A detailed description of this function is given in the Software Reference.

Table 7-5: ***IP*** ➧ ***IP ADDRESS POOL LAN (DHCP)*** ➧ **ADD**

To do Make the following entries to configure **X4000** as a DHCP server:

- Select **Interface**, e.g. ***en1***.
- Enter **IP Address**, e.g. ***192.168.1.1***.

- Enter **Number of Consecutive Addresses**, e.g. ***8***.
- Enter **Lease Time (Minutes)**, e.g. ***120***.
- Enter **MAC Address**, if applicable.
- Enter **Gateway**, if applicable.
- Select **NetBT Node Type**, e.g. *not specified*.
- Press **SAVE**.

  You have returned to ***IP*** ➧ ***IP ADDRESS POOL LAN (DHCP)***, where the IP address pools are listed. The entries are saved and you have defined an address pool with 8 IP addresses: 192.168.1.1 to 192.168.1.8.

You can also create several entries to define an IP address pool of unconnected address ranges, e.g. 192.168.1.20 - 192.168.1.29 and 192.168.1.35 - 192.168.1.40, and so on.

7.1.5 Setting Filters

NetBIOS filters

If you are working with Windows in your local network, you should set ➤➤ **NetBIOS** filters to save costs. This prevents establishing connections from the network to your Internet Service Provider (➤➤ **ISP**), e.g. in order to forward WINS requests from PCs in your network. This means that **X4000** asks your ISP which ➤➤ **host name** can be assigned an IP address. These connections are unnecessary because the ISP cannot resolve WINS names, but still cost money.

A more detailed explanation of ➤➤ **filters** and security can be found in chapter 10.2.8, page 335.

To do

To prevent these unnecessary connections, proceed as follows:

When configuring filters, make sure not to lock yourself out.

- Use the serial interface or ISDN login on **X4000** for filter configuration.
- If you still access **X4000** over your LAN (e.g. telnet), before starting filter configuration select in the menu ***IP*** ➧ ***ACCESS LISTS*** ➧ ***INTERFACES*** ➧ ***EDIT*** : **First rule** = *none*.

➤ Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTER*** ➧ **ADD**:

```
X4000 Setup Tool                              BinTec Communications AG
[IP][ACCESS][FILTER][ADD]: Configure IP Access Filter          MyRouter

    Description              wrong_dns
    Index                    1

    Protocol                 udp

    Source Address
    Source Mask
    Source Port              specify
    Specify Port             137

    Destination Address
    Destination Mask
    Destination Port         specify
    Specify Port             53

    Type of Service (TOS)    00000000         TOS Mask     00000000

                     SAVE                     CANCEL

Enter string, max. length = 48 chars
```

To do Make the following entries to define a filter for WINS requests:

➤ Enter **Description**: ***wrong_dns***.

➤ Select **Protocol**: ***udp***.

➤ Select **Source Port**: ***specify***.

➤ Enter **Specify Port**: ***137***.

➤ Select **Destination Port**: ***specify***.

➤ Enter **Specify Port**: ***53***.

➤ Press **SAVE**.

You have returned to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTER***, and the entries have been saved.

Now define a second filter as follows:

➤ Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTER*** ➧ **ADD**.

➤ Enter **Description**: ***all***.

➤ Select **Protocol**: ***any***.

➤ Select **Source Port**: ***any***.

- Select **Destination Port**: ***any***.
- Press **SAVE**.

  You have returned to menu ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTER***. The entries have been saved and both filters are now listed.

To define rules for these filters, proceed as follows:

- Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES*** ➧ **ADD**:

```
X4000 Setup Tool                              BinTec Communications AG
[IP][ACCESS][RULE][ADD]: Configure IP Access Rules            MyRouter


    Action               deny M
    Filter               wrong_dns (1)


                 SAVE                      CANCEL

Use <Space> to select
```

To do Make the following entries to define a rule:

- Select **Action**: ***deny M***.
- Select **Filter**: ***wrong_dns (1)***.
- Press **SAVE**.

  You have returned to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES***, and the entries have been saved.

Now define a second rule as follows:

- Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES*** ➧ **ADD**.
- Select **Insert Behind Rule**: ***RI 1 FI 1 (wrong_dns)***.
- Select **Action**: ***allow M***.
- Select **Filter**: ***all (2)***.
- Press **SAVE**.

  You have returned to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES***, and the entries have been saved and listed.

```
X4000 Setup Tool                                BinTec Communications AG
[IP][ACCESS][RULE]: Configure IP Access Rules                   MyRouter

Abbreviations:   RI (Rule Index)  M  (Action if filter matches)
                 FI (Filter Index)!M (Action if filter does not match)
                 NRI (Next Rule Index)

RI  FI  NRI      Action  Filter       Conditions
1   1   2        deny  M wrong_dns    udp, sp 137, dp 53
2   2   0        allow M all

        ADD              DELETE           REORG            EXIT

Press<Ctrl-n>,<Ctrl-p>to scroll,<Space>tag/untag DELETE,<Return>to
edit
```

➤ Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***INTERFACES***:

```
X4000 Setup Tool                                BinTec Communications AG
[IP][ACCESS][INTERFACES]: Configure First Rule                  MyRouter

    Configure first rules for interfaces

    Interface    First Rule       First Filter
    en1          1                1  (wrong_dns)
    en1-snap     1                1  (wrong_dns)


    EXIT

Press <Ctrl-n>, <Ctrl-p> to scroll, <Return> to edit/select
```

To do Make the following entries:

➤ Select the LAN interface of **X4000** (***en1*** or ***en1-snap***) and confirm with **Return**.

➤ Select **First Rule**: ***RI 1 FI 1 (wrong_dns)***.

➤ Press **SAVE**.

These entries ensure that all data traffic that passes from source ➤➤ **port** 137 to destination port 53 will be discarded. This means that no unnecessary connections will be established to resolve WINS names.

➤ Leave ***IP*** ➧ ***ACCESS LISTS*** ➧ ***INTERFACES*** with **EXIT**.

➤ Leave ***IP*** ➧ ***ACCESS LISTS*** with **EXIT**.

➤ Leave ***IP*** with **EXIT**.

You have returned to the main menu.

The configuration of the basic router settings is complete.

7.1.6 Where do we go from here?

After you have configured **X4000** for your LAN, you can carry out the following steps to permit WAN connections.

➤ Configure the WAN interface(s) of **X4000** that you wish to use:
- ISDN BRI interface (chapter 7.2.1, page 137)
- X.21/V.35/V.36 interface or X.21bis interface (serial) (chapter 7.2.2, page 148)
- LAN interface for ADSL connections (chapter 7.2.3, page 155 and chapter 9.3.2, page 288)

➤ Configure the WAN partners (chapter 7.3, page 159).
Configuration examples:
- ISP T-Online ("Internet Access over T-Online", page 183)
- ISP Compuserve ("Internet Access over Compuserve", page 184)

➤ Configure the interfaces of your expansion card, if applicable (chapter 9, page 277)

➤ The facilities for more advanced configuration can be found in chapter 8, page 187.

➤ The configuration of security functions and Firewall can be found in chapter 10, page 307.

➤ If you wish to run communication applications on the hosts in the LAN with your **X4000** basic unit (e.g. RVS COM Lite), you must configure the remote CAPI on the hosts (see chapter 6.4, page 115) and assign the extension numbers accordingly ("Incoming call answering", page 141).

➤ When you have completed the configuration, you should save your configuration file (chapter 7.4, page 186).

7.2 Configuring WAN Interfaces

The necessary steps for configuring the WAN interfaces of **X4000** are described below step by step.

The basic unit is equipped with the following WAN interfaces:

- ISDN BRI interface (see chapter 7.2.1, page 137)
- Two serial interfaces: X.21/V.35/V.36 interface and X.21bis interface (see chapter 7.2.2, page 148)

ADSL

- You can also configure the LAN interface as an interface to the WAN by providing a connection to T-DSL, the ADSL connection of Deutsche Telekom, using PPP-over-Ethernet (see chapter 7.2.3, page 155).
  If you use a LAN expansion card, see chapter 9.3.2, page 288.

Installing an expansion card enables other WAN interfaces to be used on **X4000**, if applicable (see chapter 9, page 277).

7.2.1 Configuring the ISDN BRI Interface

You can use the ISDN BRI interface of **X4000** for both dialup and leased lines over ISDN.

Proceed as follows to configure the ISDN BRI interface:

- Entering the settings of your ISDN connection:
  Here you set the most important parameters of your ISDN connection.
- Configuring Incoming Call Answering:
  Here you tell **X4000** how to react to incoming calls from the WAN.

Autoconfiguration, ISDN Switch Type, …

Firstly, enter the settings for your ISDN connection.

➤ Go to ***CM-1BRI, ISDN S0***:

```
X4000 Setup Tool                                BinTec Communications AG
[WAN]: WAN Interface                                            MyRouter

    Result of Autoconfiguration: Euro ISDN, point-to-multipoint
    ISDN Switch Type             autodetect on bootup

    D-Channel                    dialup
    B-Channel 1                  dialup
    B-Channel 2                  dialup

    Incoming Call Answering>
    Advanced Settings>

                     SAVE                       CANCEL

Use <Space> to select
```

The menu contains the following fields:

Field	Meaning
Result of Autoconfiguration	Status of ISDN autoconfiguration. Automatic ➤➤ **D-channel** detection runs until a setting is found or until the ISDN protocol is entered manually under ISDN switch type.
ISDN Switch Type	Defines the ISDN ➤➤ **protocol** supplied by your ISDN provider. The following parameters are possible: ■ *autodetect on bootup:* automatic D-channel detection (default setting) ■ *Euro ISDN point-to-multipoint:* Euro ISDN for point-to-multipoint ■ *Euro ISDN point-to-point:* Euro ISDN for point-to-point ■ *none* ■ *leased line B1 channel (64S):* leased line over B-channel 1 ■ *leased line B1+B2 channel (64S2):* leased line over both B-channels ■ *leased line D+B1+B2 channel (TS02):* leased line over D-channel and both B-channels ■ *leased line B1+B2 different endpoints (digital 64S with dual connection):* leased line to two different endpoints

Field	Meaning
D-Channel	D-channel configuration. The selection can only be changed if **ISDN Switch Type** = *leased line D+B1+B2 (TS02)*. Possible values: ■ *leased dte* (default value) ■ *leased dce*
B-Channel 1	Configuration of first ➤➤ **B-channel**. Possible values: ■ *dialup* (default setting) ■ *not used* ■ *leased dte* ■ *leased dce*
B-Channel 2	Configuration of second B-channel. Possible values: ■ *dialup* (default setting) ■ *not used* ■ *leased dte* ■ *leased dce*

Table 7-6: ***CM-1BRI, ISDN S0***

To do Make the following entries:

➤ Select **ISDN Switch Type**: *autodetect on bootup*.

This setting enables **X4000** to use its automatic D-channel detection. As long as the D-channel detection is running, *running* appears next to **Result of Autoconfiguration**. Once the setting has been found, it is displayed, e.g. *Euro ISDN, point-to-multipoint*.

If the ISDN protocol is not detected, it can be entered manually under **ISDN Switch Type**. The automatic D-channel detection is then switched off.

An incorrectly set ISDN protocol prevents ISDN connections being set up!

- Select **D-Channel**, if applicable.
- Select **B-Channel 1**: e. g. *dialup*.
- Select **B-Channel 2**: e. g. *dialup*.

In most cases, you can accept the preset values for **D-Channel**, **B-Channel 1** and **B-Channel 2**.

If you use an ISDN leased line and have requested a special service from your service provider, it may be necessary to set the local side of the leased line at this point (DTE or DCE). You must then ensure that the far end has set the opposite value. You must also set **D-channel**, **B-channel 1** and **B-channel 2** to the same values, if you have selected several D-/B-channels under **ISDN Switch Type** and the values can be changed.

- Press **SAVE**.

  You have returned to the main menu. and the entries have been saved.

Incoming call answering

If you use the ISDN BRI interface for dialup connections, you must now tell **X4000** how it should respond to incoming calls from the ISDN. **X4000** distributes the incoming calls to the appropriate internal services according to the settings in the following menus.

X4000 supports the following services:

- PPP (Routing):
  The ➤➤ **PPP** service is **X4000**'s general routing service. This connects incoming data calls from WAN partners' dialup connections to your ➤➤ **LAN**. This enables partners outside your own local network to access hosts within your LAN. This subsystem also enables outgoing data calls to be set up to WAN partners outside your local network.

This PPP routing is also used for X.25 connections.

- ISDN Login:
  The ➤➤ **ISDN Login** service allows incoming data calls access to the ➤➤ **SNMP shell** of your **X4000**. This is how **X4000** is remotely configured and administrated.

- CAPI:
  The ➤➤ **CAPI** service allows connection of incoming and outgoing data and voice calls to communications applications on hosts in the LAN that access the ➤➤ **Remote-CAPI** interface of **X4000**. This enables, for example, hosts connected to **X4000** to receive and send faxes.
  To be able to use CAPI applications (e.g. RVS COM Lite) from the hosts in the LAN with the **X4000** basic unit, you must also carry out the Remote CAPI configuration on the individual hosts (see chapter 6.4, page 115) in addition to distributing the extension numbers as described in this chapter.

When a call is received, **X4000** first checks the Called Party Number (CPN) and the type of call (data or voice call). The CPN is the extension the partner has dialed to reach **X4000**. Then the call is forwarded to the corresponding service (see Figure 7-3, page 142).

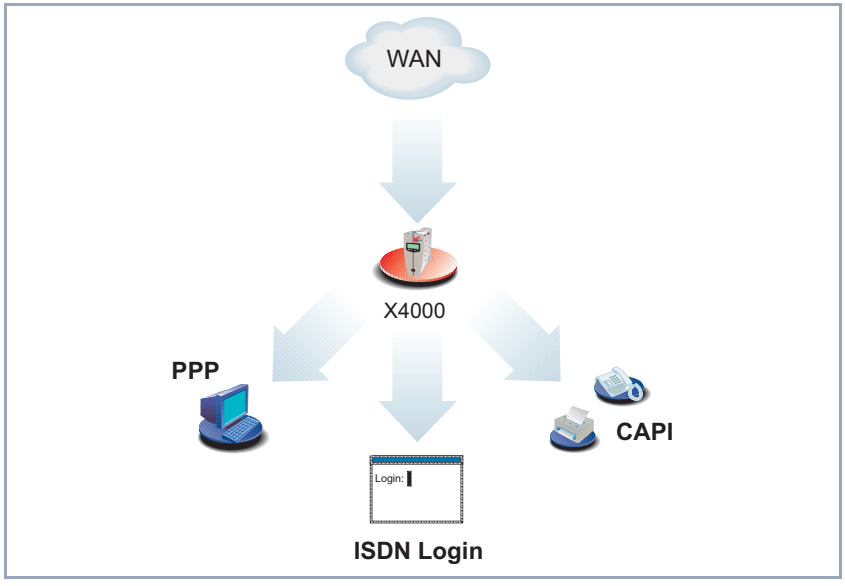


Figure 7-3: Distribution of incoming calls

If your ISDN connection has more than three extensions, a practical allocation could look as follows:

Called party number	Data services	Voice services
10	PPP (routing)	
11	CAPI	CAPI
12	ISDN Login	

Table 7-7: Distribution of extensions to services

If no entry is specified in the following menu, every incoming ISDN call is accepted by the ISDN Login service. To avoid this, be sure to make the necessary entries here.

As soon as you have made one or more entries in this menu, the matching incoming calls are distributed to the corresponding services.

In the unconfigured ex works state, a user with the user name “default” and no password is always entered for the CAPI subsystem. All calls to the CAPI are offered to all CAPI applications in the LAN.

To distribute incoming calls for the CAPI subsystem to defined users with password, you should use BinTec’s User Concept (see chapter 8.1.2, page 190). You should then delete the user "default" without password.

All incoming calls that do not match an entry are passed on to the CAPI service.

Now set the entries for Incoming Call Answering:

➤ Go to ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING:***

```
X4000 Setup Tool                                BinTec Communications AG
[WAN][INCOMING]: Incoming Call Answering                        MyRouter


Item                          Number      Mode             Username
CAPI 1.1 EAZ 1 Mapping        11          right to left
CAPI 1.1 EAZ 1 Mapping        11          right to left
ISDN Login                    12          right to left
PPP (routing)                 10          right to left


    ADD                 DELETE              EXIT

Press<Ctrl-n>,<Ctrl-p>to scroll,<Space>tag/untagDELETE,<Return>to edit
```

This menu lists the previously completed assignment of systems to extension numbers.

To make entries in the list, proceed as follows:

- Use **ADD** to add a new entry or select an existing entry. Confirm with **Return** to change the entry.

  Another menu window opens:

```
X4000 Setup Tool                                BinTec Communications AG
[WAN][INCOMING][ADD]: Incoming Calls                           MyRouter


    Item                    PPP (routing)
    Number                  10
    Mode                    right to left

    Bearer                  data

                SAVE                        CANCEL

Use <Space> to select
```

The menu contains the following fields:

Field	Meaning
Item	Service which shall accept a call to the **Number** below. Possible values: see Table 7-9, page 147.
Number	Phone number under which the service (**Item**) entered above can be reached.
Mode	Mode in which **X4000** compares the digits of **Number** with the called party number of the incoming call: ■ *right to left* (default value) ■ *left to right (DDI):* Always select if **X4000** is connected to a point-to-point connection.
User name	(only for **Item** = *CAPI 1.1 EAZ 0...9 Mapping*) CAPI user name. Only necessary if you want to use the CAPI user concept (see chapter 7.1.2, page 192).
Bearer	Type of incoming call. Possible values: ■ *data:* data call ■ *voice:* voice call ■ *any:* both data and voice calls

Table 7-8: ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING*** ➧ **ADD**

The **Item** field includes the following selection:

Possible values	Meaning
PPP (routing)	Default setting for ➤➤ **PPP** routing. Also applicable for the PPP connections below.
ISDN Login	Enables logging in with ➤➤ **isdnlogin**.
PPP 64k	Enables 64 kbps PPP data connections.
PPP 56k	Enables 56 kbps PPP data connections.
PPP Modem	(Only available if expansion card and resource card with digital modems are installed) Assigns incoming analog calls to the PPP routing service. The digital modem on the resource card that accepts this call uses the settings for Modem Profile 1, which were selected in the menu ***MODEM*** ➧ ***PROFILE CONFIGURATION*** ➧ ***PROFILE 1***.
PPP DOVB	Data transmission Over Voice Bearer - useful in the USA, for example, where voice connections are sometimes cheaper than data connections.
PPP V.110 (1200...38400)	Enables PPP connections with V.110 at bit rates of 1200 bps, 2400 bps,..., 38400 bps.
Pots	Not available in **X4000**.
PPP Modem Profile 1...8	(Only available if expansion card and resource card with digital modems are installed) Assigns incoming analog calls to the PPP routing service. The digital modem on the resource card that accepts this call uses the settings for Modem Profile 1... 8, which were selected in the menu ***MODEM*** ➧ ***PROFILE CONFIGURATION*** ➧ ***PROFILE 1...8***.
CAPI 1.1 EAZ 0...9 Mapping	Enables connections with Remote CAPI applications. Required for CAPI 1.1 applications only.

Possible values	Meaning
X.25 PAD	Enables data connections with X.25 PAD.

Table 7-9: **Item**

Make sure you enter the right number under **Number**, i.e. the number that actually arrives at **X4000**! For example, if **X4000** is connected to a ➤➤ **PABX**, only the PABX extension number arrives at **X4000**.

If you are not sure which number arrives at **X4000**, proceed as follows:

- Call **X4000** with a conventional telephone using one of its extension numbers.
- Go to ***MONITORING AND DEBUGGING*** ➧ ***ISDN MONITOR***.

  You can now see the incoming call in the menu.
- Place the cursor on the call and enter d (for details).

  Under **Local Number**, you can see the part of the number that arrives at **X4000**.
- Type in this part of the number in ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING*** ➧ **ADD** under **Number**.

If you use a communication application on your PC that is based on Remote CAPI 1.1 (current version: Remote CAPI 2.0), **X4000** must translate the ➤➤ **MSN**s (= **Number**, multidigit) of the incoming call to ➤➤ **EAZ**s (single digit) (CAPI 1.1 can only detect single-digit numbers). This is why the CAPI entry under **Item** is not simply called *"CAPI"* but *"CAPI 1.1 EAZ x Mapping"*. When using CAPI 1.1, you must therefore make sure you assign each CAPI application the corresponding EAZ(s) by "mapping". For example select for **Number** = *1234* the entry **Item** = *CAPI 1.1 EAZ **0** Mapping* and for **Number** = *5678* the entry **Item** = *CAPI 1.1 EAZ **1** Mapping*.

CAPI 2.0 evaluates the MSN directly and "translation" to EAZ is not necessary. You can use the same CAPI 1.1 EAZ x Mapping entry for each **Number** i.e. a single entry is sufficient.

You should certainly try to change your PC system to CAPI 2.0 so that you can also use new features.

To do Make the following entries:

- Select the **Item**, e.g. ***PPP (routing)***.
- Enter the **Number**, e.g. ***10***.
- Select the **Mode**, e.g. ***right to left***.
- Select the **Bearer**, e.g. ***data***.
- Press **SAVE**.

  You have returned to the menu ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING***. The entries are saved and displayed in the list.

  You have thus assigned a service (***PPP (routing)***) to one of your phone numbers (***10***). This means that when a data call is received by Called Party Number 10, it is put through to the service PPP (routing).

- Repeat these steps until you have assigned to all phone numbers the services to be reached under these numbers.

  This concludes the configuration of Incoming Call Answering. **X4000** now distributes the incoming calls to the internal services.

Advanced configuration ***CM-1BRI, ISDN S0*** ➧ ***ADVANCED SETTINGS*** contains settings for X.31 TEI (see chapter 8.1.4, page 197).

If you use a leased line, you can implement a backup solution using the Bandwidth on Demand feature (see chapter 8.2.3, page 201). If you use this facility, a dialup connection is set up to the connection partner if the leased line fails.

7.2.2 Configuring Serial Interfaces

The **X4000** basic unit is equipped with two serial WAN interfaces:

- The first serial port (Setup Tool menu ***CM-SERIAL, SERIAL*** ➧ ***UNIT 0***) can be used as interface type
  - X.21/V.11
  - V.35/V.11
  - V.36/V.11

The setting in the Setup Tool **Connector** field (see Table 7-11, page 153) enables the port to be changed so that **X4000** can be operated in both DCE and DTE Mode.

Making the relevant settings in the Setup Tool **Connector** field physically reverses the signal direction and the pin functions.

- The second serial port (Setup Tool menu ***CM-SERIAL, SERIAL*** ➧ ***UNIT 1***) can be used as interface type
  – X.21bis/V.28
  The change from DCE to DTE Mode and vice versa for this port can only be made by using a DCE or DTE cable.

	Interface Type	DTE Mode	DCE Mode
Port 1	X.21 V.35 V.36	Standard cable **Connector** = *dte*	Standard cable **Connector** = *dce*
Port 2	X.21bis	DTE cable	DCE cable

Table 7-10: Functionality of serial ports

Configuration with the Setup Tool

The following menu is available for configuring the X.21/V.35/V.36 and X.21bis interface of **X4000**:

```
X4000 Setup Tool                                BinTec Communications AG
[SLOT 3 UNIT 0 SERIAL]:Configure Serial Interface              MyRouter


    Interface Type       X.21
    Connector            dte
    Clock mode           auto
    Speed                64000 bps
    Layer 2 Mode         auto

    Interface Leads      disabled


                SAVE                        CANCEL

Use <Space> to select
```

The menu contains the following fields:

Field	Meaning
Interface Type	Defines the interface type of the port used. Possible values: ■ *none* (default value): Interface is not used. ■ *X.21*: Use as X.21/V.11 interface ■ *V.35*: Use as V.35/V.11 interface ■ *V.36*: Use as V.36/V.11 interface ■ *X.21bis*: Use as X.21bis/V.28 interface
Connector	Defines the pin assignment of the port (see chapter 13.2.4, page 393). This setting only affects the pin assignment for the first serial port ***CM-SERIAL, SERIAL ➧ UNIT 0***; a suitable DCE or DTE cable must be used for the second serial port ***CM-SERIAL, SERIAL ➧ UNIT 1***! Possible values: ■ *dte* (default value): The pins are assigned as DTE interface. This setting is necessary, for example, if **X4000** is connected to a public data network (e.g. Datex-P in Germany). ■ *dce*: The pins are assigned as DCE interface. This is necessary for using a unit configured as DTE.

Field	Meaning
Clock Mode	Defines which connection partner sends the clock signal for synchronization between transmitter and receiver. Possible values: ■ *auto* (default value): The setting is based on the **Connector** selected: – **X4000** sends the clock signal if **Connector** = *dce*. – **X4000** receives the clock signal if **Connector** = *dte*. You can usually accept this setting. ■ *external*: **X4000** receives the clock signal, irrespective of the setting selected under **Connector**. ■ *internal*: **X4000** sends the clock signal, irrespective of the setting selected under **Connector**.
Speed	Transmission rate of connection, scalable from *2400 bps* to *8 Mbps*. The value to be set depends on the quality and length of the cable and on the connection type (balanced/unbalanced). Up to 8 Mbps are possible over a short distance of up to 5 m if shielded cables are used. Default value: *64000 bps*

Field	Meaning
Layer 2 Mode	Defines the value of the HDLC address field in the transmitted command frames (Layer 2). Possible values: ■ *auto* (default value): The selection made for **Connector** is accepted. You can usually accept this setting, e.g. for access to a public data network such as Datex-P. ■ *dte:* The address field has the value for DTE. ■ *dce:* The address field has the value for DCE.
Interface Leads	Defines whether **X4000** checks the status of the interface lines. The same value should be set for both connection partners. Possible values: ■ *enabled:* The status of the signal line (I for X.21, CTS for V.35, V.36 and X.21bis) is checked and transferred as **L1State**. ■ *disabled* (default value): The status is not checked; the physical line is always up. In this setting, you should monitor the interface line in some other way, e.g. with PPP Keepalive.

Table 7-11: ***CM-SERIAL, SERIAL*** ➧ ***UNIT 0*** or ***CM-SERIAL, SERIAL*** ➧ ***UNIT 1***

	Connector = DTE (default value)	Connector = DCE	Port
Function	DTE	DCE	1
Cables	Standard cable		
Pin assignment	X.21: see "DB-15 Plug for X.21", page 395 V.35: see "M34 Plug for V.35", page 396 V.36: see "DB-37 Plug for V.36", page 397		
Function	DTE	DCE	2
Cables	DTE cable	DCE cable	
Pin assignment	X.21bis: see "DB-25 Plug for X.21bis", page 399		

Table 7-12: Use of **Connector** in the Setup Tool

To do

Proceed as follows to configure the serial interfaces (the example values given are necessary if you connect **X4000** to Datex-P):

- Go to ***CM-SERIAL, SERIAL*** ➧ ***UNIT 0*** or ***CM-SERIAL, SERIAL*** ➧ ***UNIT 1***
- Select **Interface Type**: e.g. ***X.21***.
- Select **Connector**: e.g. ***dte***.
- Select **Clock Mode**: e.g. ***auto***.
- Select **Speed**: e.g. ***64000 bps***.
- Select **Layer 2 Mode**: e.g. ***auto***.
- Select **Interface Leads**: e.g. ***disabled***.
- Press **SAVE**.

  You have returned to the main menu. and the entries have been saved.

Advanced configuration

If you use a leased line, you can implement a backup solution using the Bandwidth on Demand feature (see chapter 8.2.3, page 201). If you use this facility, a dialup connection is set up to the connection partner if the leased line fails.

7.2.3 Configuring the LAN Interface for Using ADSL (PPP-over-Ethernet)

ADSL

To be able to use ADSL (Asymmetric Digital Subscriber Line) with **X4000**, you must configure a PPP-over-Ethernet interface over the LAN interface. This is done by connecting **X4000** to T-DSL, which is the ADSL connection of Deutsche Telekom AG.

If you use the ADSL connection of another provider, ask the provider about any special features of your ADSL connection that need to be observed.

T-DSL

The T-DSL package is currently offered by Deutsche Telekom AG as high-speed access to the Internet. It consists of an ISDN connection and a data line with a bandwidth of up to 768 kbps from the Internet Service Provider to the customer (downstream) and 128 kbps in the upstream direction.

Security risks and restrictions

The following restrictions and security risks exist as the **X4000** connection to T-DSL is established only over one Ethernet interface:

- If PPP-over-Ethernet is operated with only one Ethernet interface, there is a risk of unauthorized accesses from the Internet to the local **X4000** LAN. Such unauthorized accesses can originate from the first node of the Internet.
- Users of the local network can configure a PPP-over-Ethernet client on their PC and use the Internet unnoticed by **X4000**.
- Broadcasts in the local LAN are always forwarded by the ADSL modem (NTBBA) to the PTT exchange and are not rejected until the exchange. This means that the maximum bandwidth of 128 kbps upstream to the PTT may not be fully available.

The limitations and security risks described here do not apply if **X4000** is equipped with a LAN expansion card and several LAN interfaces are therefore available (see chapter 9.3.2, page 288).

The T-DSL connection (without **X4000**) looks like this:

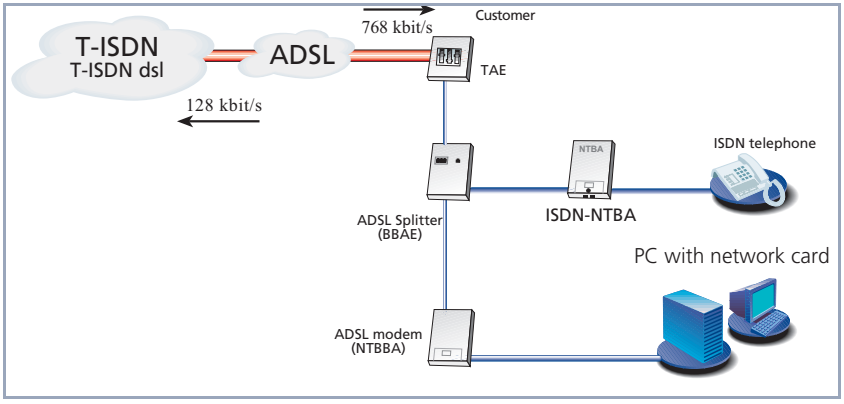


Figure 7-4: T-DSL connection (without **X4000**)

The following scenario (see Figure 7-5, page 157) is used to describe the necessary configuration steps: The LAN interface of **X4000** and the ADSL modem (NTBBA) of Deutsche Telekom AG are connected to your hub as described in chapter 3.3, page 59 .

If you receive a special cable from Deutsche Telekom AG or another provider for connecting the ADSL modem, use only this cable.

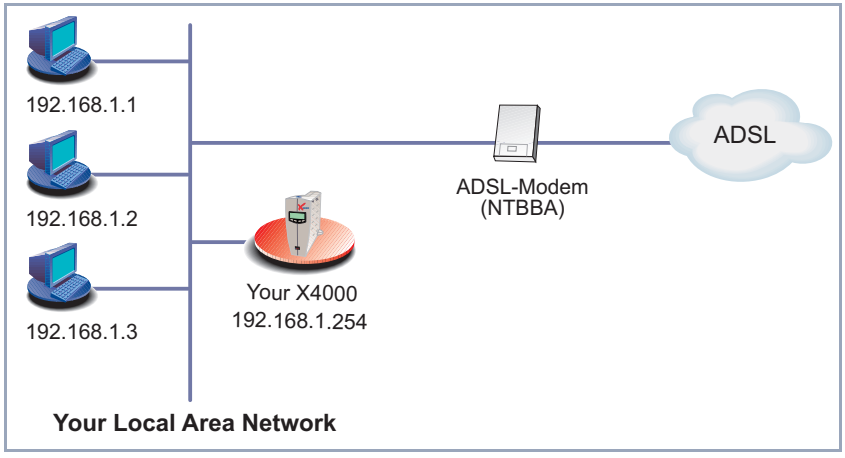


Figure 7-5: Example scenario (with **X4000**)

The following settings are necessary (the Setup Tool menus concerned are described elsewhere):

- Go to ***PPP*** (see chapter 8.1.3, page 194).
- Select **PPPoE Ethernet Interface**: *en1*.
- Press **SAVE**.
- Go to ***WAN PARTNER*** ➧ **ADD** (see Table 7-13, page 163).
- Enter your **Partner Name**: e.g. *t-online.*
- Select **Encapsulation**: *PPP*
- Go to ***WAN PARTNER*** ➧ **ADD** ➧ ***PPP*** (see Table 7-18, page 168).
- Enter **Local PPP ID** (= your user name):
  e.g. *00046000425609116938 6#0001@t-online.de*.

The T-Online user name comprises the following elements:

<Anschlußkennung><T-Online-Nummer>#<Mitbenutzernummer>@t-online.de

Anschlußkennung is a 12-digit number, in this case: *000460004256.*

T-Online-Nummer is the extension number, in this case: *091169386.*

Mitbenutzernummer is a 4-digit number, in this case: *0001.*

The T-Online-Nummer and the Mitbenutzernummer must be separated by # if the T-Online-Nummer has less than 12 digits.

- Enter **PPP Password** (= your T-Online password).
- Select **Keepalives**: *on.*
- Confirm with **OK**.
- Go to ***WAN Partner*** ➧ **ADD** ➧ ***Advanced Settings*** (see chapter 8.2.5, page 219).
- Select **Layer 1 Protocol** : *PPP over Ethernet (PPPoE).*
- Confirm with **OK**.
- Go to ***WAN Partner*** ➧ **ADD** ➧ ***IP*** (see Table 7-21, page 174).
- Select **IP Transit Network**: *dynamic client.*
- Press **SAVE**.
- Go to ***IP*** ➧ ***Routing*** ➧ **ADD** (see "Creating a Routing Entry", page 175).
- Select **Route Type**: *Default route.*
- Select **Network**: *WAN without transit network.*
- Select **Partner / Interface**: e.g. *t-online.*
- Enter **Metric**: e.g. *1.*
- Press **SAVE**.
- Go to ***IP*** ➧ ***Network Address Translation*** (see "Activating Network Address Translation (NAT)", page 181).
- Select the PPPoE interface, e.g. **t-online**, and confirm with **Return**.
- Select **Network Address Translation**: *on.*
- Press **SAVE**.

7.3 Configuring WAN Partners

To enable **X4000** to make connections to networks or hosts outside your LAN, you must configure the partners you want to connect to as WAN partners on your **X4000**. This applies to outgoing connections (**X4000** dials its WAN partner), as well as for incoming connections (a WAN partner dials the number of your **X4000**) and leased lines.

Consequently, if you want to access the Internet, you must set up your Internet Service Provider (➤➤ **ISP**) as a WAN partner. If you wish to establish a LAN-LAN connection, e.g. between your LAN (head office) and the LAN of a branch office (corporate network connection), you have to configure the LAN of your branch office as a WAN partner.

If you have set up one or more leased lines on configuring the WAN interface(s) of **X4000**, a WAN partner for each leased line is already created automatically in the WAN Partner menu. Edit this entry to suit your requirements.

General The procedure for configuring or editing a WAN partner in **X4000** is explained in general form in chapter 7.3.1, page 159 below.

Examples A number of frequently required configuration examples are shown in chapter 7.3.2, page 182.

If you would like to configure Internet access over Compuserve, please see "Internet Access over Compuserve", page 184.

7.3.1 Basic Procedure

Configuring a WAN partner generally involves the following steps:

- Entering a WAN partner:
  - Defining a ➤➤ **protocol** (encapsulation).
  - Entering extension(s).
  - Defining ➤➤ **PPP** settings for authentication.
  - Defining ➤➤ **short hold**.

– Carrying out IP configuration.

- Creating routing entry.
- Activating Network Address Translation (➤➤ **NAT**) (optional).

Off we go:

Entering a WAN Partner

WAN partner configuration

Before you get down to it, you should collect the necessary access information that you received from your ISP or system administrator (see chapter 6.1, page 110). The terms used may vary slightly from provider to provider.

To enter a WAN partner, proceed as follows:

➤ Go to ***WAN PARTNER***:

```
X4000 Setup Tool                                BinTec Communications AG
[WAN]: WAN Partners                                              MyRouter

Current WAN Partner Configuration

    Partnername              Protocol        State
    LittleIndian             ppp             dormant



ADD                 DELETE              EXIT

Press<Ctrl-n>,<Ctrl-p>to scroll,<Space>tag/untag DELETE,<Return>to
edit
```

This is where all WAN partners currently configured are listed with the corresponding **Partner name**, **Protocol** and **State**.

A WAN partner interface is created automatically for leased lines. Edit the previously created entry for a leased line in the ***WAN PARTNER*** menu and enter the necessary parameters.

State can have the following values:

- *up:* connected

- *dormant:* not connected
- *blocked:* not connected (an error occurred on establishing a connection, a renewed attempt is only possible after a specified number of seconds)
- *down:* set to down by administration

To make an entry in the list, proceed as follows:

➤ Use **ADD** to add a new entry or select an existing entry. Confirm with **Return** to change the entry.

Another menu window opens:

```
X4000 Setup Tool                              BinTec Communications AG
[WAN][ADD]: Configure WAN Partner                              MyRouter

    Partner Name                 LittleIndian

    Encapsulation                PPP
    Compression                  none
    Encryption                   none
    Calling Line Identification  no

    WAN Numbers >
    PPP >
    Advanced Settings >

    IP >
    IPX >
    Bridge >

                      SAVE                      CANCEL

Enter string, max. length = 25 chars
```

The menu contains the following fields:

Field	Meaning
Partner Name	Enter a name for uniquely identifying the WAN partner.
Encapsulation	➤➤ **Encapsulation**. Defines how the ➤➤ **data packets** are packed for transfer to the WAN partner. Possible values: ■ *PPP* ■ *Multi-Protocol LAPB Framing* ■ *Multi-Protocol HDLC Framing* ■ *Async PPP over X.75* ■ *Async PPP over X.75/T.70/BTX* ■ *X.25_PPP* ■ *X.25* ■ *HDLC Framing (IP only)* ■ *LAPB Framing (IP only)* ■ *X31 B-Channel* ■ *X.25 No Signaling* ■ *X.25 PAD* ■ *X.25 No Configuration* ■ *Frame Relay* ■ *X.25 No Configuration, No Signaling*

Field	Meaning
Compression	Defines the type of compression that should be used for data traffic to the WAN partner. Possible values: ■ *STAC:* only if **Encapsulation** = *PPP* ■ *MS-STAC:* only if **Encapsulation** = *PPP* ■ *none*
Encryption	Defines the type of encryption that should be used for data traffic to the WAN partner. Only possible if STAC compression is not activated for the connection. Possible values: ■ *MPPE 40:* MPPE version 1 with 40-bit key ■ *MPPE 56:* MPPE version 1 with 56-bit key ■ *MPPE V2 40:* MPPE version 2 with 40-bit key ■ *MPPE V2 56:* MPPE version 2 with 56-bit key ■ *DES 56*: DES with 56-bit key ■ *Blowfish 56*: Blowfish with 56-bit key ■ *none:* No encryption These values are only available if *PPP*, *Async PPP over X.75*, *Async PPP over X.75/T.70/BTX* or *X.25_PPP* has been selected under **Encapsulation**.
Calling Line Identification	Indicates whether calls from this WAN partner should be identified by means of the calling party number (➤➤ **CLID**). The value of this field is dependent on **Direction** in the submenu ***WAN NUMBERS*** and cannot be set here.

Table 7-13: ***WAN PARTNER*** ➧ **ADD**

The following table illustrates which encapsulations support procedures for ➤➤ **data compression**:

Protocols		Encapsulation	Compression: STAC, MS-STAC
IP	IPX		
X	X	*PPP*	X
X	X	*Async PPP over X.75*	X
X	X	*Async PPP over X.75/T.70/BTX*	X
X	X	*Multi-Protocol LAPB Framing*	
X	X	*Multi-Protocol HDLC Framing*	
X		*HDLC Framing (IP only)*	
X		*LAPB Framing (IP only)*	

Table 7-14: Encapsulation and compression

To do Make the following entries:

- ➤ Enter **Partner Name**, e.g. *LittleIndian*.
- ➤ Select **Encapsulation**, e.g. *PPP*.
- ➤ Select **Compression**, e.g. *none*, if applicable.
- ➤ Select **Encryption**, e.g. *none*, if applicable.
- ➤ Go to ***WAN PARTNER*** ➧ **ADD** ➧ ***WAN NUMBERS***:

Entering extension numbers

```
X4000 Setup Tool                                BinTec Communications AG
[WAN][ADD][WAN Numbers]: WAN Numbers (BigBoss)                 MyRouter


    WAN Numbers for this partner:

        WAN Number           Direction
        0911987654321        outgoing



    ADD                  DELETE                    EXIT

Press<Ctrl-n>,<Ctrl-p>toscroll,<Space>tag/untag DELETE,<Return>to edit
```

This is where the currently entered extensions of the WAN partners are listed.

To make an entry in the list, proceed as follows:

- Use **ADD** to add a new entry or select an existing entry. Confirm with **Return** to change the entry.

  Another menu window opens:

```
X4000 Setup Tool                                BinTec Communications AG
[WAN][ADD][WANNUMBERS][ADD]:Add or Change WANNumbers(BigBoss) MyRouter


    Number                    0911987654321
    Direction                 outgoing

    Advanced Settings >


              SAVE                            Cancel

Enter string, max. length = 40 chars
```

The menu contains the following fields:

Field	Meaning
Number	Extension of WAN partner.
Direction	Defines whether **Number** should be used for incoming or outgoing calls or for both.

Table 7-15: ***WAN PARTNER*** ➧ **ADD** ➧ ***WAN NUMBERS*** ➧ **ADD**

The **Direction** field contains the following selection options:

Possible values	Meaning
outgoing	For outgoing calls, where you dial your WAN partner.
both (CLID)	For incoming and outgoing calls.
incoming (CLID)	For incoming calls, where your WAN partner dials in to your **X4000**.

Table 7-16: **Direction**

When **X4000** is connected to a PABX system for which a "0" prefix is necessary for external line access, this "0" must be considered when entering the access number.

Wildcards

When entering the **Number**, you can either enter the extension digit for digit or you can replace single numbers or groups of numbers with wildcards. **Number** can therefore be the same as various extensions.

You can use the following wildcards, which have different effects for incoming and outgoing calls:

Wildcard	Meaning		Example		
	Incoming calls	Outgoing calls	Number	X4000 accepts incoming calls, e.g. with:	Outgoing calls, i.e. X4000 sets up a connection to the WAN partner with:
*	Matches a group of none or more digits.	Is ignored.	123*	123, 1234, 123789	123
?	Matches exactly one digit.	Is replaced by 0.	123?	1234, 1238, 1231	1230
[a-b]	Defines a range of matching digits.	The first digit of the specified range is used.	123[5-9]	1235, 1237, 1239	1235
[^a-b]	Defines a range of excluded digits.	The first digit after the specified range is used.	123[^0-5]	1236, 1238, 1239	1236
{ab}	Optional sequence to match.	Sequence is used.	{00}1234	00123 and 123	00123

Table 7-17: Wildcards for incoming and outgoing calls

If the calling party number of an incoming call matches both a WAN partner's **Number** with wildcards and a WAN partner's **Number** without wildcards, the entry without wildcards is always used.

To do

Make the following entries:

- Enter the **Number**, e.g. *0911987654321*.
- Select the **Direction**, e.g. *outgoing*.
- Press **SAVE**.

  The entries are saved and listed.
- Leave ***WAN PARTNER*** ➧ **ADD** ➧ ***WAN NUMBERS*** with **EXIT**.

➤➤ PPP authentication

Now enter the ➤➤ **PPP** settings of your WAN partner. These are used to authenticate your connection partner.

When a call is received, the Calling Party Number is always sent over the ISDN ➤➤ **D-channel**. This number enables **X4000** to identify the caller (➤➤ **CLID**), provided the caller is entered as a WAN partner. After identification with CLID, the router can additionally carry out PPP authentication with the WAN partner before it accepts the call. The router needs the necessary data for this, which you should enter here. First establish the type of authentication process that should be performed, then enter a common password and two user names. You get this information, for example, from your Internet Service Provider (ISP) or the system administrator at your head office. The call is only accepted if the data entered in **X4000** matches the caller's data.

If you authenticate WAN partners over a RADISU server, please see the relevant instructions in the Extended Features Reference.

To set the PPP authentication for the WAN partner, proceed as follows:

- Go to ***WAN PARTNER*** ➧ **ADD** ➧ ***PPP***:

```
X4000 Setup Tool                                BinTec Communications AG
[WAN][ADD][PPP]: PPP Settings (BigBoss)                          MyRouter


    Authentication                CHAP + PAP
    Partner PPP ID                LittleIndian
    Local PPP ID                  BigBoss
    PPP Password                  Secret

    Keepalives                    off
    Link Quality Monitoring       off


                OK                                CANCEL

Use <Space> to select
```

The menu contains the following fields:

Field	Meaning
Authentication	Authentication protocol
Partner PPP ID	ID of WAN partner
Local PPP ID	**X4000**'s ID
PPP Password	Password
Keepalives	Activates keepalive packets for checking the interface status. Possible values: ■ *off* ■ *on*
Link Quality Monitoring	Activates PPP Link Quality Monitoring as per RFC 1989. Possible values: ■ *off* ■ *on*

Table 7-18: ***WAN PARTNER*** ➧ **ADD** ➧ ***PPP***

The **Authentication** field contains the following selection options:

Possible values	Meaning
PAP	Only run ➤➤ **PAP** (PPP Password Authentication Protocol); the password is transferred uncoded.
CHAP	Only run ➤➤ **CHAP** (PPP Challenge Handshake Authentication Protocol as per RFC 1994); the password is transferred coded.
CHAP + PAP	Run primarily CHAP, otherwise PAP.
MS-CHAP	Only run MS-CHAP (MS Challenge Handshake Authentication Protocol).
CHAP + PAP + MS-CHAP	Primarily run CHAP, on denial, the authentication protocol required by the WAN partner.
MS-CHAP V2	Run MS-CHAP version 2 only.
none	Run no PPP authentication protocol.

Table 7-19: **Authentication**

To do Make the following entries:

- Select **Authentication**, e.g. *CHAP*.
- Enter **Partner PPP ID**, e.g. *LittleIndian*.
- Enter **Local PPP ID**, e.g. *BigBoss*.

How to enter the passwords is described in "Changing the password", page 85.

- Enter **PPP Password**, e.g. *Secret*.
- Select **Keepalives**, e.g. *off*.
- Select **Link Quality Monitoring**, e.g. *off*.

➤ Confirm with **OK**.

You have returned to ***WAN PARTNER*** ➧ **ADD**.

In some cases, the caller cannot be identified with ➤➤ **CLID**, although entered as a WAN partner. In this case, your **X4000** does not know which authentication protocol was set for this WAN partner. To enable the call to still be accepted, **X4000** falls back on general settings in the PPP, which you can change as necessary (chapter 8.1.3, page 194).

Setting short hold

Now set short hold so that **X4000** clears down the ISDN connection when there is no further data exchange to save money. The short hold setting can be either static or dynamic and tells **X4000** the duration of the idle time, after which it is to clear down the ISDN connection.

Static

The static ➤➤ **short hold** setting determines how much time should pass between sending the last ➤➤ **data packet** and clearing the ISDN connection. Enter a fixed period of time in seconds.

Dynamic

With the dynamic short hold setting, no fixed period of time is specified and the length of an ISDN charging unit is considered instead. Dynamic short hold is based on AOCD (advice of charge during the call).

When setting dynamic short hold, you specify how much time should pass after the last exchange of data before the connection is cleared. You enter a percentage based on the last charging unit. The value of the idle timer can therefore change, just as the length of the charging unit changes (according to the time of day, weekend, weekday, etc.). If you enter 50 %, for example, the idle timer is 60 seconds if the preceding charging unit was 120 seconds, and 300 seconds if the preceding charging unit was 600 seconds. The connection is cleared on expiry of the idle timer and shortly before the next charging unit starts.

Please note: You can only use dynamic short hold if you receive charging information during the connection. Ask your telephone company.

When using dynamic Short Hold, you must also set static Short Hold so that you do not get a permanent ➤➤ **switched connection** if AOCD fails.

You should make sure static Short Hold comes into operation later than dynamic Short Hold. If not, **X4000** always clears the connection based on static short hold and never gives dynamic short hold a chance to disconnect. In this case, enter a value for **Static Short Hold (sec)** that is a little more than the expected maximum dynamic idle time.

In Germany, only Deutsche Telekom currently supports call charging information.

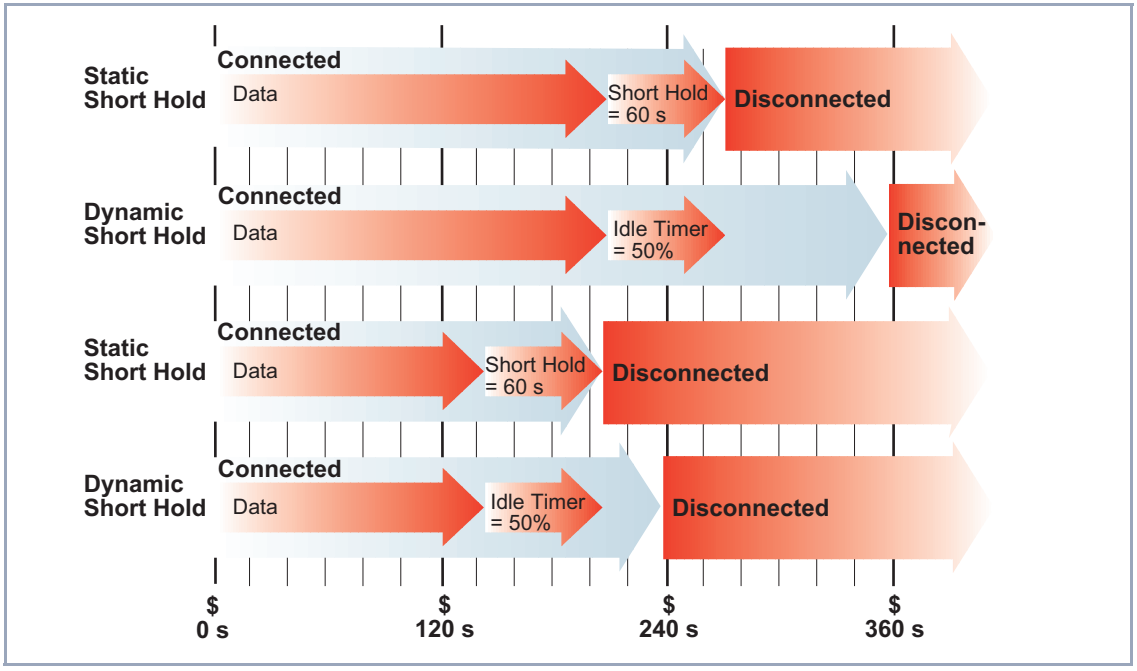


Figure 7-6: Dynamic and static short hold

Proceed as follows:

➤ Go to ***WAN PARTNER*** ➧ **ADD** ➧ ***ADVANCED SETTINGS***:

```
X4000 Setup Tool                              BinTec Communications AG
[WAN][ADD][ADVANCED]: Advanced Settings (BigBoss)             MyRouter


Callback                                 no
Static Short Hold (sec)                  20
Idle for Dynamic Short Hold (%)          0
Delay after Connection Failure (sec)     300
Layer 1 Protocol                         ISDN 64 kbps

Channel Bundling                         no


Extended Interface Settings (optional) >


                OK                                      CANCEL

Use <Space> to select
```

The following parts of the menu are relevant for this configuration step:

Field	Meaning
Static Short Hold (sec)	Idle time in seconds for static short hold. Example values for trunk connections: *60*, only effective if charging pulses are transmitted during the connection (AOCD), *20* otherwise.
Idle for Dynamic Short Hold (%)	Idle time in % for dynamic Short Hold. Only effective if charging pulses are transmitted during the connection (AOCD).

Table 7-20: ***WAN PARTNER*** ➧ **ADD** ➧ ***ADVANCED SETTINGS***

To do Make the following entries:

- Enter **Static Short Hold (sec)**, e.g. *20*.
- Enter **Idle for Dynamic Short Hold (%)**, e.g. *0*.
- Confirm with **OK**.

  You have returned to ***WAN PARTNER*** ➧ **ADD**.

Tips on entering **Idle for Dynamic Short Hold %**:

- For interactive connections (e.g. ➤➤ **telnet**), specify a high value (e.g. 80...90) to avoid clearing connections during short phases without data exchange.
- For Internet connections (e.g. WWW, http, etc.), specify a medium to high value (e.g. 50...80) to avoid clearing connections while waiting.
- For data connections (e.g. ➤➤ **ftp**), specify a low value (e.g. 10...40) to avoid the unnecessary continuation of a connection after data has been transferred.

You will find a more detailed explanation about static and dynamic short hold in the Software Reference.

Carrying out IP configuration

Now let's move on to the IP configuration of your WAN partner. Here you enter the ➤➤ **IP address** and ➤➤ **netmask** of your partner.

Proceed as follows:

➤ Go to ***WAN PARTNER*** ➧ **ADD** ➧ ***IP***:

```
X4000 Setup Tool                                BinTec Communications AG
[WAN][ADD][IP]: IP Configuration (BigBoss)                      MyRouter


    IP Transit Network                    no


    Partner's LAN IP Address              10.1.1.0
    Partner's LAN Netmask                 255.255.255.0

    Advanced Settings >

                    SAVE                      CANCEL

Use <Space> to select
```

The menu contains the following fields:

Field	Meaning
IP Transit Network	Defines whether **X4000** sets up a transit network to the WAN partner.
Local IP Address	IP address of **X4000**. You do not normally need to make an entry here, unless you wish to configure a transit network for one of your WAN partners (see chapter 8.2.6, page 222).
Local ISDN IP Address	ISDN IP address of **X4000** in the transit network.
Partner's ISDN IP Address	ISDN IP address of WAN partner in the transit network.
Partner's LAN IP Address	WAN partner's LAN IP address.
Partner's LAN Netmask	WAN partner's LAN netmask. If you make no entry, **X4000** enters a default netmask for the net class used under *Partner's LAN IP Address*.

Table 7-21: ***WAN PARTNER*** ➧ **ADD** ➧ ***IP***

To do Make the following entries (normally sufficient for a corporate network connection):

- Select **IP Transit Network**: e.g. *no*.
- Enter **Partner's LAN IP Address**, e.g. *10.1.1.0*.
- Enter **Partner's LAN Netmask**, e.g. *255.255.255.0*.
- Press **SAVE**.
- Press **SAVE** again.

  You have returned to ***WAN PARTNER*** and your entries have been saved.

If you are setting up access to the Internet, you do not normally know the IP address of your Internet Service Provider (ISP). Either your **X4000** is assigned its **Local ISDN IP Address** dynamically (for the duration of the connection) or statically by the ISP. In such a case, make the following settings in ***WAN PARTNER*** ➧ **ADD** ➧ ***IP***:

- IP address is assigned dynamically:
  - Select **IP Transit Network**: *dynamic client*.
- IP address is assigned statically:
  - Select **IP Transit Network**: yes.
  - **Local ISDN IP Address:** **X4000**'s static IP address you get from your ISP (often termed your gateway or router address).
  - **Partner's ISDN IP Address:** Partner's IP address (if known) or else **X4000**'s static IP address you get from your ISP.
  - No entries for **Partner's LAN IP Address** and **Partner's LAN Netmask**.

If you want to know more about what a transit network actually is, for example, and what you need it for, see chapter 8.2.6, page 222.

To be able to use the Domain Name Server of the ISP while connected, make the following settings in ***WAN PARTNER*** ➧ **ADD** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***:

- Select **Dynamic Name Server Negotiation**: *client (receive)*.

This setting is only necessary if you have not entered fixed IP addresses for DNS on the PCs of your network.

Creating a Routing Entry

Routing entry creation

You have just entered a WAN partner in your **X4000**. A routing entry is created automatically in the routing table of your **X4000** for every WAN partner. You can edit existing routing entries and add new ones. For the connection to your Internet Service Provider, you should always configure a default route.

Proceed as follows:

- Go to ***IP*** ➧ ***ROUTING***:

```
X4000 Setup Tool                                  BinTec Communications AG
[IP][ROUTING]: IP Routing                                         MyRouter

The flags are:   U (Up), D (Dormant), B (Blocked),
                 G (Gateway Route), I (Interface Route),
                 S (Subnet Route), H (Host Route), E (Extended Route)

Destination  Gateway          Mask         Flags    Met  Interface    Pro
192.168.1.1  192.168.1.254    255.255.255.0US       0    en1          loc
10.1.1.0                      255.255.255.0DI       0    BigBoss      mgmt
default                       0.0.0.0      DI       0    GoInternet   mgmt

    ADD             ADDEXT           DELETE               EXIT


Press<Ctrl-n>,<Ctrl-p>to scroll,<Space>tag/untag DELETE,<Return>to edit
```

All IP routes entered are listed here. **Flags** shows the current status (Up, Dormant, Blocked) and the type of route (Gateway Route, Interface Route, Subnet Route, Host Route, Extended Route). The protocol with which **X4000** has "learned" the routing entry is displayed under **Pro**.

To define a route, proceed as follows:

- Use **ADD** to add a new entry or select an existing entry. Confirm with **Return** to change the entry.

  Another menu window opens:

To create extended IP routing entries, press the **ADDEXT** button to open the relevant menu. In this case, see chapter 10.2.12, page 353.

```
X4000 Setup Tool                                BinTec Communications AG
[IP][ROUTING][ADD]: IP Routing                                  MyRouter


    Route Type                  Network route
    Network                     WAN without transit network

    Destination IP Address      10.1.1.0
    Netmask                     255.255.255.0
    Partner / Interface         BigBoss

    Metric                      1


                SAVE                        CANCEL

Use <Space> to select
```

The menu contains the following fields:

Field	Meaning
Route Type	Type of route. Possible values: ■ *Host route:* Route to a single host ■ *Network route:* Route to a network ■ *Default route:* Is only used if no other suitable route is available.
Network	Defines the type of connection (LAN, WAN), see Table 7-23, page 179.
Destination IP Address	IP address of the destination host or LAN.
Netmask	Netmask of the partner LAN (only possible for **Route Type** = *Network route*. If no entry is made, the router uses a default netmask).
Partner / Interface	WAN partner (only possible for **Network** = *WAN without transit network*).
Gateway IP Address	IP address of the host to which **X4000** should forward the IP packets.
Metric	The lower the value, the higher the priority of the route (range of values 1...14).

Table 7-22: ***IP*** ➧ ***ROUTING*** ➧ **ADD**

The **Network** field contains the following selection options:

Possible values	Meaning
LAN	Route to a destination host or LAN that can be reached via **X4000**'s LAN interface.
WAN without transit network	Route to a destination host or LAN that can be reached via a WAN partner without transit network.
WAN with transit network	Route to a destination host or LAN that can be reached via a WAN partner with transit network.
Refuse	**X4000** discards data packets using this route and sends the sender a message saying the destination of the packet is unreachable.
Ignore	**X4000** discards data packets using this route without sending a status message.

Table 7-23: **Network**

You can only configure one default route on your **X4000**. If you set up access to the Internet, you must therefore configure the route to your Internet Service Provider (ISP) as a default route.
If, for example, you configure a corporate network connection, only enter the route to the head office or branch office as a default route if you do not configure Internet access over **X4000**.
If, for example, you configure both Internet access and a corporate network connection, enter a default route to the ISP and a network route to the head office.

Default route

To define a default route, proceed as follows:

- Select **Route Type**: *Default route*.
- Select **Network**: *WAN without transit network*.
- Select **Partner / Interface**: e.g. *GoInternet*.
- Enter **Metric**, e.g. *1*.

➤ Press **SAVE**.

You have returned to ***IP*** ➧ ***ROUTING***. The entries have been saved and the newly entered or modified route is listed.

The corporate network can consist of several LANs with different network IP addresses and netmasks (➤➤ **subnets**). If you do not enter the access to such a network as a default route (e.g. because you have already set up your Internet access as a default route), then you must make a separate routing entry for each subnet you want to reach in this network.

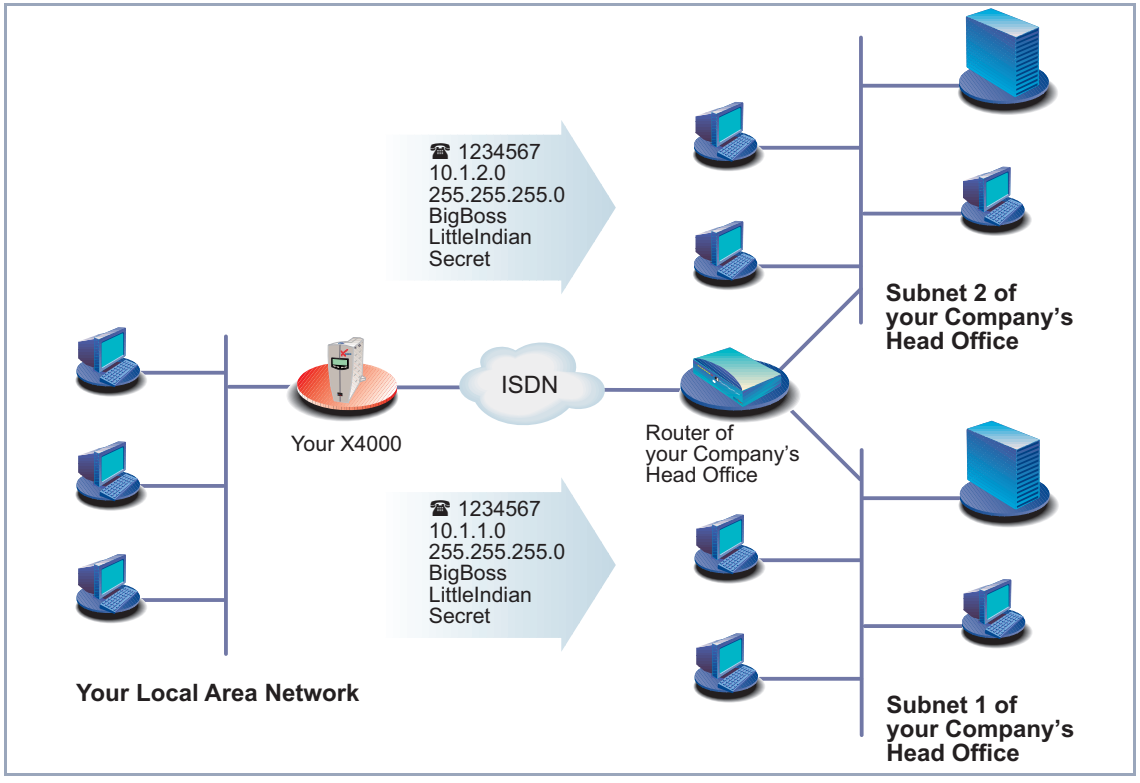


Figure 7-7: Network with subnets

Network route To establish a network route, e.g. for a corporate network connection (without a default route), proceed as follows:

➤ Select **Route Type**: *Network route*.

- Select **Network**: *WAN without transit network*.
- Enter **Destination IP Address**, e.g. *10.1.2.0*.
- Enter **Netmask**, e.g. *255.255.255.0*.
- Enter **Partner / Interface**, e.g. *LittleIndian*.
- Enter **Metric**, e.g. *1*.
- Press **SAVE**.

  You have returned to ***IP*** ➧ ***ROUTING***. The entries have been saved and the newly entered or modified route is listed.
- Repeat these steps if you have to enter several routes.

Activating Network Address Translation (NAT)

Activating NAT

Here you can activate Network Address Translation (➤➤ **NAT)** for your WAN partner. This conceals your whole network to the outside world with just one IP address. You should certainly do this for your connection to the Internet Service Provider (ISP).

More information about Network Address Translation (NAT) can be found in chapter 10.2.7, page 331.

Proceed as follows to activate NAT:

- Go to ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION***:

```
X4000 Setup Tool                                BinTec Communications AG
[IP][NAT]: NAT Configuration                                    MyRouter


Select IP Interface to be configured for NAT

                     Nat          static mappings

GoInternet           on           2
LittleIndian         off
en1                  off
en1-snap             off


EXIT

Press <Ctrl-n>, <Ctrl-p> to scroll, <Return> to edit/select
```

➤ Mark the WAN partner for which you want to activate NAT (e.g. ***GoInternet)*** and press **Return**.

Another menu window opens:

```
X4000 Setup Tool                                BinTec Communications AG
[IP][NAT][CONFIG]: NAT Configuration (GoInternet)              MyRouter

Network Address Translation      on

Configuration for sessions requested from outside

Service      Destination      Source Dep.      Dest. Dep.   Port Remap


    ADD              DELETE               SAVE             CANCEL

Use <Space> to select
```

To do Make the following entries:

➤ Select **Network Address Translation**: *on*.

➤ Press **SAVE**.

Network Address Translation is activated for the selected interface or WAN partner.

➤ Leave ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** with **EXIT**.

➤ Leave ***IP*** with **EXIT**.

You have returned to the main menu and have configured a WAN partner.

In order to permit certain external connections to hosts in the LAN in spite of activated NAT, you must define the sessions allowed exactly. How to do this is described in chapter 10.2.7, page 331.

7.3.2 Examples

The WAN partner settings for some example configurations are shown below:

- "Internet Access over T-Online", page 183
- "Internet Access over Compuserve", page 184

How to enter the passwords is described in "Changing the password", page 85.

Internet Access over T-Online

T-Online

The following settings are necessary:

- In ***WAN PARTNER*** ➧ **ADD**:
  Partner Name: e.g. *T_ONLINE*.
  Encapsulation: *PPP*
  Compression: *none*
  Encryption: *none*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***WAN NUMBERS*** ➧ **ADD**:
  Number (= dial-in number): z. B. *0191011*
  Direction: *outgoing*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***PPP***:
  Authentication: *CHAP + PAP*
  Local PPP ID (= user account + T-Online number + joint user account): e.g. *123456789012081512345678#0001*.
  PPP Password: e.g. *mycat*.
  Keepalives: *off*
  Link Quality Monitoring: *off*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***ADVANCED SETTINGS***:
  Callback: *no*
  Static Short Hold (sec): z. B. *60*
  Idle for Dynamic Short Hold (%): z. B. *0*
  Delay after Connection Failure (sec): z. B. *300*
  Channel Bundling: *no*
  Layer 1 Protocol: *ISDN 64 kbps*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***IP***:
  IP Transit Network: *dynamic client*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***:
  RIP Send: *none*
  RIP Receive: *none*
  Van Jacobson Header Compression: *off*
  Dynamic Name Server Negotiation: *client (receive)*
  IP Accounting: *off*
  Back Route Verify: *off*
  Route Announce: *up or dormant*
  Proxy Arp: *off*

- In ***IP*** ➧ ***ROUTING*** ➧ **ADD**:
  Route Type: *Default route*
  Network: *WAN without transit network*
  Partner / Interface: *T-Online*
  Metric: e.g. *1*.

- In ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** ➧ **T_Online** ➧ **Return**:
  Network Address Translation: *on*

Internet Access over Compuserve

Compuserve

The following settings are necessary:

- In ***WAN PARTNER*** ➧ **ADD**:
  Partner Name: e.g. *COMPUSERVE*.
  Encapsulation: *Async PPP over X.75*
  Compression: *none*
  Encryption: *none*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***WAN NUMBERS*** ➧ **ADD**:
  Number (= dial-in number): z. B. *010880191919*
  Direction: *outgoing*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***PPP***:
  Authentication: *none*
  Keepalives: *off*
  Link Quality Monitoring: *off*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***ADVANCED SETTINGS***:
  Callback: *no*
  Static Short Hold (sec): e.g. *120*
  Idle for Dynamic Short Hold (%): e.g. *0*
  Delay after Connection Failure (sec): e.g. *300*
  Channel Bundling: *no*
  Layer 1 Protocol: *ISDN 64 kbps*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***ADVANCED SETTINGS*** ➧ ***COMPUSERVE LOGIN***:
  Provider: Compuserve Network.
  Host: CIS.
  User ID (= your user name).
  Password.

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***IP***:
  IP Transit Network: *dynamic client*

- In ***WAN PARTNER*** ➧ **ADD** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***:
  RIP Send: *none*
  RIP Receive: *none*
  Van Jacobson Header Compression: *off*
  Dynamic Name Server Negotiation: *client (receive)*
  IP Accounting: *off*
  Back Route Verify: *off*
  Route Announce: *up or dormant*
  Proxy Arp: *off*

- In ***IP*** ➧ ***ROUTING*** ➧ **ADD**:
  Route Type: *Default route*
  Network: *WAN without transit network*
  Partner / Interface: *COMPUSERVE*
  Metric: e.g. *1*.

- In ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** ➧ **COMPUSERVE** ➧ **Return**:
  Network Address Translation: *on*

7.4 Saving the Configuration File

After creating a working configuration on your **X4000**, make sure you save it:

- From the Setup Tool main menu, select **Exit** and press **Return**.

  Another menu window opens:

```
X4000 Setup Tool                                BinTec Communications AG
[EXIT]: Exit Setup                                              MyRouter


            Back to Main Menu

            Save as boot configuration and exit
            Exit without saving
```

You have three alternatives:

- Select **Back to Main Menu** to return to the Setup Tool main menu.
- Select **Save as boot configuration and exit** to save the configuration data as a file in the flash memory.

  The SNMP shell of **X4000** appears with the login prompt. All the changes you have made with the Setup Tool are saved. The next time you start your **X4000**, the configuration file you have just saved will be loaded.
- Select **Exit without saving** to quit the Setup Tool without saving the changes made.

  The SNMP shell of **X4000** appears with the login prompt. All settings or changes you have made with the Setup Tool will be lost when you turn off your **X4000**.

8 Advanced Configuration of the Basic Unit with the Setup Tool

This chapter contains more **X4000** configuration options for the advanced user. This is the right chapter if you would like to make additional settings that are not covered by the Configuration Wizard or in chapter 6, page 123.

The following configuration steps are described:

- General ➤➤ **WAN** Settings (chapter 8.1, page 188)
- Settings Specific to WAN Partners (chapter 8.2, page 198)
- Basic ➤➤ **IP** Settings (chapter 8.3, page 242)
- ➤➤ **IPX** Settings (chapter 8.4, page 268)
- Bridging (chapter 8.5, page 275)
- Extra License Functions (chapter 8.6, page 276)

Use the Credits Based Accounting System (see chapter 10.1.3, page 316). This enables you to set a limit for connections to **X4000** to prevent unnecessary charges accumulating as a result of mistakes made during configuration.

8.1 General WAN Settings

General WAN functions:

- **X4000** as Dynamic IP Address ➤➤ **Server** (chapter 8.1.1, page 188)
- CAPI User Concept (chapter 8.1.2, page 190)
- General ➤➤ **PPP** Settings (chapter 8.1.3, page 194)
- Setting of X.31 TEI value (chapter 8.1.4, page 197)

These settings are not linked to certain WAN partners, but concern all WAN connections.

8.1.1 Dynamic IP Address Server

IP address pools

X4000 can operate as a dynamic IP address server for PPP connections. You can use this function by providing one or more pools of ➤➤ **IP addresses**. These IP addresses can be assigned to dial-in WAN partners for the duration of the connection.

Any host routes entered always have priority over IP addresses from the address pools. That is, when an incoming call has been authenticated, **X4000** first checks whether a host route is entered in the routing table for this caller. If not, **X4000** can assign an IP address from an address pool (if available).

If address pools have more than one IP address, you cannot specify which WAN partner receives which address. The addresses are initially assigned in order. If a new dial-in takes place within an interval of one hour, an attempt is made to assign the same IP address assigned to this partner the last time.

Configuration is made in:

- ***IP*** ➧ ***IP ADDRESS POOL WAN (PPP)***
- ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP***
- ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

Field	Meaning
Pool ID	Unique number for identifying the address pool. A pool may comprise a number of address ranges.
IP Address	First IP address in the address pool.
Number of Consecutive Addresses	Total number of IP addresses in the address pool, including the first IP address (**IP Address**).

Table 8-1: ***IP*** ➧ ***IP ADDRESS POOL WAN (PPP)***

Field	Meaning
IP Transit Network	Defines whether a transit network is to be used between **X4000** and the WAN partner. You must select *dynamic server* here if you assign an address pool.

Table 8-2: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP***

Field	Meaning
IP Address Pool	**Pool ID** of the address pool assigned to the WAN partner.

Table 8-3: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

To do Proceed as follows:

- Go to ***IP*** ➧ ***IP ADDRESS POOL WAN (PPP)*** ➧ **ADD**.
- Enter **Pool ID**.
- Enter **IP Address**.
- Enter **Number of Consecutive Addresses**.
- Press **SAVE**.

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** to assign an address pool to a WAN partner.
- Select **IP Transit Network**: *dynamic server*.
- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***.
- Enter **IP Address Pool**: *Pool ID*.
- Confirm with **OK**.
- Press **SAVE**.

8.1.2 CAPI User Concept

User name and password

The CAPI user concept is used to check access to the ➤➤ **CAPI** service. This ensures that only users entered with a user name and password can use **X4000**'CAPI services.

Example

This means, for example, that an incoming fax for the user Winnetou is only passed to Winnetou and not to a user such as Old Shatterhand, who is located in the same LAN. If the CAPI user concept is not used (see "Incoming call answering", page 141), all incoming calls passed to the CAPI service are offered to all CAPI applications in the LAN. The first user to respond receives the call. So if Old Shatterhand is quicker off the mark ...

Configuration is made in:

- ***CAPI*** ➧ ***USER***
- ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING***

Field	Meaning
Name	User name for which access to the CAPI service is to be allowed or denied (maximum 16 characters).
Password	Password with which the user **Name** has to identify to gain access to the CAPI service.
CAPI	Determines whether access to the CAPI service is allowed or denied for the user **Name**. Possible values: ■ *enabled:* access to CAPI allowed ■ *disabled:* access to CAPI denied

Table 8-4: ***CAPI*** ➧ ***USER***

Field	Meaning
Item	Service which is to accept a call to the **Number** below.
Number	Phone number under which the service (**Item**) entered above can be reached.
Mode	Mode in which **X4000** compares the digits of **Number** with the called party number of the incoming call: *right to left:* default mode. *left to right (DDI):* always select this mode if **X4000** is connected to a point-to-point ISDN access (system access).
User name	Corresponds to **Name** in ***CAPI*** ➧ ***USER***. User to whom an incoming call to the CAPI service under **Number** is to be passed.
Bearer	Type of incoming call. Possible values: ■ *data:* data call ■ *voice:* voice call ■ *any:* random call

Table 8-5: ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING***

When on starting **X4000** in ***CAPI*** ➧ ***USER*** there is no entry, automatically a standard entry is created without password (with **Name** = *default* and **CAPI** = *enabled*).

To do Proceed as follows:

➤ Go to ***CAPI*** ➧ ***USER***.

➤ Select an existing entry and confirm it with **Return** or add a new entry with **ADD**.

➤ Enter **Name**.

➤ Enter your **Password**.

How to enter the passwords in the Setup Tool is described in "Changing the password", page 85.

➤ Select **CAPI**.

➤ Press **SAVE**.

➤ Repeat these steps for every user in the LAN.

➤ Go to ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING***.

Make an entry here for every user in the LAN who has access to the CAPI service.

➤ Select an existing entry and confirm it with **Return** or add a new entry with **ADD**.

➤ Select **Item**: *CAPI*.

If you use a communication application on your PC that is based on Remote CAPI 1.1 (current version: Remote CAPI 2.0), **X4000** must translate the ➤➤ **MSN**s (= **Number**, multidigit) of the incoming call to ➤➤ **EAZ**s (single digit) (CAPI 1.1 can only detect single-digit numbers). This is why the CAPI entry under **Item** is not simply called *"CAPI"* but *"CAPI 1.1 EAZ x Mapping"*. When using CAPI 1.1, you must therefore make sure you assign each CAPI application the corresponding EAZ(s) by "mapping". For example select for **Number** = *1234* the entry **Item** = *CAPI 1.1 EAZ **0** Mapping* and for **Number** = *5678* the entry **Item** = *CAPI 1.1 EAZ **1** Mapping*.

CAPI 2.0 evaluates the MSN directly and "translation" to EAZ is not necessary. You can use the same CAPI 1.1 EAZ x Mapping entry for each **Number** i.e. a single entry is sufficient.

You should certainly try to change your PC system to CAPI 2.0 so that you can also use new features.

➤ Enter **Number**.

➤ Select **Mode**.

➤ Enter **User Name**.

➤ Select **Bearer**.

➤ Press **SAVE**.

➤ Repeat these steps as often as necessary until you have created an entry for every user.

When you carry out remote CAPI configuration on the hosts, you must enter the user name and password for each user corresponding to the entries in **X4000**.

8.1.3 General PPP Settings

Authentication

You must enter the ➤➤ **PPP** settings for each WAN partner, e.g. the settings needed for authentication of connection partners with ➤➤ **CHAP** or ➤➤ **PAP** (see chapter 7.3, page 159). If a call is received, **X4000** then recognizes the calling WAN partner from the calling party number with the aid of ➤➤ **CLID** (Calling Line Identification) and therefore knows what authentication negotiations it has agreed with this partner. The call is accepted if the authentication is correct.

CLID

In some cases, it is not possible to identify an incoming call via CLID. This is the case, for example,

- if the call is made over an analog line (the caller dials into your router via a ➤➤ **modem**),
- if the caller suppresses the CLID facility.

In both cases, **X4000** receives no calling line number. The caller therefore cannot be identified by CLID, even if the caller is entered as a WAN partner. **X4000** does not know which ➤➤ **PPP authentication** protocol to use to identify the incoming call.

General PPP settings

In order to answer the call in spite of the identification problem, **X4000** executes the defined general PPP authentication protocol with the caller. This protocol does not refer to a certain WAN partner. If the data (password, partner PPP ID) obtained by executing the authentication protocol are the same as the data of an entered WAN partner, **X4000** accepts the incoming call.

The general PPP settings are configured in ***PPP:***

Field	Meaning
Authentication Protocol	Defines the PPP authentication protocol offered to the caller first. Possible values: ■ *PAP:* PAP only ■ *CHAP:* CHAP only ■ *CHAP + PAP:* first CHAP, then PAP ■ *MS-CHAP:* MS-CHAP only ■ *CHAP + PAP + MS-CHAP:* first CHAP, if denied then the protocol required by the caller ■ *MS-CHAP V2*: MS-CHAP version 2 only ■ *none:* no PPP authentication
Radius Server Authentication	Settings for RADIUS server authentication. For RADIUS, see Extended Features Reference.
PPP Link Quality Monitoring	Defines whether Link Quality Monitoring is executed for PPP connections. Possible values: ■ *no*, is not executed. ■ *yes*, the connection statistics are stored in the ➤➤ **MIB** table **biboPPPLQMTable**.
PPPoE Ethernet Interface	Defines the interface used by PPP-over-Ethernet for using an ADSL connection (see chapter 7.2.3, page 155).

Table 8-6: ***PPP***

To do Proceed as follows to define the general PPP settings:

➤ Go to ***PPP***.

➤ Select **Authentication Protocol**, e.g. *CHAP + PAP + MS-CHAP*.

- Select **Link Quality Monitoring**, e.g. *no*.
- Press **SAVE**.

8.1.4 X.31 TEI

The menu ***CM-1BRI, ISDN S0*** ➧ ***ADVANCED SETTINGS*** contains settings for X.31 TEI (X.25 in the D-channel). You only need to make changes here if you want to use the X.31 TEI value for CAPI applications.

The menu contains the following fields:

Field	Meaning
X.31 TEI Value	X.31 TEI is detected automatically in ISDN autoconfiguration and this value set to *specify*. If autoconfiguration has not detected TEI, you can set *specify* manually.
Specify TEI Value	The value for X.31 TEI assigned by the exchange. This value is detected automatically by ISDN autoconfiguration, but can also be entered manually.
X.31 TEI Service	Here you select the service for which you want to use X.31 TEI. Possible values: ■ *Capi* ■ *Capi Default* ■ *Packet Switch* *Capi* and *Capi Default* are for using X.31 TEI for CAPI applications. For *CAPI*, the TEI value set in the CAPI application is used. For *CAPI Default*, the value of the CAPI application is ignored and the default value set here is always used. Set to *Packet Switch* if you want to use X.31 TEI for the X.25 router.

Table 8-7: ***CM-1BRI, ISDN S0*** ➧ ***ADVANCED SETTINGS***

8.2 Settings Specific to WAN Partners

Specific functions for ➤➤ **WAN partners** make it possible to define the characteristics for connections to WAN partners individually. Carry out the configuration steps described separately for each WAN partner.

- Delay after Connection Failure (chapter 8.2.1, page 198)
- Channel Bundling (chapter 8.2.2, page 199)
- Bandwidth on Demand (BoD) (chapter 8.2.3, page 201)
- Always On/Dynamic ISDN (AO/DI) (chapter 8.2.4, page 206)
- Layer 1 Protocol (ISDN B-Channel) (chapter 8.2.5, page 219)
- IP Transit Network (chapter 8.2.6, page 222)
- Transfer of DNS and WINS Server IP Addresses to WAN Partners (chapter 8.2.7, page 225)
- ➤➤ **RIP** (Routing Information Protocol) (chapter 8.2.8, page 229)
- Compression: ➤➤ **VJHC**, ➤➤ **STAC**, MS-STAC (chapter 8.2.9, page 232)
- ➤➤ **Proxy ARP** (Address Resolution Protocol) (chapter 8.2.10, page 234)
- Keepalive Monitoring (chapter 8.2.11, page 236)

The configuration steps necessary in each case are explained in detail below.

8.2.1 Delay after Connection Failure

This function enables you to set the period of time **X4000** is to wait after an unsuccessful attempt to set up a call.

This is configured in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***:

Field	Meaning
Delay after Connection Failure (sec)	Block timer. Indicates the wait time in seconds before **X4000** tries again after an attempt to establish a connection has failed.

Table 8-8: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***

To do Proceed as follows:

- ➤ Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***.
- ➤ Enter **Delay after Connection Failure (sec)**.
- ➤ Confirm with **OK**.
- ➤ Press **SAVE**.

8.2.2 Channel Bundling

X4000 supports dynamic and static ➤➤ **channel bundling** for dialup connections. Only one B-channel is initially opened when a connection is established.

Dynamic Dynamic channel bundling means that **X4000** connects other ➤➤ **ISDN** B-channels to increase the throughput for connections to the WAN partner, if this is required, e.g. for large amounts of data. If the amount of data traffic drops, the additional ➤➤ **B-channels** are closed again.

Static In static channel bundling, you specify right from the start how many B-channels **X4000** uses for connections to the WAN partner, regardless of the amount of data transferred.

The configuration is made in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***:

Field	Meaning
Channel Bundling	Defines whether and which type of channel bundling is to be used for connections to the WAN partner.
Total Number of Channels	For dynamic channel bundling: Defines the maximum number of B-channels that may be opened. For static channel bundling: Defines the number of B channels that are open during the complete connection.

Table 8-9: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***

The **Channel Bundling** field contains the following selection options:

Possible values	Meaning
no	No channel bundling, only one B-channel is ever available for connections.
dynamic	Dynamic channel bundling.
static	Static channel bundling.

Table 8-10: **Channel bundling**

To do Proceed as follows:

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***.
- Select **Channel Bundling**.
- Enter **Total Number of Channels**.
- Confirm with **OK**.
- Press **SAVE**.

Refer to Bandwidth on Demand (BOD) function, see chapter 8.2.3, page 201.

8.2.3 Bandwidth on Demand (BoD)

This function permits dynamic bundling of leased lines with dialup lines to cope with large amounts of data. You have the following options:

- BOD for leased lines, i.e. dynamic connection of one or more dialup connection(s) to the existing leased line, if required.
- BOD for dialup connections, i.e. dynamic connection of one or more dialup connection(s) to the existing dialup connection, if required.
- Backup for leased lines, i.e. establishing a dialup connection when the leased line to the partner fails. BOD also acts if the leased line fails (i.e. other dialup connections can be switched in); if more than 1 additional channel was allowed in the configuration (**Maximum Number of Dialup Channels** > *1*).

Switching B-channels in and out

A B-channel is switched in if the current data throughput of the relevant interface to the connection partner is 90 % or more of the maximum permissible throughput for at least 5 seconds.

The current throughput is not used as a basis for switching out a B-channel already connected. This is based on the calculated (i.e. fictitious) throughput of the channel group after switching out one B-channel. A B-channel is switched out if the calculated value stays below 80 % of the maximum permissible throughput of the remaining channels for 10 seconds.

Static or dynamic short hold may also cause an additional B-channel to be switched out. If static short hold has been configured, this always has the highest priority. If dynamic short hold has been configured, the calculated value mentioned above must also apply.

X4000 also supports the AO/DI (Always On/Dynamic ISDN) function for using the ISDN D-channel for data transmission (see chapter 8.2.4, page 206).

Authentication

PPP authentication is not required from the connection partner for establishing a leased line. Authentication is, however, necessary for any dialup connections switched in.

Configuration is made in:

- ***WAN Partner*** ➧ ***Edit*** ➧ ***Advanced Settings*** ➧ ***Extended Interface Settings (optional)***
- ***WAN Partner*** ➧ ***Edit*** ➧ ***WAN Numbers*** ➧ **ADD** (menu description in chapter 7.3, page 159)
- ***WAN Partner*** ➧ ***Edit*** ➧ ***PPP*** (menu description in chapter 7.3, page 159)

The menu ***WAN Partner*** ➧ ***Edit*** ➧ ***Advanced Settings*** ➧ ***Extended Interface Settings (optional)*** contains the following fields:

The fields described below appear only if **Channel Bundling** = *dynamic* has previously been selected in the menu ***WAN Partner*** ➧ ***Edit*** ➧ ***Advanced Settings***.

Field	Meaning
Mode	Defines which mode is used for BOD. Possible values: see Table 8-12, page 205.
Line Utilization Weighting	Defines how the line utilization is calculated. Possible values: ■ *equal:* All the measured values of throughput in **Line Utilization Sample (sec)** are weighted equally for the calculation (default value). ■ *proportional:* The last measured values of throughput are weighted more heavily for the calculation, i.e. the calculation is most heavily influenced by the last measured values in **Line Utilization Sample (sec)**.
Line Utilization Sample (sec)	Time interval in seconds. Throughput measurements in **Line Utilization Sample (sec)** are included in the calculation of the line utilization. Possible values: *5* to *300* (default value: *5*).
Gear Up Threshold	Utilization threshold at which another B-channel is added for a connection.
Gear Down Threshold	B-channels are dropped until the remaining channels have at least the percentage utilization degree remaining here.
D-Channel Queue Length	(only if **Layer 1 Protocol** = *AO/DI* in the menu ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***) Threshold value for the number of bytes accumulated in the D-channel at which the system is to change to the B-Channel Mode (see chapter 8.2.4, page 206).

Field	Meaning
Maximum Number of Dialup Channels	Maximum permitted number of channels that are opened for dialup connections. The value is only displayed here; it is set under **Total Number of Channels** in the menu ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***.

Table 8-11: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS*** ➧ ***EXTENDED INTERFACE SETTINGS (OPTIONAL)***

The **Mode** field includes the following selection options:

Possible values	Meaning
Bandwidth On Demand Disabled	Deactivates BOD, no additional channels are opened (default value).
Bandwidth On Demand Enabled	(For dialup connections only) Activates BOD, additional channels can be opened. The connection partner who initiated the connection opens the additional channels.
BAP, Active Mode	(Necessary for the AO/DI (Always On/Dynamic ISDN) function, see Table 8-17, page 214)
BAP, Passive Mode	Is currently not supported by **X4000**.
BAP, Active and Passive Mode	Is currently not supported by **X4000**.
BAP, Client Active Mode	Is currently not supported by **X4000**.
Backup	(For leased lines only) Backup connection is activated if the leased line fails. The backup connection is cleared when the leased line is available again. BOD is also available for this mode, if a value > 1 is used for **Maximum Number of Dialup Channels**.
Bandwidth On Demand Active	(For leased lines only) Enables BOD and defines the active partner. Only one of the connection partners should be configured as active partner. This page activates switching in and out additional B-channels on demand.
Bandwidth On Demand Passive	(For leased lines only) Enables BOD and defines the passive partner. This page does not activate switching in and out additional channels.

Table 8-12: **Mode**

To do Proceed as follows:

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS*** ➧ ***EXTENDED INTERFACE SETTINGS (OPTIONAL)***.
- Select **Mode** and **Line Utilization Weighting**.
- Enter **Line Utilization Sample (sec)** and **Maximum Number of Dialup Channels**.
- Press **SAVE**.
- Confirm with **OK**.
- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***WAN NUMBERS*** ➧ **ADD**.
- Enter **Number**.
- Select **Direction**.

Select **Direction** = *outgoing* if you have set **Mode** = *Bandwidth On Demand Active*.

Select **Direction** = *incoming (CLID),* if you have set **Mode** = *Bandwidth On Demand Passive*.

- Press **SAVE**.
- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***PPP***.
- Select **Authentication**.
- Enter **Partner PPP ID**, **Local PPP ID** and **PPP Password**, if applicable.
- Confirm with **OK**.
- Press **SAVE**.

8.2.4 Always On/Dynamic ISDN (AO/DI)

Always On/Dynamic ISDN (AO/DI) uses the existing ISDN infrastructure to configure a new service for the user without hardware changes: AO/DI is a permanently available (always on) but nevertheless low-cost connection from the end customer to the Internet Service Provider.

Short Description

AO/DI uses X.25 data packet transmission in the D-channel (X.31) to set up a PPP connection (PPP over X.25). 9600 bps are available for data transmission in the D-channel (D-channel Mode). If more bandwidth is needed, one or two B-channels are dynamically added (Dynamic ISDN). Data transmission in this case is only in the B-channel or B-channels, i.e. the B-channels remain reserved for bandwidth-intensive applications (B-channel Mode).

AO/DI offers the following advantages:

- three full communication channels, which can be independent if required
- permanent connection to the Internet at low-cost
- transparent bandwidth control
- in D-Channel Mode
  - high reliability and guaranteed throughput times
  - volume-oriented charges independent of distance
- in B-Channel Mode:
  - time-dependent connection charges only for bandwidth-intensive applications

How Does AO/DI Work?

AO/DI is implemented in **X4000** via a special PPP interface. As soon as the interface is configured and ready for operation, the initial PPP connection is set up via X.31 (X.25 in the D-channel). This involves carrying out authentication of the PPP connection partner and assigning a dynamic IP address and DNS addresses, if applicable (AO/DI Client Mode).

The use of the B-channels is controlled by the data throughput or by application-dependent bandwidth management (Bandwidth on Demand, BOD for IP-based applications). Both Bandwidth on Demand and BOD for IP-based applications uses the Bandwidth Allocation Control Protocol (BACP/BAP to RFC 2125) in order to agree with the remote terminal on the circumstances under which B-channels are to be added or dropped. The use of BACP/BAP is agreed during the initial connection setup. As the D-channel connection is normally no longer

ended after connection setup, it represents a permanently available (always on) connection to the provider.

As soon as the bandwidth of the D-channel is no longer adequate for data transmission, B-channels are added and data transmission takes place exclusively in the B-channels (Dynamic ISDN). This is implemented in **X4000** by an advanced configuration option in the IP subsystem. An interface is assigned filters, rules and rule chains similar to the concept for IP Access Lists (see User's Guide, chapter 9.2.8 "Filters (Access Lists)". These rules can be used to determine whether additional B-channels are to be set up for certain protocols, ports or IP addresses, or whether data transfer is to take place exclusively in the D-channel.

How is AO/DI Configured?

The following steps are necessary for configuring **X4000** for AO/DI:

- Carry out X.31 configuration, i.e. reserve the TEI (Terminal Endpoint Identifier) value for X.25 (Packet Switch) (see "X.31 configuration", page 209)
- Carry out X.25 configuration (see "X.25 configuration", page 209):
  - Link configuration for Datex-P
  - Call routing
- Configure AO/DI partner as WAN partner (see "Configuring AO/DI partner as WAN partner", page 211)
  - Select PPP parameters
  - Define the PPP interface as AO/DI interface
  - Enter X.25 destination address for initial connection setup
  - Control Bandwidth on Demand (dynamic B-channel bundling)
  - Control BOD for IP-based applications

Please note the following when carrying out X.25 configuration:

Some of the X.25 parameters must be adapted to the X.25 network connected. For Datex-P, the **Windowsize/Packetsize Neg.** field must be deactivated using the Setup Tool.

For **X4000**, the X.25 software is designed as an X.25 switch. This switch must be appropriately configured for AO/DI (see "X.25 configuration", page 209).

You will find all the necessary steps below for configuring **X4000** for AO/DI with the Setup Tool.

X.31 configuration

Proceed as follows to assign X.31/X.25:

- Go to ***CM-1BRI, ISDN S0*** ➧ ***ADVANCED SETTINGS*** (the menu is described in chapter 8.1.4, page 197).
- Select **X.31 TEI Value**: *specify*.

The default setting for **X.31 TEI Value** should be*specify*. If this is not the case, the X.31 service has not been detected by autoconfiguration and this service is probably not supported (contact your telephone provider).

- Enter **Specify TEI Value**: *1*.
- Select **X.31 TEI Service**: *Packet Switch*.
- Press **SAVE**.

  You have returned to the ***CM-1BRI, ISDN S0*** menu.
- Press **SAVE**.

  You have returned to the main menu. The main menu now contains the X.25 menu, which you need for the following configuration steps. Information about the X.25 parameters can be found in the Extended Features Reference at www.bintec.de.

X.25 configuration

Proceed as follows to make the preset link settings for X.25 configuration for Datex-P:

- Go to ***X.25*** ➧ ***LINK CONFIGURATION***.
- Select the interface for which you want to configure X.25, e.g. *x31d2-0-1*.

The following parts of the menu are relevant for this configuration step:

Field	Meaning
L3 Packet Size	Permissible size of data packets for this connection on the third layer of the OSI model.
Windowsize/Packetsize Neg.	Negotiation of the size of **Windowsize** and **Packetsize** with the remote terminal. There is only one meaningful setting for Datex-P: *never*, i.e. negotiation is deactivated.
Highest Two-Way-Channel (HTC)	Defines the highest number of virtual channels.

Table 8-13: ***X.25*** ➧ ***LINK CONFIGURATION*** ➧ ***EDIT***

- Select **L3 Packet Size max**: *256*.
- Select **Windowsize/Packetsize Neg.** : *never*.
- Enter **Highest Two-Way-Channel (HTC)**: *1*.
- Press **SAVE**.
- Leave ***X.25*** ➧ ***LINK CONFIGURATION*** with **Exit**.

Proceed as follows to make the preset routing settings for X.25 configuration:

- Go to ***X.25*** ➧ ***ROUTING*** ➧ ***ADD***.

The following parts of the menu are relevant for this configuration step:

Field	Meaning
Source Link	Source interface of data packets.
Destination Link	Destination interface of data packets.
Destination X.25 Address	X.25 destination address

Table 8-14: ***X.25*** ➧ ***ROUTING*** ➧ ***ADD***

- Select **Source Link**: *local*.
- Select **Destination Link**, e.g. *x31d2-0-1*.

- Enter **Destination X.25 Address**, e.g. *019011*.
- Press **SAVE**.
- Leave ***X.25*** ➧ ***ROUTING*** ➧ ***ADD*** with **Exit**.
- Leave ***X.25*** ➧ ***ROUTING*** with **Exit**.
  You have returned to the main menu.

Configuring AO/DI partner as WAN partner

To define an AO/DI-capable PPP interface, proceed as follows:

- Go to ***WAN PARTNER*** ➧ ***ADD***.
- Enter **Partner Name**, e.g. *AODI partner*.
- Select **Encapsulation**: *PPP*.

Proceed as follows to make the PPP settings:

- Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***PPP***.
- Select **Authentication**, e.g. *CHAP*.
- Leave out **Partner PPP ID**.
- Enter **Local PPP ID**, e.g. *bintec_router*.
- Enter **PPP Password** twice, e.g. *secret*.
  An asterisk appears on the screen as a place marker for each letter you enter for the password.
- Confirm with **OK**.

To activate AO/DI on the PPP interface and enter the X.25 address, proceed as follows:

- Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***ADVANCED SETTINGS***.

The following part of the menu is relevant for this configuration step:

Field	Meaning
Layer 1 Protocol	Defines which Layer 1 Protocol **X4000** is to use. There is only one meaningful setting for AO/DI: *AO/DI*.
Channel Bundling	Defines whether or which type of channel bundling is to be used for connections to the WAN partner (see manual, chapter 7.2.2). If *AO/DI* is selected under **Layer 1 Protocol**, *dynamic* is set automatically for **Channel Bundling**.
Total Number of Channels	Defines the maximum number of channels that may be opened for dynamic channel bundling.
Remote X.25 Address	X.25 destination address. Appears only if *AO/DI* is selected under **Layer 1 Protocol**.

Table 8-15: ***WAN PARTNER*** ➧ ***ADD*** ➧ ***ADVANCED SETTINGS***

- Select **Layer 1 Protocol**: *AO/DI*.
- Enter **Total Number of Channels**, e.g. *1*.
- Enter **Remote X.25 Address**, e.g. *019011*.

Proceed as follows to configure BACP/BAP for the "AO/DI client" access (control of Bandwidth On Demand):

- Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***ADVANCED SETTINGS*** ➧ ***EXTENDED INTERFACE SETTINGS (OPTIONAL)***.

The following part of the menu is relevant for this configuration step:

Field	Meaning
Mode	Defines which mode is used for BOD. Only the *BAP, Active Mode* setting is used for an AO/DI client.
Line Utilization Weighting	Weighting within the interval considered for adding and dropping B-channels.
Line Utilization Sample (sec)	Length of the interval over which the mean of the measured throughput data is taken and weighted with **Line Utilization Weighting**.
Gear Up Threshold	Utilization threshold at which another B-channel is added for a connection.
Gear Down Threshold	B-channels are dropped until the remaining channels have at least the percentage utilization degree remaining here.
D-Channel Queue Length	Threshold value for the number of bytes accumulated in the D-channel at which the system is to change to the B-Channel Mode.
Maximum Number of Dialup Channels	Maximum number of channels that may be opened. The value is defined in the **Total Number of Channels** field under ***WAN PARTNER*** ➧ ***ADD*** ➧ ***ADVANCED SETTINGS***.

Table 8-16: ***WAN PARTNER*** ➧ ***ADD*** ➧ ***ADVANCED SETTINGS*** ➧ ***EXTENDED INTERFACE SETTINGS (OPTIONAL)***

The following selection option in the **Mode** field is relevant for AO/DI:

Possible values	Meaning
BAP, Active Mode	The Bandwidth Allocation Protocol (BAP) knows three different options for negotiating a bandwidth change. It behaves as follows in Active Mode: ■ Call Request: one of the two communication partners wants to add a B-channel; adding the channel is initiated if applicable. ■ Callback Request: the remote terminal is requested to add a B-channel; adding the channel is not initiated but accepted if applicable. ■ Link Drop Request: one communication partner wants to drop a B-channel; dropping is initiated or accepted if applicable.

Table 8-17: **Mode** = *BAP, Active Mode*

- Select **Mode**: *BAP, Active Mode*.
- Use the preset values for the other fields of this menu.
- Press **SAVE**.
- Confirm with **OK**.

To enter the necessary ISDN extensions for adding the B-channel, proceed as follows:

- Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***WAN NUMBERS*** ➧ ***ADD***.
- Enter the **Number**, e.g. *0911123456*.
- Select **Direction**: *outgoing*.
- Press **SAVE**.

➤ Leave ***WAN PARTNER*** ➧ ***ADD*** ➧ ***WAN NUMBERS*** ➧ ***ADD*** with **Exit**.

For dynamic assignment of the IP address by the Internet Service Provider, proceed as follows:

➤ Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***IP***.

➤ Select **IP Transit Network**: *dynamic client*.

➤ Press **SAVE**.

➤ Press **SAVE**.

➤ Leave ***WAN PARTNER*** with **Exit**.
You have returned to the main menu.

BOD for IP-Based Applications (Optional)

Filters and rules

BOD for IP-based applications is configured by filters and rules in a similar way to Access Lists for IP packets (see chapter 10.2.8, page 335). First filters are defined that determine which IP packets (and thus applications) are to influence the available bandwidth. If several filters are defined, they can be interlinked using a rule chain.

Proceed as follows to define suitable filters:

➤ Go to ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***FILTER*** ➧ ***ADD***.

➤ Enter **Description**, e.g. *mail_smtp_out*.

➤ Select **Protocol**, e.g. *tcp*.

➤ Enter **Destination Address**, e.g. *172.16.08.15*.

➤ Enter **Destination Mask**, e.g. *255.255.255.255*.

➤ Select **Destination Port**: e.g. *specify*.

➤ Enter **Specify Port**, e.g. *25* (port for SMTP).

➤ Press **SAVE**.
A list of all the previously defined filters appears.

➤ Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***FILTER*** with **Exit**.

A rule for BOD is defined in a similar way to a rule for IP packets (see chapter 10.2.8, page 335). Different rules normally consist of different filters

and can be interlinked to form a rule chain. Each rule results in an action, but the direction of the data packets for which it is to apply can also be stated for each rule, i.e. for sent or received data packets.

Proceed as follows to define a rule for BOD:

➤ Go to ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***RULES FOR BOD*** ➧ ***ADD***.

In addition to the already familiar fields for definition of conventional rules (see chapter 10.2.8, page 335), the menu contains the following fields:

Field	Meaning
Direction	Direction of data packets to which the rule is to be applied. Possible values: ■ *incoming*: incoming data packets ■ *outgoing*: outgoing data packets ■ *both*: incoming and outgoing data packets
Number of Channels	Number of B-channels that are to be added.

Table 8-18: ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***RULES FOR BOD*** ➧ ***ADD***

The **Action** field, which indicates how a filtered out data packet is to be handled, contains the following selection options:

Possible values	Meaning
invoke M	B-channels are added if the rule matches.
invoke !M	B-channels are added if the rule does not match.
deny M	B-channels are not added if the rule matches.
deny !M	B-channels are not added if the rule does not match.
ignore	The rule is ignored or it is omitted if part of a rule chain.

Table 8-19: **Action**

- Select **Action**, e.g. *invoke M*.
- Select **Direction**, e.g. *outgoing*.
- Select **Number of Channels**, e.g. *1*.
- Select **Filter**, e.g. *mail_smtp_out*.
- Press **SAVE**.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***RULES FOR BOD*** with **Exit**.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** with **Exit**.
  You have returned to the main menu.

To apply a rule to an interface, proceed as follows:

- Go to ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***CONFIGURE INTERFACES FOR BOD***.
- Select the interface to which you wish to apply a rule, e.g. *aodiclient*, and press **Return**.
- Select the rule you wish to apply to this interface, e.g. *mail_smtp_out*.
- Press **SAVE**.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***CONFIGURE INTERFACES FOR BOD*** ➧ ***EDIT*** with **Exit**.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***CONFIGURE INTERFACES FOR BOD*** with **Exit**.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** with **Exit**.
  You have returned to the main menu.

Configuration Examples for BOD (Bandwidth on Demand)

Two configuration examples are described below:

- Additional Bandwidth for HTTP Connections
- Restricting Mail Reception to D-Channel

Additional bandwidth for HTTP connections

The following example shows a special configuration of **X4000** for connection setup of the PC with the IP address 172.16.77.11 (TCP Port 80) to the Internet. The system should always change to B-Channel Mode with one B-channel when an HTTP connection is set up to the Internet.

Proceed as follows to define the relevant filter for BOD:

- Go to ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***FILTER*** ➧ ***ADD***.
- Enter **Description**: *hostxy_http_out*.
- Select **Protocol**: *tcp*.
- Enter **Source Address**: *172.16.77.11*.
- Enter **Source Mask**: *255.255.255.255*.
- Select **Destination Port**: *specify*.
- Enter **Specify Port**: *80*.
- Press **SAVE**.
  A list of all the previously defined filters appears.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***FILTER*** with **Exit**.

Proceed as follows to define a rule for BOD:

- Go to ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***RULES FOR BOD*** ➧ ***ADD***.
- Select **Action**: *invoke M*.
- Select **Direction**: *outgoing*.
- Select **Number of Channels**: *1*.
- Select **Filter**: *hostxy_http_out (1)*.
- Press **SAVE**.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***RULES FOR BOD*** with **Exit**.

Restricting mail reception to D-channel

In the following configuration example, mail reception is restricted to the D-channel and there is no change to B-Channel Mode. The inquiry about whether new mails have been received does not cause a change to B-Channel Mode either.

Proceed as follows to define the relevant filter for BOD:

- Go to ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***FILTER*** ➧ ***ADD***.
- Enter **Description**: *mail_pop3_in*.
- Select **Protocol**: *tcp*.

- Enter **Destination Address**: *172.16.08.15*.
- Enter **Destination Mask**: *255.255.255.255*.
- Select **Destination Port**: *specify*.
- Enter **Specify Port**: *110*.
- Press **SAVE**.
  A list of all the previously defined filters appears.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***FILTER*** with **Exit**.

Proceed as follows to define a rule for BOD:

- Go to ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***RULES FOR BOD*** ➧ ***ADD***.
- Select **Action**: *deny*.
- Select **Direction**: *incoming*.
- Select **Number of Channels**: *1*.
- Select **Filter**: *mail_pop3_in (2)*.
- Press **SAVE**.
- Leave ***IP*** ➧ ***BANDWIDTH ON DEMAND (BOD)*** ➧ ***RULES FOR BOD*** with **Exit**.

8.2.5 Layer 1 Protocol (ISDN B-Channel)

ISDN B-channel

You can define the Layer 1 Protocol of the ISDN ➧➧ **B-channel** that **X4000** is to use for connections to the WAN partner. The default setting is the protocol for 64-kbps ISDN data connections, which is the default value of the B-channel. Only change the setting if expressly required.

This is configured in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***:

Field	Meaning
Layer 1 Protocol	Defines which Layer 1 Protocol **X4000** is to use. This setting applies only to outgoing calls to the WAN partner and to incoming calls from the WAN partner, if they have been identified from the calling party number.

Table 8-20: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***

For incoming calls that cannot be identified from the calling party number, **X4000** uses the settings under **Item** in menu ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING*** as the Layer 1 Protocol (see "Incoming call answering", page 141).

Layer 1 Protocol contains the following selection options:

Possible values	Meaning
ISDN 64 kbps	For 64-kbps ISDN data connections. This is the default value.
ISDN 56 kbps	For 56-kbps ISDN data connections.
Modem	(Only available if expansion card and resource card with digital modems are installed) Assigns incoming analog calls to the PPP routing service. The digital modem on the resource card that accepts this call uses the settings for Modem Profile 1, which were selected in the menu ***MODEM*** ➧ ***PROFILE CONFIGURATION*** ➧ ***PROFILE 1***.
DOVB	Data transmission Over Voice Bearer - useful in the USA, for example, where voice connections are sometimes cheaper than data connections.
V.110 (1200 ... 38400)	For GSM connections with V.110 at bit rates of 1200 bps, 2400 bps,..., 38400 bps.
Modem Profile 1 ... 8	(Only available if expansion card and resource card with digital modems are installed) Assigns incoming analog calls to the PPP routing service. The digital modem on the resource card that accepts this call uses the settings for Modem Profile1... 8, which were selected in the menu ***MODEM*** ➧ ***PROFILE CONFIGURATION*** ➧ ***PROFILE 1...8***.
PPTP PNS	For VPN interface.
PPP over Ethernet (PPPoE)	For connections to ADSL (see chapter 7.2.3, page 155 and chapter 9.3.2, page 288).
AO/DI	For using Always On/Dynamic ISDN (AO/DI, see chapter 8.2.4, page 206).

Table 8-21: **Layer 1 Protocol**

Most of the entries for **Layer 1 Protocol** correspond to the entries for **Item** in ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING*** (see "Incoming call answering", page 141).

To do Proceed as follows:

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***ADVANCED SETTINGS***.
- Select **Layer 1 Protocol**.
- Confirm with **OK**.
- Press **SAVE**.

8.2.6 IP Transit Network

When you enter a WAN partner in **X4000**, there are various options for indicating the IP address of the partner network:

- You enter the ➤➤ **IP address** and ➤➤ **netmask** of the partner or partner network. You must obviously have this information available.
- You use an additional ISDN IP address each for **X4000** and the WAN partner. You thus set up a virtual IP network during the connection, a so-called transit network. You do not need this setting normally, only for some special configurations.
- You assign the WAN partner a dynamic IP address from a specified IP address pool for the duration of the connection.
- Get the WAN partner to assign you a dynamic IP address for the duration of the connection.

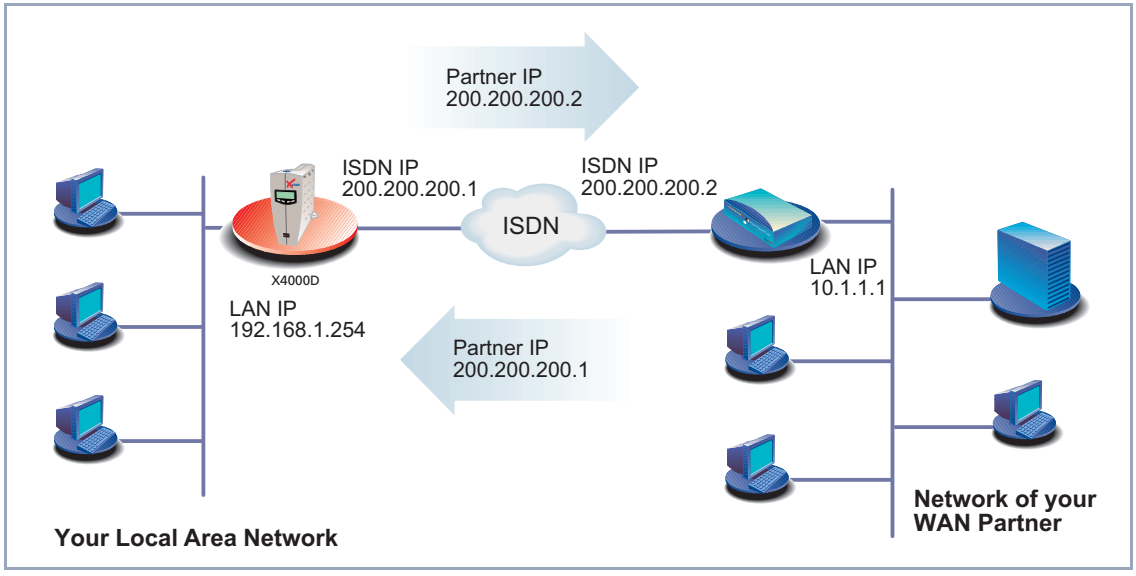


Figure 8-1: LAN-LAN link with transit network

The configuration is made in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP***:

Field	Meaning
IP Transit Network	Defines whether **X4000** sets up a transit network to the WAN partner. Possible values: see Table 8-23, page 225.
Local IP Address	LAN IP address of **X4000**. Appears only for the following value of **IP Transit Network**: *no*. You normally do not need to make any entry here. Exception: You set up several WAN partners, use a transit network for one or more WAN partners and no transit network for the other WAN partners. Then enter the **Local IP Address** (LAN IP address) for all WAN partners without a transit network.
Local ISDN IP Address	ISDN IP address of **X4000** in the transit network.
Partner's ISDN IP Address	WAN partner's ISDN IP address in the transit network.
Partner's LAN IP Address	IP address of LAN of WAN partner or LAN IP address (host).
Partner's LAN Netmask	WAN partner's LAN netmask. If you make no entry, **X4000** enters a default netmask for the net class used under **Partner's LAN IP Address**.

Table 8-22: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP***

IP Transit Network contains the following selection options:

Possible values	Meaning
yes	A transit network is used.
dynamic client	**X4000** receives its IP address from the WAN partner for the duration of the connection.
dynamic server	**X4000** assigns the ➤➤ **Remote** WAN partner an IP address for the duration of the connection. In this case, **X4000** must be configured as a dynamic IP address server, i.e. it has an IP address pool available (see chapter 8.1.1, page 188).
no	No transit network. This setting is adequate for most WAN partners.

Table 8-23: **IP Transit Network**

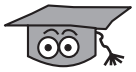
To do Proceed as follows:

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP***.
- Select **IP Transit Network**.
- Enter **Local IP Address**, if applicable.
- Enter **Local ISDN IP Address**.
- Enter **Partner's ISDN IP Address**, if applicable.
- Enter **Partner's LAN IP Address**, if applicable.
- Enter **Partner's LAN Netmask**, if applicable.
- Press **SAVE**.

8.2.7 Transfer of DNS and WINS IP Addresses to WAN Partner

IP address = ? A Domain Name Server (➤➤ **DNS**) or Windows Internet Name Server (WINS) is used for converting host names and ➤➤ **NetBIOS** names into IP addresses

(name resolution). Domain Name Servers form a hierarchical tree structure. As soon as a request is sent to a Domain Name Server, it tries to execute name resolution using its internal tables. If it cannot find the name, it asks a higher-level DNS that it knows.



If you use the DNS Proxy function, **X4000** can save previously resolved names and IP addresses in the cache and on receipt of a request first checks if the desired address can be answered from the cache. This keeps the costs of setting up WAN connections to name servers outside the LAN at a low level and optimizes performance in the LAN, as requests to frequently used addresses or addresses already resolved are answered by **X4000** itself. How to configure the DNS Proxy function is described in chapter 8.3.2, page 246.

When you enter a WAN partner in **X4000**, you can define whether **X4000** sends or answers requests for WINS or DNS IP addresses.

Configuration is made in:

- ***IP*** ➧ ***STATIC SETTINGS***
- ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

Field	Meaning
Primary Domain Name Server	IP address of **X4000**'s first global Domain Name Server (DNS).
Secondary Domain Name Server	IP address of another global Domain Name Server.
Primary WINS	IP address of **X4000**'s first global WINS (Windows Internet Name Server) or NBNS (NetBIOS Name Server).
Secondary WINS	IP address of another global WINS or NBNS.

Table 8-24: ***IP*** ➧ ***STATIC SETTINGS***

Field	Meaning
Dynamic Name Server Negotiation	In the event of dynamic name server negotiation, defines whether **X4000** receives IP addresses for **Primary Domain Name Server**, **Secondary Domain Name Server**, **Primary WINS** and **Secondary WINS** from the WAN partner or sends them to the WAN partner.

Table 8-25: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

The **Dynamic Name Server Negotiation** field contains the following selection options:

Possible values	Meaning
off	**X4000** does not send or answer requests for WINS or DNS IP addresses.
yes	The response is linked to the mode for issuing/ receiving an IP address (setting in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** under **IP Transit Network**): ■ **X4000** sends requests for name server addresses to the WAN partner if *dynamic client* is selected. ■ **X4000** answers requests for name server addresses from the WAN partner if *dynamic server* is selected. ■ **X4000** answers but does not send requests for name server addresses if *yes* or *no* is selected.
client (receive)	**X4000** sends requests for name server addresses to the WAN partner.
server (send)	**X4000** answers requests from the WAN partner for name server addresses.

Table 8-26: **Dynamic Name Server Negotiation**

WINS, DNS in the LAN

If you have set up a DNS or WINS in your LAN, enter its IP address.

To do

Proceed as follows if you have not made this entry already (see chapter 8.3.2, page 246):

➤ Go to ***IP*** ➧ ***STATIC SETTINGS***.

➤ Enter **Primary** or **Secondary Domain Name Server**.

➤ Enter **Primary** or **Secondary WINS**.

➤ Press **SAVE**.

Proceed as follows if you want **X4000** to report the name server addresses entered to the WAN partner (Server Mode) or if other name server addresses other than those in the LAN are to be used for connections to the WAN partner (Client Mode, e.g. for dialing in to an Internet Service Provider):

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***.
- Select **Dynamic Name Server Negotiation**.
- Confirm with **OK**.
- Press **SAVE**.

If you do not have a Secondary DNS or WINS server, you can enter the IP address of the Primary DNS or WINS server in the **Secondary Domain Name Server** or **Secondary WINS** field again.

This may be necessary for connection to some data communications clients.

If you do not have a Domain Name Server in your LAN (smaller networks often have no DNS of their own), the name resolution can be carried out, for example, via your Internet Service Provider (Client Mode). However, this requires ISDN connections, which involve charges.

If you work with Windows, you can also obtain name resolution without asking for a DNS. To do this, you must adapt the LMHOSTS file on all PCs in the LAN.

8.2.8 Routing Information Protocol (RIP)

Routing

Routing can be described as follows: The➤➤ **router** receives ➤➤ **data packets**, each of which contains data about the destination host. On the basis of the entries in the so-called Routing Table (see "Creating a Routing Entry", page 175), the router decides which route to use to forward the data packet to ensure that it arrives at its destination as quickly and cheaply as possible (with the fewest possible intermediate stations). The entries in the routing table can be defined statically or the routing table can be updated constantly by a dynamic exchange of routing information between several routers. This exchange is

controlled by a so-called Routing Protocol, e.g. RIP (Routing Information Protocol).

RIP

Routers use the ➤➤ **RIP** to exchange the information stored in their routing tables by communicating with each other at regular intervals to mutually supplement and renew their routing entries. **X4000** supports both version 1 and version 2 of RIP, either exclusively or parallel.

RIP is configured separately for LAN and WAN.

Active and passive

Routers can be defined as active or passive routers: Active routers offer their routing entries to other routers via ➤➤ **broadcasts**. Passive routers accept the information from the active routers and store it, but do not pass on their own routing entries. **X4000** can do both.

WAN partner

If you negotiate to receive and/or send RIP packets from/to your WAN partner, **X4000** can exchange routing information dynamically with the routers in the LAN of the WAN partner.

Receiving routing tables via the RIP is a possible security loophole, as external computers or routers can change **X4000**'s routing functionality.

RIP packets do not set up or hold ISDN connections.

Configuration is made in:

- ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings***
- ***CM-100BT, Fast Ethernet*** ➧ ***Advanced Settings***

Field	Meaning
RIP Send	Enables RIP packets to be sent via the interface to the WAN partner and LAN interface.
RIP Receive	Enables RIP packets to be received via the interface to the WAN partner and LAN interface.

Table 8-27: ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings*** or ***CM-100BT, Fast Ethernet*** ➧ ***Advanced Settings***

RIP Send and **RIP Receive** contain the following selection options:

Possible values	Meaning
none	Not activated.
RIP V1	Enables sending and receiving of RIP packets in version 1.
RIP V2	Enables sending and receiving of RIP packets in version 2.
RIP V1 + V2	Enables sending and receiving of RIP packets in both version 1 and version 2.

Table 8-28: **RIP Send** and **RIP Receive**

To do Proceed as follows:

- Go to ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings***.
- Select **RIP Send**.
- Select **RIP Receive**.
- Confirm with **OK**.
- Press **SAVE**.
- Press **SAVE**.
- Go to ***CM-100BT, Fast Ethernet*** ➧ ***Advanced Settings***.
- Select **RIP Send**.
- Select **RIP Receive**.
- Press **SAVE**.

8.2.9 Compression

Data compression

You can increase the data throughput and so reduce the connection costs by using ➤➤ **data compression**. **X4000** supports several options, depending on the ➤➤ **encapsulation** selected, e.g. PPP (see chapter 7.3, page 159):

- ➤➤ **STAC**:
  The industry standard STAC data compression (Check Mode 3 in RFC 1974) implemented in **X4000** can increase the data throughput on the PPP ISDN connections.
- MS-STAC:
  STAC data compression for Windows ➤➤ **clients** (Check Mode 4 in RFC 1974). Select this if you dial into a Windows Remote Access Server.
- Van Jacobson Header Compression (➤➤ **VJHC**):
  Reduces the size of ➤➤ **TCP/IP** packets. Van Jacobson Header Compression can be used in addition to the above-mentioned compression algorithms.

If the far station does not support data compression or its data compression is not activated, **X4000** detects this during the ➤➤ **PPP** negotiation phase and deactivates data compression for this connection.

Configuration is made in:

- ***WAN PARTNER*** ➧ ***EDIT***
- ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

Field	Meaning
Compression	Defines the type of compression for connections to the WAN partner.

Table 8-29: ***WAN PARTNER*** ➧ ***EDIT***

The **Compression** field contains the following selection options:

Possible values	Meaning
none	No compression.
STAC	Enables STAC data compression (if **Encapsulation** = *PPP*).
MS-STAC	Enables STAC data compression for dialing into a Windows Remote Access Server (if **Encapsulation** = *PPP*).

Table 8-30: **Compression**

Field	Meaning
Van Jacobson Header Compression	Enables VJHC.

Table 8-31: ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings***

STAC, MS-STAC Proceed as follows to set STAC or MS-STAC:

- Go to ***WAN Partner*** ➧ ***Edit***.
- Select **Compression**.
- Press **SAVE**.

VJHC Proceed as follows to set VJHC:

- Go to ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings***.
- Activate **Van Jacobson Header Compression:** *on*.
- Confirm with **OK**.
- Press **SAVE**.
- Press **SAVE**.

8.2.10 Proxy ARP (Address Resolution Protocol)

ARP requests

The ➤➤ **Proxy ARP** function enables **X4000** to answer ➤➤ **ARP** requests from the LAN. That is, if a host in the LAN wants to set up a connection to another host in the LAN or to a WAN partner but doesn't know its hardware address, it sends a so-called ARP request into the network as a ➤➤ **broadcast**. This is actually a question to all those in the network: "What is the hardware address of host x?" If Proxy ARP is activated in **X4000** and the desired host can be reached over a defined WAN connection, **X4000** answers the ARP request with its own hardware address. This is sufficient for establishing the connection: The ➤➤ **data packets** are sent to **X4000**, which then forwards them to the desired host.

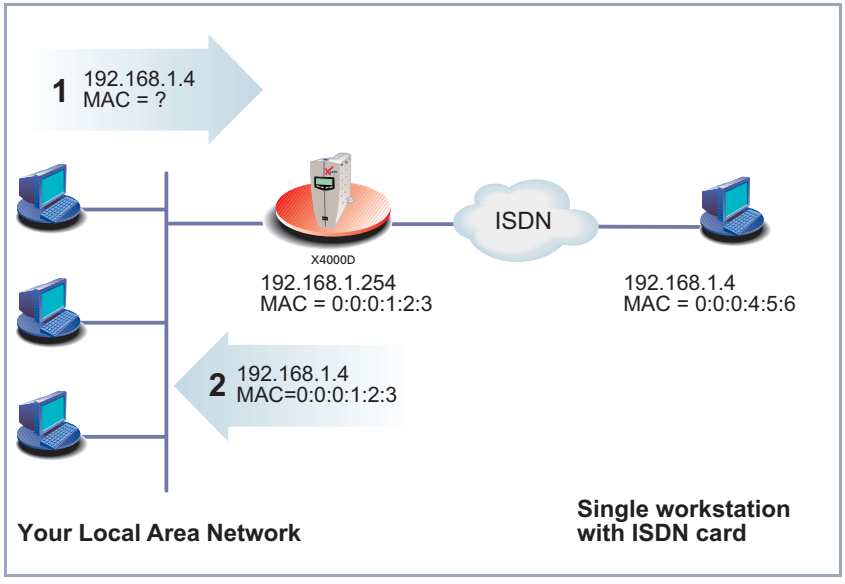


Figure 8-2: Proxy ARP

Configuration is made in:

- ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings***
- ***CM-100BT, Fast Ethernet*** ➧ ***Advanced Settings***

Field	Meaning
Proxy Arp	Enables **X4000** to answer ARP requests.

Table 8-32: ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings*** or ***CM-100BT, Fast Ethernet*** ➧ ***Advanced Settings***

Proxy Arp in ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings*** contains the following selection options:

Possible values	Meaning
off	Disables Proxy ARP via the interface to the WAN partner.
on (up or dormant)	**X4000** answers an ARP request only if the status of the connection to the WAN partner is *up* (active) or *dormant* (idle). In the case of *dormant*, **X4000** only answers the ARP request; the connection is not set up until someone actually wants to use the route.
on (up only)	**X4000** answers an ARP request only if the status of the connection to the WAN partner is up (active), i.e. a connection already exists to the WAN partner.

Table 8-33: **Proxy Arp**

Proxy Arp in ***CM-100BT, Fast Ethernet*** ➧ ***Advanced Settings*** contains the following selection options:

Possible values	Meaning
off	Disables Proxy ARP via the LAN interface.
on	Enables Proxy ARP via the LAN interface.

Table 8-34: **Proxy Arp**

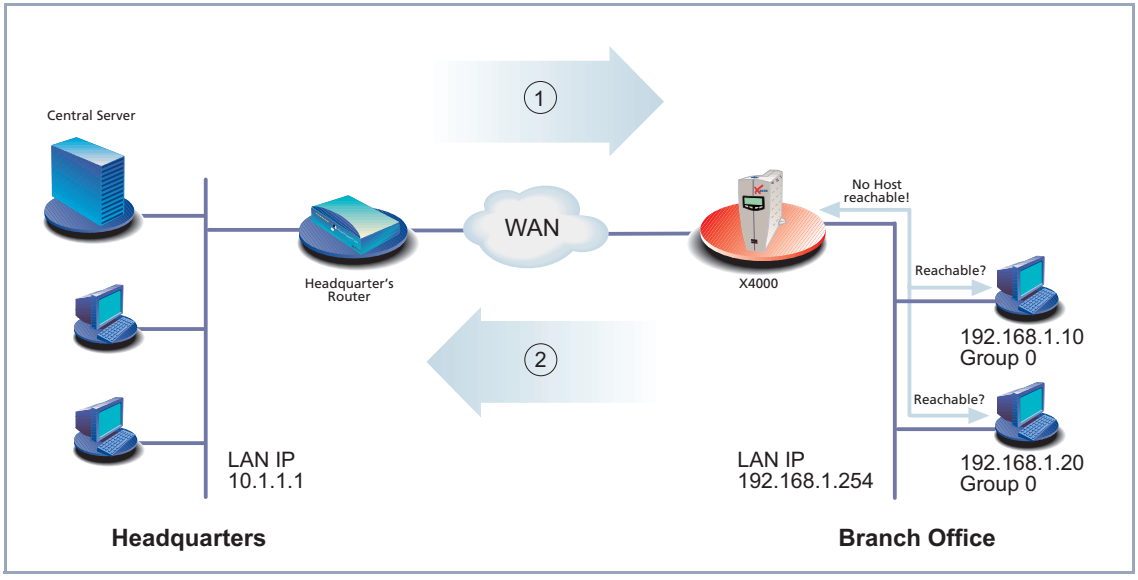
To do Proceed as follows:

- Go to ***WAN Partner*** ➧ ***Edit*** ➧ ***IP*** ➧ ***Advanced Settings***.
- Select **Proxy Arp**.
- Press **SAVE**.
- Press **SAVE**.
- Go to ***CM-100BT, Fast Ethernet*** ➧ ***Advanced Settings***.
- Select **Proxy Arp**.
- Press **SAVE**.
- Press **SAVE**.

8.2.11 Keepalive Monitoring

LAN-LAN connection If you have connected two (or more) LANs over a dialup connection, e.g. between the LAN of the head office and the LAN of a branch office as in Figure 8-3, page 237, a central server is frequently located in the LAN at the head office. If this central server is configured such that it regularly sets up WAN connections to **X4000** in the LAN of the branch office, e.g. for updating data, these connections are superfluous (but unfortunately not free) if none of the hosts in the branch office can be reached, e.g. because all PCs are switched

off. As it is not possible to determine whether the hosts can be reached until the connection is set up, costs are incurred by the calling party, i.e. the head office.



1	Connection setup attempt	2	**X4000** is "busy", no connection is possible

Figure 8-3: Keepalive Monitoring

Cutting costs

The Keepalive Monitoring function enables you to configure **X4000** in the branch office so that unnecessary WAN connections from the head office to the branch office are avoided. **X4000** checks at regular, adjustable intervals to see whether the hosts to be monitored in the LAN at the branch office can be reached. If none of the hosts to be checked answers a corresponding request after three consecutive attempts, connection setup by the central server is prevented by **X4000** deactivating the interface to the "head office" WAN partner. The result is that the line to the branch office appears to be busy if the central server at head office attempts to set up a connection. This means that no costs are incurred for a connection, which would have been useless anyway.

In some countries (e.g. Switzerland), costs may still occur for these useless dial-in attempts in spite of using Keepalive Monitoring.

If all PCs in the LAN at the branch office were inactive, a connection to the head office is not set up automatically as soon as one of the PCs to be monitored is switched on. The interface to the "head office" WAN partner is not activated, i.e. a connection cannot be set up to the head office, until **X4000** has registered that a PC can be reached. The amount of time that expires before **X4000** indicates that a PC can be reached again depends on the monitoring interval set (**Interval**).

The corresponding WAN partner, i.e. the head office, should be identifiable in **X4000** via CLID (Calling Line Identification). If this is not the case, Keepalive Monitoring may not function.

If Keepalive Monitoring is configured in **X4000** for WAN partners that are authenticated over a RADIUS server, Keepalive Monitoring does not function. This means the relevant unnecessary connections cannot be prevented in this way.

Configuration is made in ***SYSTEM*** ➧ ***KEEPALIVE MONITORING*** ➧ **ADD**:

Field	Meaning
Group	Defines a group of hosts, whose reachability is to be monitored by **X4000**. Each host to be monitored is assigned to a group. A total of ten groups can be configured with up to ten hosts each. Possible values: *0* ... *9*
IPAddress	Defines a host that is to be monitored by **X4000**.
Interval	Defines the time interval in s to be used for reachability of hosts (default value: *300*). The smallest time interval is used within a group. That is, all the hosts in a group are checked by **X4000** at the smallest time interval of the group.
DownAction	Defines how the status of the **X4000** interfaces selected in **FirstIfIndex** and **Range** is set if ALL hosts in a group are not reachable. Possible values: ■ *down* (default value): Interfaces are deactivated. ■ *up*: Interfaces are activated. The status of the interfaces is set to the original value again when at least one host in a group can be reached again.

Field	Meaning
FirstIfIndex	Defines the first interface of an interface range in **X4000**, for which the action defined under **DownAction** is to be executed. Possible values: *10001* ... *15000* (default value: *10001*). Interfaces with indices from 10001 to 15000 are provided for dialup connections to WAN partners. The default value *10001* designates the interface to the first WAN partner configured in **X4000** (dialup connection). The indices of other interfaces are given in the Software Reference.
Range	Defines the range of interfaces in **X4000**, for which the action defined under **DownAction** is to be executed. If you set **FirstIfIndex** = *10001* and **Range** = *0*, only the interface with the index 10001 is affected. If you set **FirstIfIndex** = *10001* and **Range** = *4999* (default value), the interfaces with indices 10001 to 15000 are affected.

Table 8-35: ***SYSTEM*** ➧ ***KEEPALIVE MONITORING*** ➧ **ADD**

SYSTEM ➧ ***KEEPALIVE MONITORING*** lists all the hosts that are monitored by Keepalive Monitoring. The reachability of the hosts is listed under **State**: *alive*, if the host was reachable on the last check, *down*, if the host was not reachable.

To do Proceed as follows to configure the example shown in Figure 8-3, page 237:

- Go to ***SYSTEM*** ➧ ***KEEPALIVE MONITORING***.
- Press **ADD** to add the first host that is to be monitored by **X4000** with Keepalive Monitoring.
- Enter **Group**: ***0***.
- Enter **IPAddress**: ***192.168.1.10***.

- Enter **Interval**, e.g. ***300***.
- Select **DownAction**: ***down***.
- Enter **FirstIfIndex**: ***10001***.
- Type in **Range**: ***4999***.
- Press **SAVE**.
- Press **ADD** to add the second host.
- Enter **Group**: ***0***.
- Enter **IP Address**: ***192.168.1.20***.
- Enter **Interval**, e.g. ***300***.
- Select **DownAction**: ***down***.
- Enter **FirstIfIndex**: ***10001***.
- Type in **Range**: ***4999***.
- Press **SAVE**.

These settings ensure that **X4000** checks the reachability of hosts 192.168.1.10 and 192.168.1.20 at intervals of 300 s. If neither of the two hosts is reachable after three consecutive attempts, all **X4000** interfaces for dialup connections to WAN partners are deactivated. **X4000** continues to check the hosts at the time interval of 300 s and **X4000** activates the interfaces again as soon as at least one host is reachable again.

8.3 Basic IP Settings

Here you will find a number of basic settings you can define in **X4000**:

- Deriving System Time (chapter 8.3.1, page 242)
- Name Resolution (➤➤ **DNS**) in **X4000** (chapter 8.3.2, page 246)
- ➤➤ **Port** Numbers (chapter 8.3.3, page 265)
- ➤➤ **BOOTP** Relay Agent (chapter 8.3.4, page 266)

The necessary configuration steps are explained below.

8.3.1 System Time

System time

You need the system time to obtain correct timestamps for recording connection data (for accounting).

You can derive the system time

- automatically, e.g. via ISDN or a time server (see "Deriving the System Time Automatically", page 243).
- by setting it manually in **X4000** (see "Setting the System Time Manually", page 245).

Deriving the System Time Automatically

Configuration is made in ***IP*** ➧ ***STATIC SETTINGS***.

Field	Meaning
Time Protocol	Protocol used to derive the current time. Possible values: ■ *TIME/UDP* ■ *TIME/TCP* ■ *SNTP* ■ *ISDN* ■ *none*
Time Offset (sec)	Number of seconds added to or subtracted from the derived time. If you enter values between -24 and +24, **X4000** interprets the input as the number of hours and converts it to the corresponding number of seconds automatically after you press **SAVE**. Note: If you select *ISDN* as **Time Protocol**, you must set the **Time Offset** to *0*. If you change **Time Offset (sec)** (turn back the time), there should be no data flow.
Time Update Interval (sec)	Time interval in seconds, after which the system time is checked and updated if necessary. If you enter values between 1 and 24, **X4000** interprets the input as the number of hours and converts it to the corresponding number of seconds automatically after you press **SAVE**. For **Time Protocol** = *TIME/UDP*, *TIME/TCP* or *SNTP:* Current time is checked after every **Time Update Interval** in seconds. For **Time Protocol** = *ISDN:* Current time is checked for each first ISDN connection after expiry of the **Time Update Interval**.

Field	Meaning
Time server	IP address of the time ➤➤ **server** used by **X4000**. **Time Server** is not needed if you set *ISDN* as **Time Protocol**.

Table 8-36: ***IP*** ➧ ***STATIC SETTINGS***

The **Time Protocol** field contains the following selection options:

Possible values	Meaning
TIME/UDP	System time (RFC 868) via ➤➤ **UDP**.
TIME/TCP	System time (RFC 868) via ➤➤ **TCP**.
TIME/SNTP	System time as per SNTP (Simple Network Time Protocol, RFC 1769) via UDP.
ISDN	System time from ISDN ➤➤ **D-channel** (free).
none	System time not derived.

Table 8-37: **Time Protocol**

ISDN Proceed as follows to derive the system time via ISDN:

- ➤ Go to ***IP*** ➧ ***STATIC SETTINGS***.
- ➤ Select **Time Protocol**: *ISDN*.
- ➤ Enter **Time Offset (sec)**: *0*.
- ➤ Enter **Time Update Interval (sec)**, e.g. *86400* (corresponds to 24 hours).
- ➤ Press **SAVE**.

  After the first ISDN connection has been ended, **X4000** derives the system time from the ISDN.

Time server Proceed as follows to derive the system time from a time server:

- ➤ Go to ***IP*** ➧ ***STATIC SETTINGS***.
- ➤ Select **Time Protocol**, e.g. *TIME/UDP*.
- ➤ Enter **Time Offset (sec)**, e.g. *0*.

- Enter **Time Update Interval (sec)**, e.g. *86400* (corresponds to 24 hours).
- Enter IP address or host name for **Time Server**.
- Press **SAVE**.

  X4000 now derives the system time via a time server. **X4000** adjusts its system time to the time set on the time server every 24 hours.

The ➤➤ **DIME Tools** contain a time server. If you enter the IP address of your PC for **Time Server**, make sure the time server of **DIME Tools** is active on your PC every time you start **X4000**.

If your computer has no fixed IP address but is assigned its IP address dynamically via ➤➤ **DHCP**, you cannot use your computer as a time server.

Setting the System Time Manually

Configuration is made in ***System*** ➧ ***Time and Date***.

Field	Meaning
Time is currently controlled by:	Shows the settings defined under ***IP*** ➧ ***Static Settings*** for deriving the time automatically.
Current Time:	Shows the system time currently set in **X4000** (date and time).
New Time:	For entering the new time to be used by **X4000** (hours:minutes).
New Date:	For entering the new date to be used by **X4000** (month/day/year).

Table 8-38: ***System*** ➧ ***Time and Date***

Proceed as follows to enter the system time in **X4000** manually:

If a method for deriving the time automatically is also defined in **X4000**, the values obtained automatically have higher priority. That is, if **X4000** receives a relevant time signal (e.g. from a time server), any system time entered manually is overwritten.

- Go to ***System*** ➧ ***Time and Date***.
- Enter **New Time**.
- Enter **New Date**.
- Confirm the new system time with **SET**.
  Current Time: shows the new system time set in **X4000**.

8.3.2 Name Resolution in X4000 with DNS Proxy

Why Name Resolution?

IP address = ?

Name resolution is necessary for converting host names in a LAN or on the Internet into IP addresses. For example, if you would like to reach the host "Goofy" in your LAN or enter the URL "http://www.bintec.de" in your Internet browser, you need the associated IP address before you can set up the required connection. The following options are available:

- DNS (Domain Name Server):
  A DNS stores the relevant IP addresses for host names in the form of DNS records and resolves the names if a relevant request is received, i.e. the name server sends a DNS record with the IP address associated with the name to the source of the request. Name servers form a hierarchical tree structure. If a name server cannot resolve a name, it therefore asks a higher-order name server, etc.
- HOSTS files:
  HOSTS files are located on the PCs in the LAN. You can use these files to create a table of host names with associated addresses. This means connections to DNS are no longer needed to resolve these names. As the HOSTS files must be updated on each PC, this method of name resolution is not very practicable.

In practice, the DNS of the Internet Service Provider is often used for name resolution.

Advantages of Name Resolution with X4000

X4000 has the following functions and facilities for name resolution (port 53):

- DNS Proxy, for passing DNS requests to the right DNS.
- DNS cache, for saving the results of DNS requests.
- Static name entries, for defining assignments of names to IP addresses.
- Filter function, to prevent the resolution of certain names.
- Monitoring via Setup Tool, to provide an overview of DNS requests in **X4000**.

This is how it works:

DNS Proxy DNS Proxy makes the tedious updating of HOSTS files on PCs in the LAN unnecessary, as you can enter **X4000** as DNS on the relevant PCs. DNS requests are passed by the PC to **X4000** for processing. The configuration of the PCs in the LAN is then easy and can also be left at provider changes. This also works if the PCs in the LAN do not have any static DNS entries, but are assigned these dynamically by **X4000** as DHCP server.

Forwarding entries enable **X4000** to decide which DNS is to be used for the resolution of certain names. If you have configured two WAN partners in **X4000**, your head office and your Internet Service Provider, it is advisable to have Internet names resolved by the DNS of your ISP, but names from within the corporate network by the DNS of the head office. A DNS request for resolution of an internal company address usually cannot be answered by the DNS of the ISP and is thus superfluous, causes unnecessary costs and resolution takes longer than necessary. A forwarding entry, which passes DNS requests for names such as "*.intranet.de" to the WAN partner "head office", is therefore advisable.

DNS cache If a DNS request is passed by **X4000** to a DNS and this DNS answers with a DNS record, the resolved name is saved with the associated IP address as a positive dynamic entry in the DNS cache of **X4000**. This means that once a name has been resolved and is required again, **X4000** can answer the request

from the cache and a new request to an external name server is not necessary. These requests can therefore be answered more quickly, bandwidth is reduced on the WAN connections and the costs of unnecessary connections are saved.

If a DNS request cannot be answered by any of the DNS asked, this is saved in the cache as a negative dynamic entry. As failed DNS requests (requests that cannot be answered) are not usually saved by applications or IP stacks, these negative dynamic entries in the cache prevent frequent unsuccessful connection setups to external DNS.

The validity of the positive dynamic entries in the cache is given by the TTL (Time To Live), which is contained in the DNS record. Negative entries are assigned the value **Maximum TTL for Neg Cache Entries**. A dynamic entry is deleted from the cache when the TTL expires.

Static name entries

You use positive static entries to enter names with the associated IP addresses in **X4000**. If you save frequently needed IP addresses in this way, **X4000** can answer relevant DNS requests itself and the connection to an external name server is not necessary. This speeds up access to these addresses. For a small network, such a name server can be configured in **X4000**. The installation of a separate DNS and the tedious updating of HOSTS files on the PCs in the LAN is not necessary.

With negative static entries, a name is not assigned an IP address, a corresponding DNS request is answered negatively and not passed to any other name server either.

You can easily change a dynamic entry to a static entry "at the press of a button" in ***IP*** ➧ ***DNS*** ➧ ***DYNAMIC CACHE*** (see Table 8-43, page 258).

Filter function

By using negative static entries, you can limit name resolution in **X4000** using a filter function. This makes access to certain domains much more difficult for users in the LAN, as it prevents the corresponding names being resolved. You can use wildcards (*) when entering the name.

When you enter a static entry, you define how long this assignment of name and IP address is valid by setting the TTL. This TTL is entered in each DNS record with which **X4000** answers a relevant DNS request.

Make sure your static entries are always up to date. Names or IP addresses can change at any time!

Monitor function

Which IP addresses are requested by hosts in the LAN and how often?

The Setup Tool permits rapid access to this and other statistical information. You can also use the `nslookup` command in the command line (SNMP shell) to check how a name or an IP address is resolved by **X4000** or another name server (see chapter 14.1, page 412). To obtain help information for the command, enter `nslookup -?`.

Other Options

Global name server

In ***IP*** ➧ ***STATIC SETTINGS***, you can also enter the IP address of preferred global name servers that are to be asked if **X4000** cannot answer requests itself or with forwarding entries.

For local applications, the IP address of **X4000** or the loopback address (127.0.0.1) can be entered as global name server.

If necessary, **X4000** can send or receive the addresses of name servers to and from WAN partners:

Default interface

In **Default Interface**, you can also select a WAN partner to whom a connection is set up as standard for name server negotiation if name resolution was not successful using the methods already stated.

Exchanging DNS Addresses with LAN Partners

DHCP

If **X4000** is configured as DHCP server, DHCP clients in the LAN can be sent IP addresses from name servers. In this case, the addresses of the global name servers entered in **X4000** can be sent or the address of **X4000** itself. In the latter case, DNS requests from the DHCP clients are sent to **X4000**, which either answers these itself or passes them on if necessary (proxy function).

Exchanging DNS Addresses with WAN Partners

IPCP The same applies if the dynamic negotiation of name servers is activated for the IP configuration of a WAN partner and **X4000** is operating in Server Mode (**Dynamic Name Server Negotiation** = *server (send)*). In this case, the addresses of the global name servers or the address of **X4000** itself can also be sent for name server negotiations via IPCP to the WAN partner, who is the IP address client.

If **X4000** is operating in Client Mode (**Dynamic Name Server Negotiation** = *client (receive)*), name server addresses can if necessary be negotiated with the WAN partner, who is the IP address server, and sent to **X4000**. These can be entered as global name servers in **X4000** and are thus available for future name resolutions.

Strategy for Name Resolution in X4000

A DNS request is handled by **X4000** as follows:

1. Can the request be answered directly from the static or dynamic cache (IP address or negative answer)?
   - If yes, the information is forwarded.
   - If no, see 2.
2. Is a matching forwarding entry available?
   In this case, the relevant DNS are asked. If the connection to the WAN partner is not active, an attempt is made to set it up.
   - If a DNS can resolve the name, the information is forwarded and a dynamic entry created in the cache.
   - If none of the DNS asked can resolve the name or no matching forwarding entry is available, see 3.
3. Are global name servers entered?
   In this case, the relevant DNS are asked. If the IP address of **X4000** or the loopback address is entered for local applications, these are ignored here.
   - If a DNS can resolve the name, the information is forwarded and a dynamic entry created in the cache.
   - If none of the DNS asked can resolve the name or no static name servers are entered, see 4.

4. Is a WAN partner selected as default interface?
   In this case, the associated DNS are asked. If the connection to the WAN partner is not active, an attempt is made to set it up.
   – If a DNS can resolve the name, the information is forwarded and a dynamic entry created in the cache.
   – If none of the DNS asked can resolve the name or no default interface has been selected, see 5.
5. Is overwriting the global name server addresses admissible (**Overwrite Global Nameserver** = *yes*)?
   In this case, a connection is set up to the first WAN partner, which is configured so that addresses of DNS can be sent – provided this has not previously been attempted. If name server negotiation is successful, these are entered as global name servers and are therefore available for further requests.
6. Request is answered with server error.

If one of the DNS answers with "non-existent domain", this answer is forwarded to the source of the request immediately and included in the cache as negative entry.

Overview of Configuration with the Setup Tool

The configuration and monitoring of name resolution in **X4000** is set in:

- ***IP*** ➧ ***STATIC SETTINGS***:
- ***IP*** ➧ ***DNS***
- ***IP*** ➧ ***DNS*** ➧ ***STATIC HOSTS***
- ***IP*** ➧ ***DNS*** ➧ ***FORWARDED DOMAINS***
- ***IP*** ➧ ***DNS*** ➧ ***DYNAMIC CACHE***
- ***IP*** ➧ ***DNS*** ➧ ***ADVANCED SETTINGS...***
- ***IP*** ➧ ***DNS*** ➧ ***GLOBAL STATISTICS...***
- ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

IP ➧ ***STATIC SETTINGS*** contains the following fields:

Field	Meaning
Domain Name	Defines **X4000**'s Domain Name.
Primary Domain Name Server	IP address of **X4000**'s first global Domain Name Server (DNS).
Secondary Domain Name Server	IP address of another global Domain Name Server.
Primary WINS	IP address of **X4000**'s first global WINS (Windows Internet Name Server) or NBNS (NetBIOS Name Server).
Secondary WINS	IP address of another global WINS or NBNS.

Table 8-39: ***IP*** ➧ ***STATIC SETTINGS***

IP ➧ ***DNS*** contains the following fields:

Field	Meaning
Positive Cache	Enables positive dynamic entries in the cache. Possible values: ■ *enabled* (default value): Successfully resolved names and IP addresses are saved in the cache. ■ *flush*: All positive dynamic entries in the cache are deleted. ■ *disabled*: Successfully resolved names and IP addresses are not saved in the cache and existing dynamic positive entries are deleted (static entries are not deleted).
Negative Cache	Enables negative dynamic entries in the cache. Possible values: ■ *enabled* (default value): Names that could not be resolved are saved in the cache as negative entries. ■ *flush*: All negative dynamic entries in the cache are deleted. ■ *disabled*: Names that could not be resolved are not saved in the cache and existing dynamic negative entries are deleted (static entries are not deleted).
Overwrite Global Nameservers	Defines whether the addresses of global name servers in **X4000** (in ***IP*** ➧ ***STATIC SETTINGS***) may be overwritten with name server addresses sent by WAN partners. Possible values: ■ *yes* (default value) ■ *no*

Field	Meaning
Default Interface	Defines the WAN partner to which a connection is normally set up for name server negotiation if other name resolution attempts were not successful.
DHCP Assignment	Defines which name server addresses are sent to the DHCP client if **X4000** is configured as DHCP server. Possible values: ■ *none*: No name server address is sent. ■ *self* (default value): The address of **X4000** is sent as name server address. ■ *global*: The addresses of the global name servers entered in **X4000** are sent.
IPCP Assignment	Defines which name server addresses are sent by **X4000** to a WAN partner for dynamic name server negotiation. Possible values: ■ *none*: No name server address is sent. ■ *self*: The address of **X4000** is sent as name server address. ■ *global* (default value): The addresses of the global name servers entered in **X4000** are sent.
Static Hosts	The number of static entries is displayed in brackets.
Forwarded Domains	The number of forwarding entries is displayed in brackets.
Dynamic Cache	The number of positive and negative dynamic entries in the DNS cache is displayed in brackets.

Table 8-40: ***IP*** ➧ ***DNS***

IP ➧ ***DNS*** ➧ ***STATIC HOSTS*** ➧ ***ADD*** contains the following fields:

Field	Meaning
Default Domain:	The Domain Name of **X4000** entered in ***IP*** ➧ ***STATIC SETTINGS*** is displayed.
Name	Host name, which is assigned the **Address** with this static entry. May also contain wildcards (*) (only at the start of **Name**, e.g. *.bintec.de). If an incomplete name is entered without a dot, this is completed with ".**Default Domain**" after confirming with **SAVE**.
Response	Defines the type of static entry. Possible values: ■ *positive* (default value): A DNS request for **Name** is answered with a DNS record, which contains the associated **Address**. ■ *ignore*: A DNS request is ignored; no answer is given (not even a negative answer). ■ *negative*: A DNS request for **Name** is answered with a negative answer.
Address	(Only for **Response** = *positive*) IP address, which is assigned to **Name**.
TTL	Period of validity in s for the assignment of **Name** to **Address** (only relevant for **Response** = *positive*). This value is displayed in the TTL field (Time To Live) if **X4000** sends a corresponding DNS record. Default value: *86400* (= 24 h)

Table 8-41: ***IP*** ➧ ***DNS*** ➧ ***STATIC HOSTS*** ➧ ***ADD***

IP ➧ ***DNS*** ➧ ***FORWARDED DOMAINS*** ➧ ***ADD*** contains the following fields:

Field	Meaning
Global Nameservers:	The global name servers entered in ***IP*** ➧ ***STATIC SETTINGS*** are displayed.
Default Domain:	The Domain Name of **X4000** entered in ***IP*** ➧ ***STATIC SETTINGS*** is displayed.
Name	Host name that is to be resolved with this forwarding entry. May also contain wildcards (only at the start of **Name**, e.g. *.bintec.de). If an incomplete name is entered without a dot, this is completed with ".**Default Domain**" after confirming with **SAVE**.
Interface	Defines the WAN partner to which a connection is set up for the resolution of **Name**.
TTL	Period of validity in s for the assignment of **Name** to **Address**. Default value: *86400* (= 24 h) If the request of **X4000** for **Name** is answered with a DNS record, this contains a TTL field (= Time To Live in s), whose value is not normally changed by **X4000** on forwarding the DNS record. If the TTL field received has the value 0 or exceeds **Maximum TTL for Pos Cache Entries**, then **TTL** is also sent with the DNS record forwarded.

Table 8-42: ***IP*** ➧ ***DNS*** ➧ ***FORWARDED DOMAINS*** ➧ ***ADD***

IP ➧ *DNS* ➧ *DYNAMIC CACHE* contains the following fields:

Field	Meaning
Name	Host name, which is assigned the **Address** with this dynamic entry in the cache.
Address	IP address, which is assigned to **Name**.
Resp	Defines the type of dynamic entry. Possible values: ■ *positive*: A DNS request for **Name** is answered with the associated IP address from the cache. ■ *negative*: A DNS request for **Name** is answered with a negative answer from the cache.
TTL	Indicates how many seconds the dynamic entry remains in the cache. The entry is deleted on expiry of **TTL**. When a positive dynamic entry is saved in the cache, the value of the TTL field (= Time To Live in s) contained in the DNS record is used. If the TTL field in the DNS record is set to 0 or exceeds **Maximum TTL for Pos Cache Entries**, the value **Maximum TTL for Pos Cache Entries** is used when saving the entry. When a negative dynamic entry is saved in the cache, **Maximum TTL for Neg Cache Entries** is always assigned as this value.
Ref	Indicates how often the entry has been referenced, i.e. how often a DNS request has been answered with the entry from the cache.

Field	Meaning
STATIC	A dynamic entry can be converted to a static entry by tagging the entry with the **Space** bar and confirming with STATIC. The relevant entry then disappears from ***IP*** ➧ ***DNS*** ➧ ***DYNAMIC CACHE*** and is listed in ***IP*** ➧ ***DNS*** ➧ ***STATIC HOSTS***. **TTL** is transferred in this operation.

Table 8-43: ***IP*** ➧ ***DNS*** ➧ ***DYNAMIC CACHE***

IP ➧ ***DNS*** ➧ ***ADVANCED SETTINGS...*** contains the following fields:

Field	Meaning
Maximum Number of DNS Records	Defines the maximum number of static and dynamic entries. Once this value is reached, an older dynamic entry is deleted from the cache when a new entry is added. The entry deleted is always the dynamic entry that has not been requested for the longest period of time. If **Maximum Number of DNS Records** is reduced by the user, dynamic entries are also deleted, if necessary. Static entries are not deleted; **Maximum Number of DNS Records** cannot be set lower than the current number of existing static entries. If **Maximum Number of DNS Records** corresponds to the number of static entries, no further dynamic entries are possible!
Maximum TTL for Pos Cache Entries	Is assigned to a positive dynamic entry in the cache as **TTL** if the field of the DNS record has the value 0 or exceeds **Maximum TTL for Pos Cache Entries**.
Maximum TTL for Neg Cache Entries	Is assigned as **TTL** to a negative dynamic entry in the cache.

Table 8-44: ***IP*** ➧ ***DNS*** ➧ ***ADVANCED SETTINGS...***

IP ➧ ***DNS*** ➧ ***GLOBAL STATISTICS...*** contains the following fields (the menu is updated every second):

Field	Meaning
Received DNS Packets	Displays the number of received DNS packets, including the answer packets for forwarded requests.
Invalid DNS Packets	Displays the number of invalid DNS packets received.
DNS Requests	Displays the number of correct DNS requests received.
Cache Hits	Displays the number of requests that could be answered with static or dynamic entries from the cache.
Forwarded Requests	Displays the number of requests forwarded to other name servers.
Cache Hitrate (%)	Displays the number of **Cache Hits** per **DNS Request** in %.
Successfully Answered Queries	Displays the number of successful requests (positive and negative) answered.
Server Failures	Displays the number of requests that could not be answered by any name server (either positively or negatively).

Table 8-45: ***IP*** ➧ ***DNS*** ➧ ***GLOBAL STATISTICS...***

The following part of ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS*** is of interest for this configuration step:

Field	Meaning
Dynamic Name Server Negotiation	In the event of dynamic name server negotiation, defines whether **X4000** receives IP addresses for **Primary Domain Name Server**, **Secondary Domain Name Server**, **Primary WINS** and **Secondary WINS** from the WAN partner or sends them to the WAN partner.

Table 8-46: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

The **Dynamic Name Server Negotiation** field contains the following selection options:

Possible values	Meaning
off	**X4000** does not send or answer requests for name server addresses.
yes	The response is linked to the mode for issuing/ receiving an IP address (setting in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** under **IP Transit Network**): ■ **X4000** sends requests for name server addresses to the WAN partner if *dynamic client* is selected. ■ **X4000** answers requests for name server addresses from the WAN partner if *dynamic server* is selected. ■ **X4000** answers but does not send requests for name server addresses if *yes* or *no* is selected.
client (receive)	**X4000** sends requests for name server addresses to the WAN partner.
server (send)	**X4000** answers requests from the WAN partner for name server addresses.

Table 8-47: **Dynamic Name Server Negotiation**

Procedure for Configuration with the Setup Tool

To do Proceed as follows to configure name resolution with DNS Proxy in **X4000**:

Name resolution in X4000 If applicable, first enter the global name servers in **X4000**:

➤ Go to ***IP*** ➧ ***STATIC SETTINGS***.

➤ Enter **Domain Name**, e.g. ***mycompany.com***.

➤ Enter **Primary** or **Secondary Domain Name Server**, if applicable.

- Enter **Primary** or **Secondary WINS**, if applicable.

If you do not have a Secondary DNS or Secondary WINS server, you can enter the IP address of the Primary DNS or WINS server in the **Secondary Domain Name Server** or **Secondary WINS** field again.

This may be necessary for connection to some data communications clients.

- Press **SAVE**.

Activate or deactivate the cache function and define general settings for DNS Proxy:

- Go to ***IP*** ➧ ***DNS***.
- Select **Positive Cache** and **Negative Cache**, e.g. *enabled*.
- Select **Overwrite Global Nameservers**, e.g. *yes*, if you do not wish to enter any static global name servers under ***IP*** ➧ ***STATIC SETTINGS***.
- Select **DHCP Assignment**, e.g. *self*.
- Select **IPCP Assignment**, e.g. *global*.

Define the values for the static and dynamic entries:

- Go to ***IP*** ➧ ***DNS*** ➧ ***ADVANCED SETTINGS...***.
- Enter **Maximum Number of DNS Records**.
- Enter **Maximum TTL for Pos Cache Entries**.
- Enter **Maximum TTL for Neg Cache Entries**.
- Press **SAVE**.

How to create static entries:

- Go to ***IP*** ➧ ***DNS*** ➧ ***STATIC HOSTS***.
  All the existing static entries are listed here.
- You can create a new entry with **ADD**.
- Enter **Name**.
- Select **Response**.
- Enter **Address**, if applicable.
- Enter **TTL**.

- Press **SAVE**.

How to create forwarding entries:

- Go to ***IP*** ➧ ***DNS*** ➧ ***FORWARDED DOMAINS***.
  All the existing forwarding entries are listed here.
- You can create a new entry with **ADD**.
- Enter **Name**.
- Select **Interface**.
- Enter **TTL**.
- Press **SAVE**.
- Select **EXIT**.
- Press **SAVE**.

X4000 <–––> WAN partner

Proceed as follows if you would like to configure a WAN partner so that the address of a name server is sent from **X4000** to the WAN partner or from the WAN partner to **X4000**, as applicable:

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***.
- Select **Dynamic Name Server Negotiation**.
- Confirm with **OK**.
- Press **SAVE**.

Monitoring and statistics

How to obtain a list of dynamic entries in the cache:

- Go to ***IP*** ➧ ***DNS*** ➧ ***DYNAMIC CACHE***.
  This menu contains a list of all the dynamic entries in the cache.
- To convert a dynamic entry into a static entry, tag the entry with the **Space** bar and confirm with **STATIC**.
  The entry disappears from the list of dynamic entries and is listed as a static entry under ***IP*** ➧ ***DNS*** ➧ ***STATIC HOSTS***.

How to obtain a list of static parameters:

- Go to ***IP*** ➧ ***DNS*** ➧ ***GLOBAL STATISTICS...***.
  Here you will find some statistics for DNS Proxy.

8.3.3 Port Numbers

What is a ➤➤ port?

X4000 has a number of services or applications, e.g. HTTP, ➤➤ **telnet**. To be able to reach several services on the same host and as it were to enter an exact destination for the IP packet within the host, a port is also entered in addition to the IP address for a connection to **X4000**. This addresses the relevant application. Ports are only used in the TCP and UDP protocols.

X4000 forwards incoming ➤➤ **data packets** to the port with the number associated with the desired application. This addresses the relevant **X4000** application and the incoming data can be processed.

You can define important port numbers in ***IP*** ➧ ***STATIC SETTINGS***:

As the settings are normally correct, you should only make changes here if necessary.

Field	Meaning
Remote CAPI Server TCP Port	Port number for ➤➤ **Remote CAPI** connections: 2662 (defined by IANA, www.iana.com).
Remote TRACE Server TCP Port	Port number for TRACE Requests. Default value: 7000.
RIP UDP Port	Port number for ➤➤ **RIP** (Routing Information Protocol). Default value: 520. The RIP can be disabled with **RIP UDP Port** = *0*.
HTTP TCP Port	Port number for HTTP Requests. Default value: 80. **HTTP TCP Port** = *0* disables access to **X4000**'s HTTP status page (see chapter 10.1.4, page 320).

Table 8-48: ***IP*** ➧ ***STATIC SETTINGS***

To do Proceed as follows to change one of the port numbers:

- Go to ***IP*** ➧ ***STATIC SETTINGS.***
- Enter **Remote CAPI Server TCP Port**, **Remote TRACE Server TCP Port**, **RIP UDP Port** and/or **HTTP TCP Port**.
- Press **SAVE**.

8.3.4 BOOTP Relay Agent

Bootstrap protocol The Bootstrap Protocol (➤➤ **BOOTP**) defines how a host (BOOTP ➤➤ **client**) in a TCP/IP network receives his IP address and other configuration information on booting. The BOOTP client sends a BOOTP Request, a BOOTP server answers the request with a BOOTP Response and supplies the client with the necessary information. As the server only hears requests from the LAN in which it is located, it is sometimes advisable to set up a BOOTP Relay Agent. The agent forwards all requests and responses between the client and server via a WAN connection to this server.

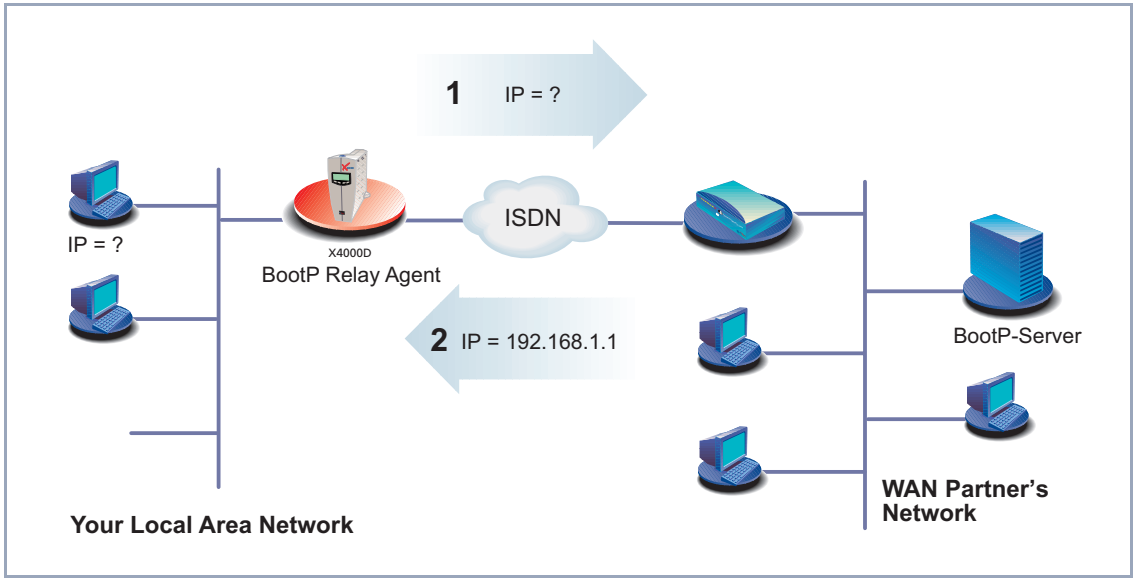


Figure 8-4: **X4000** as BOOTP Relay Agent

Configuration is made in ***IP*** ➧ ***STATIC SETTINGS:***

Field	Meaning
BOOTP Relay Server	IP address of the BOOTP server.

Table 8-49: ***IP*** ➧ ***STATIC SETTINGS***

To do Proceed as follows:

- Go to ***IP*** ➧ ***STATIC SETTINGS***.
- Enter **BOOTP Relay Server**.
- Press **SAVE**.

If a WAN connection is needed for the connection between the BOOTP server and BOOTP client, you must configure an appropriate WAN partner (chapter 7.3, page 159).

8.4 IPX Settings

The ➤➤ **IPX** Protocol (Internet Packet Exchange Protocol) is a network protocol that is used mainly in Novell networks. Novell ➤➤ **clients** and Novell ➤➤ **servers** can use IPX to communicate via LAN/WAN connections.

The configuration steps necessary for IPX connections are explained below:

- General Settings
- Configuring the LAN Interface
- Configuring WAN Partners

8.4.1 General Settings

Here you will find the global parameters for IPX. These settings apply to all IPX connections of **X4000**.

The configuration is made in ***IPX***:

Field	Meaning
Local System Name	IPX system name of **X4000** using upper case letters, numbers and -: /.
Internal Network Number	**X4000**'s internal network number. This value must be unique among all the network numbers and normally comprises the last four bytes of **X4000**'s ➤➤ **MAC address**. Change this value only if it is already used somewhere else in the network. **Internal Network Number** of a ➤➤ **Remote** IPX router has the same value.
Enable IPX Spoofing	Enables and disables NCP session watchdog spoofing and handling of "broadcast message waiting" packets. Possible values: ■ *yes*: convenient for IPX-WAN connections ■ *no*
Enable SPX Spoofing	Enables and disables spoofing of SPX session watchdog packets. Possible values: ■ *yes*: convenient for SPX sessions over WAN connections ■ *no*
NetBIOS Broadcast Replication	Defines how **X4000** handles ➤➤ **NetBIOS** packets.

Table 8-50: ***IPX***

NetBIOS Broadcast Replication contains the following selection options:

Possible values	Meaning
yes	All NetBIOS hosts in the network can access each other, even if WAN connections must be set up frequently. Cost-intensive!
no (default value) *on LAN only*	NetBIOS hosts in the LAN can only access each other if they do not need WAN connections to be set up. Low cost.

Table 8-51: **NetBIOS Broadcast Replication**

To do Proceed as follows:

- Go to ***IPX***.
- Enter **Local System Name**.
- Enter **Internal Network Number** (only if necessary!).
- Activate **Enable IPX Spoofing**, if applicable.
- Activate **Enable SPX Spoofing**, if applicable.
- Select **NetBIOS Broadcast Replication**, e.g. *on LAN only*.
- Press **SAVE**.

8.4.2 Configuring the LAN Interface

The next step is to configure **X4000**'s LAN interface to the IPX network. The LAN interface is the physical interface to the local network. In the next menu, you tell the router the network number of the IPX LAN to which it is connected. As long as **X4000** does not have this information, it cannot actively participate in its own IPX LAN.

The configuration is made in ***CM-100BT, FAST ETHERNET***.

Field	Meaning
Local IPX NetNumber	The IPX network number of the LAN to which **X4000** is connected.
Encapsulation	Defines the type of header to be used for IPX packets in the LAN connected. Possible values: ■ *none* ■ *Ethernet II* ■ *Ethernet 802.2 LLC* ■ *Ethernet SNAP* ■ *Ethernet NOVELL 802.3*

Table 8-52: ***CM-100BT, FAST ETHERNET***

To do Proceed as follows:

➤ Go to ***CM-100BT, FAST ETHERNET***.

➤ Enter **Local IPX NetNumber**.

➤ Select **Encapsulation**.

➤ Press *SAVE*.

8.4.3 Configuring WAN Partners

If the connection to one or more WAN partners is implemented with the IPX protocol, you must define a number of IPX-specific settings for the WAN partner.

The configuration is made in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IPX***:

Field	Meaning
Enable IPX	Enables IPX for the WAN partner. Possible values: ■ *yes* ■ *no*
IPX NetNumber	IPX network number of the WAN connection. This is required by some IPX routers.
Send RIP/SAP Updates	Defines how often ➤➤ **RIP** (Routing Information Protocol) and SAP (Service Advertising Protocol) packets are sent by **X4000** to the WAN partner. In IPX networks, RIP and SAP packets are sent as ➤➤ **broadcasts** to connected networks to provide information about current routes and services. The data flow caused by this is acceptable in the LAN, but you must make a setting here to control the data flow for networks connected via WAN connections.
Update Time	Defines the time intervals at which periodic updates are sent.
Age Multiplier	If routes and services entered are not renewed during **Update Time** x **Age Multiplier**, they are deleted. This prevents accumulation of unnecessarily large numbers of routes and services that are not used.

Table 8-53: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IPX***

The **Send RIP/SAP Updates** field contains the following selection options, which are explained with the aid of a table:

Possible values for **Send RIP/SAP Updates**	New connection opened?	Update the existing tables?	Periodic update?	Remarks
off	never	no	no	All routes and services must be entered statically.
triggered + piggyback (on changes, only if link active)	only for changes	yes	yes	This is the default setting, which is sufficient in most cases.
triggered (on changes)	only for changes	yes	no	Less data traffic than *triggered + piggyback*, but also less reliable.
piggyback (only if link active)	never	yes	yes	At least 1 static route and 1 static service must be entered for the WAN partner.
passive triggered (on changes only if link active)	never	yes	no	At least 1 static route and 1 static service must be entered for the WAN partner.
timed update (always)	always	yes	yes	Cost-intensive!

Table 8-54: **Send RIP/SAP Updates**

To do Proceed as follows:

- Go to ***WAN Partner*** ➧ ***Edit*** ➧ ***IP***.
- Select **Enable IPX**: *yes*.
- Enter **IPX NetNumber**.
- Select **Send RIP/SAP Updates**.
- Enter **Update Time**, if applicable.
- Enter **Age Multiplier**, if applicable.

- Confirm with **OK**.
- Press **SAVE**.

8.5 Bridging

X4000 supports the bridging function. The description of the configuration of **X4000** as a bridge can be found in the Software Reference.

8.6 Extra License Features

This chapter briefly describes the **X4000** features you can activate with extra licenses.

The relevant extra licenses are activated by adding the information received with the license in the Setup Tool menu ***LICENSES*** (see chapter 7.1.1, page 121).

Extra licenses are currently obtainable for the following features:

- X.25
- Frame Relay
- OSPF
- VPN (Virtual Private Network)
- TAF (Token Authentication Firewall)

You can find detailed information and configuration instructions (with examples) in the Extended Features Reference.

9 Configuration of Expansion and Resource Cards with the Setup Tool

This chapter tells you the configuration steps you can carry out if you have equipped your **X4000** basic unit with an expansion card and possibly resource cards. Any expansion and resource cards equipped are automatically detected by **X4000** on startup.

To install your expansion and resource cards, please follow the installation guide supplied with the cards and chapter 3.2, page 53.

Enter any necessary license(s) in the Setup Tool (see chapter 7.1.1, page 121) before you start the configuration.

This chapter is broken down as follows:

9.1 WAN Interface Card for ISDN BRI

By installing a BRI (Basic Rate Interface) expansion card, you can equip **X4000** with up to three additional ISDN BRI interfaces. You can use these interfaces for both dialup and leased lines over ISDN.

The ISDN BRI expansion card can be equipped with a resource card with digital modems (see chapter 9.4, page 295) and/or with a resource card for encryption and compression (see chapter 9.5, page 306).

9.1.1 Configuration with the Setup Tool

The additional interfaces are shown in the Setup Tool main menu under `Module:` as follows:

```
X4000 Setup Tool                                BinTec Communications AG
                                                                MyRouter

Licenses                System

LAN:         CM-100BT,Fast Ethernet       Module:  X4E-3BRI,ISDN S0


WAN:         CM-1BRI,ISDN S0

Serial WAN:  CM-SERIAL,Serial

WAN Partner
IP      IPX      PPP      MODEM    ISDN     CAPI

Configuration Management
Monitoring and Debugging
Exit
```

The interface(s) are configured in the following menus:

- ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 0*** for the first additional ISDN BRI port
- ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 1*** for the second additional ISDN BRI port
- ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 2*** for the third additional ISDN BRI port

The number of ISDN BRI ports available with the expansion card can vary, depending on how many interfaces are activated by license. You can obtain any necessary licenses from your dealer.

To do

Proceed as follows to configure the ISDN BRI interface(s) of the expansion card:

- Go to ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 0*** for the first interface.
  This menu offers the same options as ***CM-1BRI, ISDN S0*** for the ISDN BRI interface of the basic unit. For a detailed description, see chapter 7.2.1, page 137.
- Select **ISDN Switch Type**: *autodetect on bootup*.
  This setting enables **X4000** to use its automatic D-channel detection. As long as the D-channel detection is running, *running* appears next to **Result of Autoconfiguration**. Once the setting has been found, it is displayed, e.g. *Euro ISDN, point-to-multipoint*.
- Select **D-Channel**, if applicable.
- Select **B-Channel 1**: e.g. *dialup*.
- Select **B-Channel 2**: e.g. *dialup*.

In most cases, you can accept the preset values for **D-Channel**, **B-Channel 1** and **B-Channel 2**.

If you use an ISDN leased line and have requested a special service from your service provider, it may be necessary to set the local side of the leased line at this point (DTE or DCE). You must then ensure that the far end has set the opposite value. You must also set **D-channel**, **B-channel 1** and **B-channel 2** to the same values, if you have selected several D-/B-channels under **ISDN Switch Type** and the values can be changed.

Incoming Call Answering

If dialup connections are to be set up over the ISDN BRI interface, first tell **X4000** how it is to respond to incoming calls over this interface (these settings are not necessary for a leased line):

- Go to ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 0*** ➧ ***INCOMING CALL ANSWERING***.
  This menu lists the services previously assigned to numbers and offers the same options as ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING*** for the

distribution of incoming calls over the ISDN BRI interface of the basic unit. For a detailed description, see "Incoming call answering", page 141.

- Use **ADD** to add a new entry or select an existing entry. Confirm with **Return** to change the entry.
- Select the **Item**, e.g. *PPP (routing)*.
- Enter the **Number**, e.g. *091112330*.
- Select the **Mode**, e.g. *right to left*.
- Select the **Bearer**, e.g. *data*.
- Press **SAVE**.

  You have returned to menu ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 0*** ➧ ***INCOMING CALL ANSWERING***. The entries are saved and displayed in the list.

  You have now assigned a possible service (*PPP (routing)*) to one of your numbers (*0911 123 30*). This means that when a data call is received for the Called Party Number *0911 123 30*, it is put through to the PPP (routing) service.
- Repeat these steps until you have assigned to all phone numbers the services to be reached under these numbers.

  You have now configured Incoming Call Answering for this ISDN BRI interface and **X4000** distributes the incoming calls to the internal services.
- Leave ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 0*** ➧ ***INCOMING CALL ANSWERING*** with **EXIT**.
- Press **SAVE**.
- If applicable, go to ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 1*** to configure the second interface.
- If applicable, go to ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 2*** to configure the third interface.

WAN partner

To enable **X4000** to make connections to networks or hosts outside your LAN, you must configure the partners you want to connect to as WAN partners on your **X4000**. This applies to outgoing connections, incoming connections and leased lines. Refer to chapter 7.3, page 159.

9.2 WAN Interface Card for ISDN PRI and/or G.703

The PRI (Primary Rate Interface) or G.703 expansion card is equipped with two ports, each with two sockets (IN and OUT). By installing the expansion card, you can equip **X4000** with

- one ISDN PRI and/or one G.703 interface or
- two ISDN PRI interfaces or
- two G.703 interfaces

The necessary licenses for activating the desired interfaces can be obtained from your dealer.

PRI You can connect **X4000**'s ISDN PRI interface to a Primary Rate Interface. This is done by connecting the NT (Network Termination) adapter of your telephone provider to the IN socket of a port activated by license. In Germany, this provides you with 30 B-channels and 1 D-channel, which you can use for both dialup and leased lines over ISDN.

G.703 With an **X4000** G.703 interface, you can install a G.703 leased line to a connection partner. This is also done by connecting the NT (Network Termination) adapter of your telephone provider to the IN socket of a port activated by license. A G.703 leased line is an unstructured high-speed line of up to 2 Mbps for the transmission of data with HDLC framing. The connection status is not checked at layer 1; if necessary, this must be done by higher protocol layers such as the PPP.

You can use a PRI interface as both a PRI and G.703 interface.

You can only use a G.703 interface as a G.703 interface.

The PRI or G.703 expansion card is equipped as standard with hardware support for encryption and compression (chapter 9.5, page 306) and can be optionally equipped with up to two resource cards with digital modems (chapter 9.4, page 295).

9.2.1 Configuration with the Setup Tool

The additional interfaces are shown in the Setup Tool main menu under `Module:` as follows:

```
X4000 Setup Tool                                BinTec Communications AG
                                                                MyRouter

Licenses                System

LAN:         CM-100BT,Fast Ethernet       Module:  X4E-2PRI, ISDN S2M


WAN:         CM-1BRI,ISDN S0

Serial WAN:  CM-SERIAL,Serial

WAN Partner
IP      IPX      PPP      MODEM    ISDN     CAPI

Configuration Management
Monitoring and Debugging
Exit
```

The ISDN PRI/G.703 interface(s) is/are configured in the menus

- ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 0*** for the first ISDN PRI/G.703 port
- ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 1*** for the second ISDN PRI/G.703 port

The number of ISDN PRI or G.703 ports available with the expansion card can vary, depending on how many and which interfaces are activated by license. You can obtain any necessary licenses from your dealer.

The menus contain the following fields:

Field	Meaning
Result of Autoconfiguration	Status of ISDN autoconfiguration. Automatic ➤➤ **D-channel** detection runs until a setting is found or until the ISDN protocol is entered manually under **ISDN Switch Type**.
ISDN Switch Type	Defines the ISDN ➤➤ **protocol** supplied by your ISDN provider. Possible values: ■ *autodetect on bootup:* automatic D-channel detection (default setting) ■ *Euro ISDN S2M user profile (TE)* ■ *Euro ISDN S2M network profile (NT)* ■ *leased line B1..B30* ■ *leased line, 1 hyperchannel* ■ *leased line, chann. E1, 31 diff. endpoints*: This type of leased line is also called an "aggregated kilostream" in the UK. ■ *back to back*
ISDN Line Framing	Possible values: ■ *standard (CRC4)* (default setting) ■ *special (no CRC)* ■ *G.703*: necessary if you want to configure a G.703 leased line over the interface. The default setting is used in most cases for a PRI interface. In some cases in Sweden and France, the setting *special (no CRC)* is necessary if **X4000** is connected to a PABX.

Field	Meaning
Clock Mode	Defines which connection partner sends the clock signal for synchronization between transmitter and receiver. If the clock signal is not generated by the (PABX) network itself, one of the two connection partners must generate this signal. Possible values: ■ *external* (default setting): **X4000** receives the clock signal ■ *internal*: **X4000** sends the clock signal

Table 9-1: ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 0*** and ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 1***

To do Proceed as follows:

➤ Go to ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 0*** for the first ISDN PRI interface.

➤ Select **ISDN Switch Type**: *autodetect on bootup*.

This setting enables **X4000** to use its automatic D-channel detection. As long as the D-channel detection is running, *running* appears next to **Result of Autoconfiguration**. The setting found is then displayed, e.g. *Euro ISDN S2M user profile (TE)*.

If the ISDN protocol is set incorrectly, an ISDN connection cannot be set up and the provider's exchange may disconnect the line if it is not used!

Make sure **X4000** detects the ISDN protocol used correctly and displays it under **Result of Autoconfiguration**. If not, enter it manually under **ISDN Switch Type**. The automatic D-channel detection is then switched off.

➤ Select **ISDN Line Framing**, e.g. *standard (CRC4)*.

➤ Select **Clock Mode**, e.g. *external*.

Incoming Call Answering

If dialup connections are to be set up over the ISDN PRI/G.703 interface, first tell **X4000** how it is to respond to incoming calls over this interface (these settings are not necessary for a leased line):

- Go to ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 0*** ➧ ***INCOMING CALL ANSWERING***.

  This menu lists the previously completed assignment of systems to numbers. The menu offers the same options as ***CM-1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING*** for distribution of incoming calls over the ISDN BRI interface of the basic unit. For a detailed description, see "Incoming call answering", page 141.

- Use **ADD** to add a new entry or select an existing entry. Confirm with **Return** to change the entry.
- Select the **Item**, e.g. *PPP (routing)*.
- Enter the **Number**, e.g. *091112330*.
- Select the **Mode**, e.g. *right to left*.
- Select the **Bearer**, e.g. *data*.
- Press **SAVE**.

  You have returned to menu ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 0*** ➧ ***INCOMING CALL ANSWERING***. The entries are saved and displayed in the list.

  You have now assigned a possible service (*PPP (routing)*) to one of your numbers (*0911 123 30*). This means that when a data call is received for Called Party Number 0911 123 30, it is put through to the PPP (routing) service.

- Repeat these steps until you have assigned to all phone numbers the services to be reached under these numbers.

  You have now configured Incoming Call Answering for this ISDN PRI interface and **X4000** distributes the incoming calls to the internal services.

- Leave ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 0*** ➧ ***INCOMING CALL ANSWERING*** with **EXIT**.
- Press **SAVE**.
- If applicable, go to ***X4E-2PRI, ISDN S2M*** ➧ ***UNIT 1*** to configure the second ISDN PRI/G.703 interface.

WAN partner To enable **X4000** to make connections to networks or hosts outside your LAN, you must configure the partners you want to connect to as WAN partners on your **X4000**. This applies to outgoing connections, incoming connections and leased lines. Refer to chapter 7.3, page 159.

9.3 LAN Interface Card for 10/100 Mbps

By installing a LAN expansion card, you can equip your **X4000** with two additional LAN interfaces.

You can equip the LAN expansion card with an optional resource card for encryption and compression (see chapter 9.5, page 306).

9.3.1 Configuration with the Setup Tool

The additional interfaces are shown in the Setup Tool main menu under `Module:` as follows:

```
X4000 Setup Tool                                BinTec Communications AG
                                                              MyRouter

Licenses                System

LAN:         CM-100BT,Fast Ethernet   Module:  X4E-100BT,FastEthernet


WAN:         CM-1BRI,ISDN S0

Serial WAN:  CM-SERIAL,Serial

WAN Partner
IP      IPX      PPP      ISDN     CAPI

Configuration Management
Monitoring and Debugging
Exit
```

You can configure the interfaces in the following menus:

- ***X4E-100BT, FAST ETHERNET*** ➧ ***UNIT 0*** for the first additional LAN interface
- ***X4E-100BT, FAST ETHERNET*** ➧ ***UNIT 1*** for the second additional LAN interface

To do

Proceed as follows to configure the LAN interface(s) of the expansion card:

- Go to ***X4E-100BT, FAST ETHERNET*** ➧ ***UNIT 0*** for the first interface.
  This menu offers the same options as ***CM-1OOBT, FAST ETHERNET*** for the LAN interface of the basic unit. For a detailed description, see chapter 7.2.1, page 137.
- Enter **Local IP Number**, e.g. *192.168.1.250*.
- Enter **Local Netmask**, e.g. *255.255.255.0*.
- If applicable, enter **Second Local IP Number** and **Second Local Netmask**.
- Select **Encapsulation**, e.g. *Ethernet II*.
- Select **Mode**, e.g. *auto*.
- Press **SAVE**.
  You have returned to the main menu and the entries have been saved.

Advanced configuration

If you wish to use the IPX ➧➧ **protocol**, you will find an explanation of how to configure the LAN interface for IPX in chapter 8.4, page 268.

Information about bridging can be found in the Software Reference.

9.3.2 Broadband Internet Access (ADSL) with X4000 and LAN Expansion Card

BinTec Communications AG's **X4000** offers the PPP-over-Ethernet protocol. This protocol is required, for example, for connecting terminals to the Internet over the T-DSL connection of Deutsche Telekom AG to achieve increased bandwidth.

If you use the ADSL connection of another provider, ask the provider about any special features of your ADSL connection that need to be taken into account.

chapter 7.2.3, page 155 describes how you can use the T-DSL connection with **X4000**'s basic unit with only one LAN interface. The limitations and security risks described there do not apply if **X4000** is equipped with a LAN expansion

card and several LAN interfaces are therefore available. In this case, for example, you can use one of **X4000**'s LAN interfaces for your LAN and another LAN interface for access to T-DSL.

Example Scenario

The following scenario provides an example configuration for the settings in the Setup Tool. The LAN connection is handled over the LAN interface of **X4000**'s basic unit. The ADSL modem is connected to one of the LAN interfaces of the expansion card.

If you receive a special cable from Deutsche Telekom AG or another provider for connecting the ADSL modem, use only this cable!

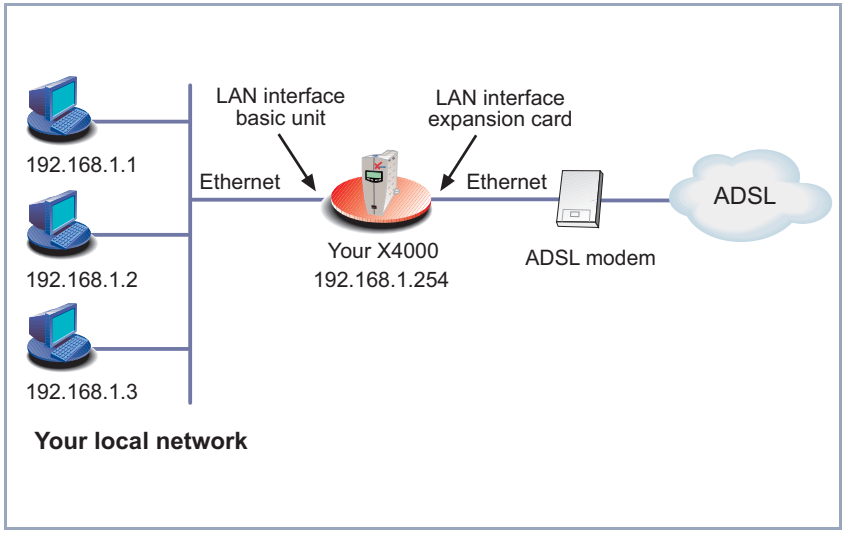


Figure 9-1: Example scenario

IP address configuration

Proceed as follows to define the IP address of **X4000**:

- Go to ***CM-100BT, FAST ETHERNET***.
- Enter your IP address in the **Local IP Number** field, e.g. ***192.168.1.254***.

➤ Enter your netmask in the **Local Netmask** field, e.g. ***255.255.255.0***.
This address should be the default gateway for the hosts in your LAN.

➤ Press **SAVE**.

General PPP settings

The general PPP settings are configured in ***PPP***:

Here you must configure an interface on which PPP-over-Ethernet is to run. You can leave all the other settings at the default value.

➤ Go to ***PPP***.

The following field is relevant:

Field	Meaning
PPPoE Ethernet Interface	Defines the interface used for ADSL.

Table 9-2: ***PPP***

Proceed as follows to define the necessary PPP settings:

➤ Select your **PPPoE Ethernet Interface**, e.g. ***en2***.

➤ Press **SAVE**.

WAN partner settings

To configure a PPP-over-Ethernet partner, proceed exactly as for configuration of a WAN partner.

When configuring the WAN partner, make sure that Van Jacobson Header Compression is not activated in the menu ***WAN PARTNER*** ➧ ***ADD*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***. The IPX, Bridging and Bandwidth on Demand functions should not be used either.

➤ Go to ***WAN PARTNER*** ➧ ***ADD***.

The following fields are relevant:

Field	Meaning
Partner Name	Enter a name for uniquely identifying the PPP-over-Ethernet partner.
Encapsulation	Encapsulation defines how the data packets are packed for transfer to the WAN partner. PPP-over-Ethernet: Only *PPP* should be selected here.
Calling Line Identification	Indicates whether calls from this WAN partner should be identified by means of the calling party number (CLID). The value of this field is dependent on *Direction* in the submenu ***WAN NUMBERS*** and cannot be set here.

Table 9-3: ***WAN PARTNER*** ➧ ***ADD***

- Enter your WAN partner's name for PPP-over-Ethernet under **Partner Name**, e.g. ***t-online***.
- Select **Encapsulation**: *PPP*.

WAN partner PPP settings

- Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***PPP***.

The following fields are relevant:

Field	Meaning
Partner PPP ID	ID of WAN partner. Remains empty.
Local PPP ID	Your T-Online user ID. Comprises the following elements: <Kennung><T-Online-Nr.>#<Mitbenutzer-Nr.>@t-online.de Kennung = the 12-digit user account (here: ***000460004256***) T-Online-Nummer = telephone number (here: ***091169386***) Mitbenutzer-Nr. = 4-digit co-user number (here: ***0001***) The T-Online-Nr. and the Mitbenutzer-Nr. must be separated by # if the T-Online-Nr. has less than 12 digits.
PPP Password	Your T-Online password.
Keepalives	Activates keepalive packets. The activated Keepalive function checks the interface status. This permits faster detection and signaling if the connection to the provider fails (for example, if the LAN cable is accidentally disconnected).

Table 9-4: ***WAN PARTNER*** ➧ ***ADD*** ➧ ***PPP***

- Make no entry under **Partner PPP ID**.
- Enter the **Local PPP ID**,
  e.g. *000460004256091169386#0001@t-online.de.*
- Enter the **PPP Password**.
- Select **Keepalives**: *on*.
- Confirm with **OK**.

Advanced settings

➤ Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***ADVANCED SETTINGS***.

The following field is relevant:

Field	Meaning
Layer 1 Protocol	Here you can define the Layer 1 Protocol of the ISDN B-channel that **X4000** is to use for connections to the WAN partner. PPP over Ethernet (PPPoE) must be selected here for access to T-DSL.

Table 9-5: ***WAN PARTNER*** ➧ ***ADD*** ➧ ***ADVANCED SETTINGS***

➤ Select **Layer 1 Protocol**: *PPP over Ethernet (PPPoE)*.

➤ Confirm with **OK**.

IP settings

➤ Go to ***WAN*** ➧ ***ADD*** ➧ ***IP***.

The following field is relevant:

Field	Meaning
IP Transit Network	Defines whether **X4000** uses a transit network to the WAN partner. The IP address is assigned dynamically if *dynamic client* is selected.

Table 9-6: ***WAN PARTNER*** ➧ ***ADD*** ➧ ***IP***

➤ Select **IP Transit Network**: *dynamic client*.

➤ Press **SAVE**.

➤ Press **SAVE**.

➤ Leave ***WAN PARTNER*** with **EXIT**.

Creating a default route

➤ Go to ***IP*** ➧ ***ROUTING*** ➧ ***ADD***.

The following field is relevant:

Field	Meaning
Partner / Interface	Your PPPoE partner.

Table 9-7: ***IP*** ➧ ***ROUTING*** ➧ ***ADD***

- ➤ Select **Route Type**: *Default route*.
- ➤ Select **Partner / Interface**, e.g. ***t-online***.
- ➤ Press **SAVE**.

Activating Network Address Translation (NAT)

You can use NAT to ensure that

- no more accesses can be made to your network from the Internet,
- and that connections to the Internet appear only under a single dynamically assigned IP address.

- ➤ Go to ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION***.
- ➤ Select the WAN interface on which you want to activate NAT, e.g. ***t-online***, and confirm with **Return**.

  Another menu window opens:

The following field is relevant:

Field	Meaning
Network Address Translation	Here you can activate Network Address Translation (NAT) for your WAN partner. This conceals your whole network to the outside world with just one IP address.

Table 9-8: ***IP*** ➧ ***NAT***

- ➤ Select **Network Address Translation**: *on*.
- ➤ Press **SAVE**.

9.4 Resource Card with Digital Modems

ISDN BRI and ISDN PRI/G.703 expansion cards (see chapter 9.1, page 278 and chapter 9.2, page 281) can also be equipped with resource cards with digital modems.

Resource cards with digital modems are available in various versions:

- XTR-S: resource card with 8 digital modems
- XTR-M: resource card with 12 digital modems
- XTR-L: resource card with 30 digital modems

If your **X4000** is equipped with resource card(s) with digital modems for analog data and fax connections, it can be used as

- Remote Access Server for ISDN and GSM connections and for analog connections (dial-in)
- fax gateway (please observe future software releases and release notes).

If you are using an expansion card with resource card(s) in the **X4000** built-in unit, BinTec Communications AG recommends that you use the fan unit obtainable as optional equipment.

9.4.1 X4000 with Digital Modems as Remote Access Server

X4000 equipped with digital modems can be used for dial-in connections, e.g. by home office staff with analog modems or by field service staff with laptop, mobile phone and modem.

X4000 uses the digital modems of the resource card(s) as a modem pool and always dynamically takes the next available modem for an incoming dial-in connection.

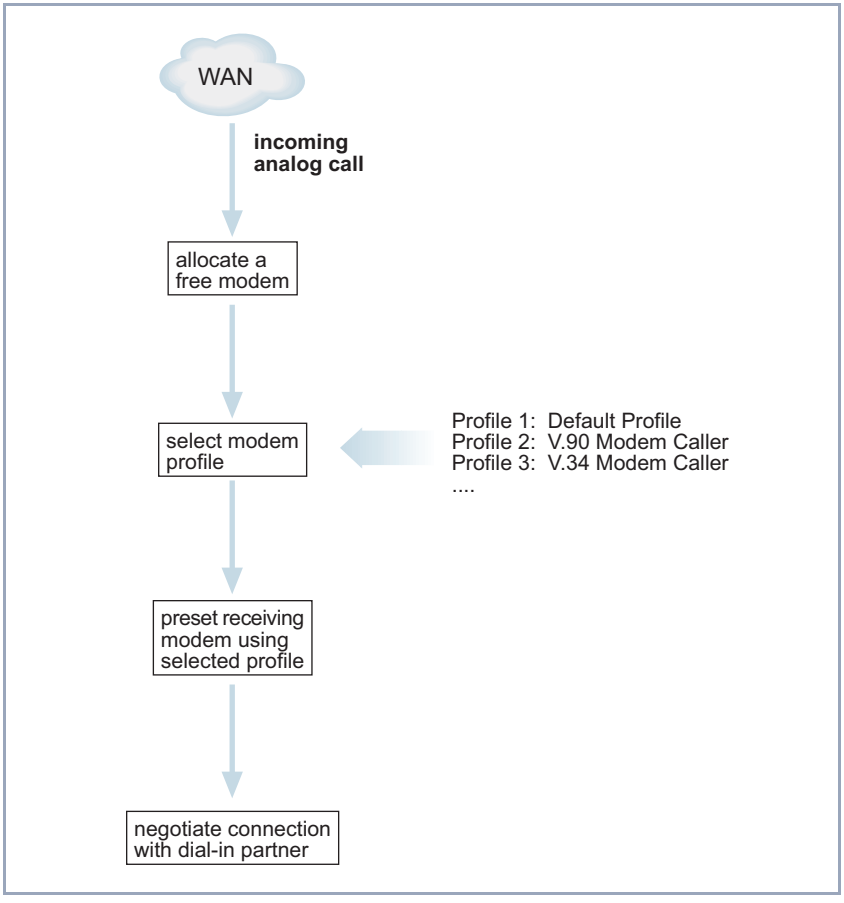


Figure 9-2: Dial-in to **X4000** with digital modems

The modems (e.g. 30 modems with an XTR-L resource card) need not be individually configured, as **X4000** uses a flexible concept of modem profiles. Up to eight modem profiles can be configured for **X4000** in the menu ***MODEM*** ➧ ***PROFILE CONFIGURATION***; the modem actually used then dynamically assumes the settings of the appropriate modem profile on connection setup. A modem profile defines the modem settings that are required for a connection to the opposite terminal, e.g. automatic baud rate negotiation, compression and maximum or minimum baud rate. Creating several modem profiles gives you a tuning facility if you do not want to use just the default settings.

When defining the settings for Incoming Call Answering, e.g. in menu ***CM-3BRI, ISDN S0, UNIT 0*** ➧ ***INCOMING CALL ANSWERING*** for the first ISDN BRI interface of a BRI expansion card (see "Incoming Call Answering", page 285), you can explicitly define which modem profile is to be used for an incoming call. If the party dialing in has not been assigned a modem profile or the calling party cannot be authenticated, the modem automatically uses modem profile 1.

Modem profile 1 is therefore used as default setting and should allow maximum selection of the settings. As all dial-in users that cannot be authenticated by CLID etc. are assigned modem profile 1 for the connection, modem profile 1 should be able to operate all modems. You can use the remaining seven modem profiles to define user groups, so that the dial-in connection partners find optimum modem settings in **X4000**.

Example scenario A typical scenario, e.g. for an Internet Service Provider, could look like this:

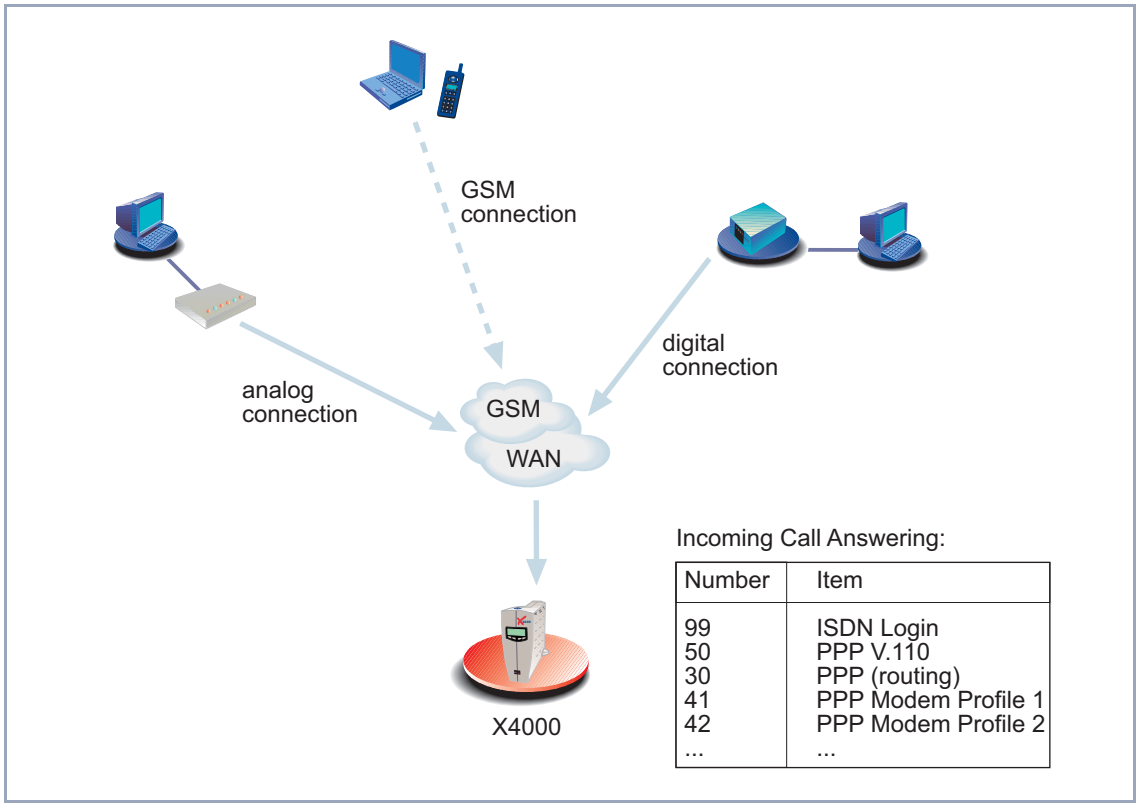


Figure 9-3: Scenario for dial-in

- Dial-in users who dial in over an analog connection use the numbers 0911 123 41 to 0911 123 48 for dialing in (according to which analog modem type they use).
- Dial-in users who use an ISDN connection use 0911 123 30.
- Dial-in users who dial in with a mobile phone over a GSM connection use 0911 123 50.
- Incoming calls to the number 0911 123 99 are connected through to the ISDN Login service.

Configuration with the Setup Tool

If **X4000** is equipped with a resource card with digital modems, the menu ***MODEM*** appears in the Setup Tool main menu:

```
X4000 Setup Tool                                BinTec Communications AG
                                                                MyRouter

Licenses                System

LAN:         CM-100BT,Fast Ethernet       Module:  X4E-3BRI,ISDN S0

WAN:         CM-1BRI,ISDN S0

Serial WAN:  CM-SERIAL,Serial

WAN Partner
IP      IPX      PPP      MODEM    ISDN     CAPI

Configuration Management
Monitoring and Debugging
Exit
```

The modem profiles whose settings are used by the digital modems in **X4000** are defined in menu ***MODEM***.

General procedure for the configuration of dial-in connections:

1. First define the settings for modem profile 1 in ***MODEM*** ➧ ***PROFILE CONFIGURATION***.
2. Define other modem profiles 2 ... 8 as necessary in ***MODEM*** ➧ ***PROFILE CONFIGURATION***.
3. Use the settings for Incoming Call Answering to control the use of the modem profiles according to the dial-in connection partner, e.g. in ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 0*** ➧ ***INCOMING CALL ANSWERING***.
4. Configure a WAN partner entry for each dial-in user in ***WAN PARTNER***.

The menus ***MODEM*** ➧ ***PROFILE CONFIGURATION*** ➧ ***PROFILE 1 ... 8*** contain the following fields:

Field	Meaning
Name	Profile 1 ... 8 is displayed.
Description	Freely selectable description of the modem profile.
Modulation	Defines the modem standard to be used. The selected modem standard must be supported by the analog modem of the opposite terminal. *V.90* and lower are supported by 56000-modems, *V.34* and lower by 33600-modems, *V.32bis* and lower by 14400-modems. Possible values: ■ *V.90* ■ *V.34bis* ■ *V.34* ■ *V.32bis* ■ *V.32* ■ *V.23* ■ *V.22bis* ■ *V.22* ■ *V.21*
Error Correction	Defines the error correction to be used. For possible values, see Table 9-10, page 303.

Field	Meaning
Automode	Defines whether dynamic negotiation of parameters for baud rates and modem standards is allowed with the dial-in user. Possible values: ■ *on* (default value): Negotiation is allowed. ■ *off*: The set values are always used.
Min Bps	Defines the minimum baud rate that can be used with the modem profile. Any speed supported by the modem standard set under **Modulation** can be set here. The connection is cleared if the only baud rates that can be negotiated with the opposite terminal are smaller than the value set here. Scalable from *300* (default value) to *56000*.
Max Receive Bps	Defines the maximum baud rate of incoming data ("upstream") that can be used with the modem profile. Any speed supported by the modem standard set under **Modulation** can be set here. The value set under **Max Transmit Bps** is used here if this value is less than the value set here. Scalable from *300* to *56000*, default value: *33600*.
Max Transmit Bps	Is only used if **Modulation** = *V.90*. Defines the maximum baud rate of outgoing data ("downstream") that can be used with the modem profile. Scalable from *300* to *56000*, default value: *33600*.

Field	Meaning
V.42bis Compression	Defines whether V.42bis compression can be negotiated for a connection. Possible values: ■ *auto*: Negotiation is allowed. ■ *off*: V.42bis compression is not used.
MNP5 Compression	Defines whether MNP5 compression can be negotiated for a connection. Possible values: ■ *auto*: Negotiation is allowed. ■ *off*: MNP5 compression is not used.

Table 9-9: Menu ***MODEM*** ➧ ***PROFILE CONFIGURATION*** ➧ ***PROFILE 1 ... 8***

The **Error Correction** field contains the following selection options:

Possible values	Meaning
none	Error correction is not used.
required	First LAPM and then MNP4 is tried for error correction. If both fail, the modem clears the connection.
auto (default value)	First LAPM and then MNP5 is tried for error correction. If both fail, error correction is not used. This setting should generally be selected, except for dial-in users with modems that only support obsolescent standards such as V.23, V.22bis or V.21.
LAPM	LAPM (Link Access Protocol for Modems) is used. If this fails, the modem clears the connection.
MNP	MNP4 (Microcom Networking Protocol) is used. If this fails, the modem clears the connection.

Table 9-10: **Error Correction**

To do Proceed as follows:

- Go to ***MODEM*** ➧ ***PROFILE CONFIGURATION***.
- Select ***PROFILE 1*** and confirm with **Return**.

Modem profile 1 configuration

- Enter **Description**, e.g. *Default Modem Profile*.
- Select **Modulation**, e.g. *V.34*.
- Select **Error Correction**, e.g. *auto*.
- Select **Automode**, e.g. *on*.
- Select **Min Bps**, e.g. *2400*.
- Select **Max Receive Bps**, e.g. *33600*.
- If applicable, select **Max Transmit Bps**, e.g. *33600*.

- Select **V.42bis Compression**, e.g. *auto*.
- Select **MNP5 Compression**, e.g. *auto*.
- Press **SAVE**.

Modem profile 2 ... 8 configuration

- Configure other modem profiles as necessary, see Table 9-11, page 305.

Incoming Call Answering

Proceed as follows to assign the defined modem profiles to the dial-in users (the example values are taken from the scenario in Figure 9-3, page 298):

- Go to ***X4E-3BRI, ISDN S0*** ➧ ***UNIT 0*** ➧ ***INCOMING CALL ANSWERING*** if you wish to assign an incoming dial-in connection over the first interface of an ISDN BRI expansion card.
- Add a new entry with **ADD**.
- Select **Item**, e.g. *PPP Modem Profile 2*.
- Enter **Number**, e.g. *091112342*.
- Select **Mode**, e.g. *right to left*.
- Select the **Bearer**, e.g. *any*.
- Press **SAVE**.
- Add other entries as necessary.

WAN partner

Proceed as follows to create WAN partner entries for the dial-in users:

- Go to ***WAN PARTNER***, add a new entry with **ADD**.
  You will find detailed information about configuring a WAN partner in chapter 7.3, page 159; the following settings are essential here:
- Enter **Partner Name**, e.g. *homeoffice_2*.
- Select **Encapsulation**, e.g. *PPP*.
- Select authentication information in ***WAN PARTNER*** ➧ ***ADD*** ➧ ***PPP***.
- Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***ADVANCED SETTINGS***.
- Select **Layer 1 Protocol**, e.g. *Modem Profile 2*.
- Confirm with **OK**.
- Go to ***WAN PARTNER*** ➧ ***ADD*** ➧ ***WAN NUMBERS*** ➧ ***ADD***.

- Enter the number to be used by **X4000** under **Number**, e.g. *09117890*.
- Select **Direction**, e.g. *outgoing*.
- Press **SAVE**.
- Leave ***WAN PARTNER*** ➧ ***ADD*** ➧ ***WAN NUMBERS*** with **EXIT**.
- Select the necessary settings in ***WAN PARTNER*** ➧ ***ADD*** ➧ ***IP*** (see "Carrying out IP configuration", page 173).
- Press **SAVE**.

  The WAN partner entry is displayed.
- Proceed in a similar way to configure other WAN partners.

Table 9-11, page 305 uses a general example to show how you could meaningfully use the modem profiles in **X4000**:

Profile	Modulation	Error Correction	Automode	Min Bps	Max Receive Bps	Max Transmit Bps	V.42bis	MNP5
Profile 1	*V.34*	*auto*	*on*	*2400*	*33600*	*33600*	*auto*	*auto*
Profile 2	*V.90*	*auto*	*on*	*28800*	*31200*	*50000*	*auto*	*auto*
Profile 3	*V.90*	*auto*	*on*	*28800*	*31200*	*44000*	*auto*	*auto*
Profile 4	*V.90*	*auto*	*on*	*14400*	*31200*	*40000*	*auto*	*auto*
Profile 5	*V.32bis*	*auto*	*on*	*4800*	*14400*	*14400*	*auto*	*auto*
Profile 6	*V.32*	*auto*	*on*	*4800*	*9600*	*9600*	*auto*	*auto*
Profile 7	*V.23*	*auto*	*on*	*300*	*1200*	*1200*	*auto*	*auto*
Profile 8	*V.22bis*	*auto*	*on*	*300*	*2400*	*2400*	*auto*	*auto*

Table 9-11: Standard set of modem profiles

9.5 Resource Card for Encryption and Compression

The ISDN PRI or G.703 expansion card is equipped as standard with hardware support for encryption and compression. The ISDN BRI expansion card and the LAN expansion card can be optionally equipped with an appropriate resource card.

A resource card for encryption and compression provides hardware support for STAC compression and symmetrical encryption processes (DES, 3DES, CAST, Twofish, Blowfish). This enables the available bandwidth to be fully utilized and costs cut, without affecting the performance of **X4000**.

If you are using an expansion card with resource card(s) in the **X4000** built-in unit, BinTec Communications AG recommends that you use the fan unit obtainable as optional equipment.

9.5.1 Configuration with the Setup Tool

STAC compression and encryption are configured in the usual way in the Setup Tool menu ***WAN PARTNER*** ➧ ***EDIT*** (see chapter 8.2.9, page 232 and chapter 10.3.1, page 354).

10 Configuration of Security Functions and Firewall

SAFERNET

The **X4000** from BinTec Communications AG gives you a high degree of security for your network and connections. The security functions available (SAFERNET) offer monitoring of activities via the router and effective access and line tapping security. The necessary configuration steps are described in this chapter.

Some of the features can only be configured by making entries directly in the ➤➤ **MIB** tables and not by using the Setup Tool. The relevant tables and variables are given in the respective section.

You can make MIB entries either by commands in the ➤➤ **SNMP shell** or via external SNMP managers, e.g. the Configuration Manager. A description of the SNMP commands is given in the Software Reference.

This chapter is broken down as follows:

10.1 Activity Monitoring

A major requirement for a high degree of security is the possibility of accurately monitoring all activities on and over the router. BinTec Communications AG provides a variety of facilities for this purpose:

- Syslog Messages (chapter 10.1.1, page 308)
- Monitoring Functions in the Setup Tool (chapter 10.1.2, page 313)
- Credits Based Accounting System (chapter 10.1.3, page 316)
- HTTP Status Page (chapter 10.1.4, page 320)
- Java Status Monitor (chapter 10.1.5, page 321)
- Activity Monitor (chapter 10.1.6, page 322)

10.1.1 Syslog Messages

All major events on **X4000**'s various subsystems (➤➤ **ISDN**, ➤➤ **PPP**, ➤➤ **CAPI**, etc.) are logged in the form of syslog messages (system logging messages).

The number of details visible depends on the level set (eight steps from critical and information to debug). The logged data are saved by **X4000** in a list of adjustable length. All information can be and should be passed to one or more external computers for saving and further processing, e.g. to the system administrator's computer. The syslog messages are lost when you restart **X4000**.

Avoid forwarding syslog messages to log hosts reached over a dialup connection. This raises your telephone bill unnecessarily.

Make sure you only pass syslog messages to a safe computer. Check the data regularly and ensure that there is always enough spare capacity available on the hard disk of your PC.

Syslog Demon

All Unix operating systems support the recording of syslog messages (for setting up a Syslog Demon in Unix, see the Software Reference). For Windows PCs, the Syslog Demon included in DIME Tools can record the data and distribute to various files depending on the contents (see BRICKware for Windows).

Settings for syslog messages are made in:

- ***SYSTEM***
- ***SYSTEM*** ➧ ***EXTERNAL SYSTEM LOGGING***
- ***CM-100BT, FAST ETHERNET*** ➧ ***ADVANCED SETTINGS***
- ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

Field	Meaning
Syslog Output on Serial Console	Enables the display of syslog messages on the PC connected to the serial interface of **X4000**. Use this setting only if you make a fault analysis, as a very large output over the serial console adversely affects the throughput of the other interfaces. Possible values: ■ *yes* ■ *no*
Message Level for Syslog Table	Specifies the priority of the syslog messages to be recorded internally. Possible values: ■ *emerg*: emergency messages (highest priority) ■ *alert*: alert messages ■ *crit*: critical messages ■ *err*: error messages ■ *warning*: warning messages ■ *notice*: notice messages ■ *info*: info messages ■ *debug*: debug messages (lowest priority) Syslog messages are only recorded internally if they have a higher or identical priority to that indicated.
Maximum Number of Syslog Entries	Maximum number of syslog messages saved internally in **X4000** (possible values: *0* ... *100*).

Table 10-1: ***SYSTEM***

Field	Meaning
Log Host	➤➤ **IP address** of the host to which syslog messages are passed.
Level	Priority of the syslog messages to be sent to **Log Host**. Corresponds to **Message Level for Syslog Table** in ***SYSTEM***.
Facility	Syslog facility at **Log Host**. Only required if the **Log Host** is a Unix computer.
Type	Message type. Possible values: ■ *all*: all messages. ■ *system*: syslog messages except ➤➤ **accounting** messages. ■ *accounting*: accounting messages.

Table 10-2: ***SYSTEM*** ➧ ***EXTERNAL SYSTEM LOGGING***

Field	Meaning
IP Accounting	For saving accounting messages for ➤➤ **TCP**, ➤➤ **UDP** and ICMP sessions. Possible values: *on*, *off*.

Table 10-3: ***CM-100BT, FAST ETHERNET*** ➧ ***ADVANCED SETTINGS***

Field	Meaning
IP Accounting	For saving accounting messages for ➤➤ **TCP**, ➤➤ **UDP** and ICMP sessions. Possible values: *on*, *off*.

Table 10-4: ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***

To do Make the desired settings for syslog messages as follows:

- Go to ***SYSTEM***.
- Select **Syslog Output on Serial Console**.
- Select **Message Level for Syslog Table**.
- Enter **Maximum Number of Syslog Entries**.
- Go to ***SYSTEM*** ➧ ***EXTERNAL SYSTEM LOGGING*** to pass syslog messages to external hosts.
- Select an existing entry and confirm it with **Return** or add a new entry with **ADD**.
- Enter **Log Host**.
- Select **Level**.
- Select **Facility**.
- Select **Type**.

IP accounting LAN side

Proceed as follows to activate IP accounting for a LAN partner. **X4000** then generates and records accounting messages for the selected LAN partner from TCP, UDP and ICMP sessions:

- Go to ***CM-100BT, FAST ETHERNET*** ➧ ***ADVANCED SETTINGS***.
- Activate **IP Accounting** with *on*.

IP accounting WAN side

Proceed as follows to activate extended IP accounting. **X4000** then generates and records accounting messages for the selected WAN partner from TCP, UDP and ICMP sessions:

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***.
- Activate **IP Accounting** with *on*.

Displaying syslog messages

Proceed as follows to display syslog messages:

- Go to ***MONITORING AND DEBUGGING*** ➧ ***MESSAGES***.

  This displays the syslog messages saved internally in **X4000**:

```
X4000 Setup Tool                                BinTec Communications AG
[MONITOR][MESSAGE]: Syslog Messages                              MyRouter

Subj    Lev Message

SNMP    DEB sent TRAP (linkUp,0) 115 bytes to circindex 1001 Port 36880
SNMP    DEB sent TRAP (linkUp,0) 115 bytes to 199.1.1.13 Port 162


EXIT        RESET

Press <Ctrl-n>, <Ctrl-p> to scroll
```

Deleting syslog messages

➤ Select **RESET** to delete the syslog messages in **X4000**.

For interpretation of syslog messages, see the Software Reference.

10.1.2 Monitoring Functions in the Setup Tool

You can also use the Setup Tool to display other data in addition to syslog messages. The current status of certain subsystems is updated periodically and displayed. Display modules are available for the following functional areas:

- ISDN connections
- Credits Based Accounting System
- Interface statistics (comparative display of several interfaces)
- ➤➤ **TCP/IP** statistics
- Syslog messages (see chapter 10.1.1, page 308)

ISDN connections

Proceed as follows to display ISDN connections:

➤ Go to ***Monitoring and Debugging*** ➧ ***ISDN Monitor***.

A list of the existing ISDN connections (incoming and outgoing calls) is displayed.

```
X4000 Setup Tool                                BinTec Communications AG
[MONITOR][ISDN CALLS]: ISDN Monitor - Calls                      MyRouter

Dir Remote Name/Number   Charge   Duration Stack    Channel  State

in  2                             2910         0        B1   active
out 3                             106          0        B2   active



(c)alls    (h)istory    (d)etails    (s)tatistics    (r)elease
```

This menu also offers you other options:

- Select **h** to display a list of the last 20 ISDN calls (incoming and outgoing) completed since the last system start.
- Place the cursor on an existing or completed ISDN connection and select **d** to display detailed information about this connection.
- Select **s** to display statistics on the activity of the existing ISDN connections.
- Select **r** to release the tagged ISDN connection.
- Select **c** to display the list of existing ISDN connections again.

Credits Based Accounting System

Proceed as follows to display the state of the Credits Based Accounting System (chapter 10.1.3, page 316):

- Go to ***Monitoring and Debugging*** ➧ ***ISDN Credits***.
- Select a subsystem and confirm with **Return**.

  The current status of the Credits Based Accounting System for the selected subsystem is displayed.

```
X4000 Setup Tool                                BinTec Communications AG
[MONITOR][CREDITS][STAT]: Monitor isdnlogin Credits              MyRouter

                                                 Total    Maximum  % reached
Time till end of measure interval(sec)           7794     86400    91

Number of Incoming Connections                   0        2        0
Number of Outgoing Connections                   0        20       0

Time of Incoming Connections                     4        28800    0
Time of Outgoing Connections                     13       28800    0

Charge                                           0

EXIT
```

Information about configuring the Credits Based Accounting System can be found in chapter 10.1.3, page 316.

Interface statistics

Proceed as follows to display the current values and activities of **X4000**'s interfaces:

➤ Go to ***MONITORING AND DEBUGGING*** ➧ ***INTERFACES***.

The values for two interfaces are displayed side by side.

```
X4000 Setup Tool                                BinTec Communications AG
[MONITOR][INTERFACE]: Interface Monitoring                       MyRouter

Interface Name       en1                        PROVIDER
Operational Status   up                         dormant

                     total    per second        total    per second

Received Packets     5512     0                 0        0
Received Octets      920664   0                 0        0
Received Errors      0                          0

Transmit Packets     9        0                 0        0
Transmit Octets      1193     0                 0        0
Transmit Errors      0                          0

Active Connections   N/A                        0
Duration             N/A                        0

EXIT                 EXTENDED                   EXTENDED
```

Use <Space> to select

➤ Select the interface to be displayed under **Interface Name**.

- Select **EXTENDED** to display additional information. You can then change the status of the interface under **Operation** and confirm the entry with **START OPERATION**.

TCP/IP statistics

Proceed as follows to display the statistics for connections to ➤➤ **protocols** ICMP, ➤➤ **IP**, UDP and TCP:

- Go to ***MONITORING AND DEBUGGING*** ➧ ***TCP/IP***.

  The statistics for IP connections are displayed. You can find the meaning of the MIB variables in the MIB Reference.

```
X4000 Setup Tool                                BinTec Communications AG
[MONITOR][IP]: IP Statistics                                    MyRouter

InReceives           3912        OutNoRoutes          0
InHdrErrors          0           ReasmTimeout         500
InAddrErrors         0           ReasmReqds           0
ForwDatagrams        0           ReasmOKs             0
InUnknownProtos      0           ReasmFails           0
InDiscards           0           FragOKs              0
InDelivers           3321        FragFails            0
OutRequests          9           FragCreates          0
OutDiscards          0           RoutingDiscards      0

EXIT

         I(C)MP              (I)P              (U)DP              (T)CP
```

- Select **c** to display statistical data for ICMP.
- Select **i** to display statistical data for IP.
- Select **u** to display statistical data for UDP.
- Select **t** to display statistical data for TCP.

10.1.3 Credits Based Accounting System

ISDN charges

X4000's Credits Based Accounting System enables you to control the costs billed for ISDN charges for data connections. This means you can keep the effects of possible configuration errors within limits. For example, the system enables you to define the maximum number of connections allowed in a certain period of time. You can make settings for each subsystem (➤➤ **PPP**, ➤➤ **CAPI**, ➤➤ **ISDN Login**) to define the number of connections, the connection time and the charges billed. If the defined limit is exceeded, **X4000**

cannot set up any more connections within the defined period of time. This means you can detect configuration errors in good time, before your telephone bill gets too big!

Syslog messages

Syslog messages are generated if the number of connections reaches 90 % or 100 % of the limit and if a connection is prevented by the Credits Based Accounting System because the limit is exceeded.

The whole account is available again if you switch **X4000** off and then switch it on again (i.e. reboot).

The configuration is made in ***ISDN*** ➧ ***CREDITS***:

Field	Meaning
Surveillance	Defines whether the Credits Based Accounting System is to be activated for the respective subsystem. Possible values: *off*, *on*. With *on*, you can define the parameters listed below.
Measure Time (sec)	Time in seconds for which the limit applies.
Maximum Number of Incoming Connections	Number of incoming connections allowed during the **Measure Time (sec)**. If you activate this setting with *on*, you can enter the desired value in the line below.
Maximum Number of Outgoing Connections	Number of outgoing connections allowed during the **Measure Time (sec)**. If you activate this setting with *on*, you can enter the desired value in the line below.
Maximum Charge	Maximum charges allowed (amount, units) during the **Measure Time (sec)**. If you activate this setting with *on*, you can enter the desired value in the line below.
Maximum Time for Incoming Connections (sec)	Maximum time in seconds allowed for incoming connections during the **Measure Time (sec)**. If you activate this setting with *on*, you can enter the desired value in the line below.

Field	Meaning
Maximum Time for Outgoing Connections (sec)	Maximum time in seconds allowed for outgoing connections during the **Measure Time (sec)**. If you activate this setting with *on*, you can enter the desired value in the line below.
Maximum Number of Current Incoming Connections	Maximum number of incoming connections allowed at any one time. If you activate this setting with *on*, you can enter the desired value in the line below.
Maximum Number of Current Outgoing Connections	Maximum number of outgoing connections allowed at any one time. If you activate this setting with *on*, you can enter the desired value in the line below.

Table 10-5: ***ISDN ➧ CREDITS***

To do Proceed as follows:

- Go to ***ISDN ➧ CREDITS***.
- Select **Subsystem** and confirm with **Return**.
- Select **Surveillance**: *on*, if you want to use the Credits Based Accounting System for the selected **Subsystem**.
- Enter **Measure Time (sec)**, e.g. *86400* (= 24 hours).
- Activate **Maximum Number of Incoming Connections**, if applicable, and enter the desired value.
- Activate **Maximum Number of Outgoing Connections**, if applicable, and enter the desired value.
- Activate **Maximum Charge**, if applicable, and enter the desired value.
- Activate **Maximum Time for Incoming Connections (sec)**, if applicable, and enter the desired value.
- Activate **Maximum Time for Outgoing Connections (sec)**, if applicable, and enter the desired value.
- Activate **Maximum Number of Current Incoming Connections**, if applicable, and enter the desired value.

- Activate **Maximum Number of Current Outgoing Connections**, if applicable, and enter the desired value.
- Press **SAVE**.

10.1.4 HTTP Status Page

Every BinTec router is equipped with an internal home page, the so-called HTTP status page. You can use this together with an Internet browser (e.g. Netscape Navigator, Internet Explorer) to display the status of **X4000**. This enables all users of the **X4000** LAN to take a look at the status of the router, provided they know the password for the user name `http`.

Please note: HTTP pages are usually stored in the cache memory of the browser. This means they can possibly be read by other users at the same workspace and may also be visible at proxy ➤➤ **servers** involved.

- Enter the URL `http://<system name>` in your browser. (You can also enter **X4000**'s IP address instead of the name.)

  The HTTP status page of the BinTec router with the system name <System Name> is displayed with the IP address entered.

The HTTP status page contains three tables:

- System description:
  In addition to the version of the system software, this also lists information from the MIB table **system**, such as **System name** and **Contact**. If a valid e-mail address is given under **Contact**, this is shown underlined.
- Software options:
  This table lists information from the MIB table **biboAdmLicInfoTable** and displays the status of **X4000**'s subsystems.
- Hardware interfaces:
  This table displays the LAN and WAN interfaces of **X4000**. The third column of the table provides information about the current status of the physical interfaces.

The HTTP status page contains a number of links:

- update
  Click update to update the status page.
- login
  Click login to log in to the associated BinTec router via ➤➤ **telnet**.
- http://www.bintec.de
  Use this link to access BinTec's WWW server with the latest information on products and the current system software and documentation for **X4000**.
- system tables
  Click system tables to display a list with all the **X4000** MIB tables. Clicking a table name lists the variables contained in the table.

If you don't want to display **X4000**'s HTTP status page, enter 0 as the port number of the http port:

➤ Go to ***IP*** ➧ ***STATIC SETTINGS***.

➤ Enter **HTTP TCP port**: *0*.

➤ Press **SAVE**.

10.1.5 Java Status Monitor

The Java status monitor offers you another facility for displaying information about **X4000** using an Internet browser. You can call up the following information with the JAVA status monitor:

- Static information such as the system name of the BinTec router and the software version.
- Data flow over the individual interfaces.
- Connections to WAN partners.

If you have installed the JAVA status monitor together with BRICKware (see chapter 6.2, page 112), you can start it as follows:

➤ Select **Program** ➧ **BRICKware** ➧ **Java Status Monitor** in the Windows Start menu.

The JAVA status monitor opens with your standard browser.

Further information about the JAVA status monitor can be found in BRICKware for Windows.

10.1.6 Activity Monitor

What do you need it for?

The Activity Monitor enables Windows users to monitor the activities of **X4000**. Important information about the status of physical interfaces (e.g. ISDN line) and virtual interfaces (e.g. WAN partner) is easily obtained with ONE tool. A permanent overview of the utilization of **X4000**'s interfaces is possible.

How does it work?

A Status Demon collects information on **X4000** and transfers it in the form of UDP packets to the broadcast address of the LAN (default setting) or to an explicitly entered IP address. One packet is sent per **X4000** interface and time interval, which can be adjusted individually to values from 1 - 60 seconds. All physical interfaces and up to 100 virtual interfaces can be monitored, provided the packet size of approx. 4000 bytes is not exceeded. A Windows application on your PC receives the packets and displays the information received in various forms. This application is obtainable with BRICKware Release 5.1.1 and higher.

Activate the Activity Monitor as follows:

- Appropriately configure the **X4000**(s) to be monitored.
- Start and use the Windows application on your PC (see BRICKware for Windows).

The configuration is made in ***SYSTEM*** ➧ ***EXTERNAL ACTIVITY MONITOR***:

Field	Meaning
Client IP Address	IP address to which **X4000** sends the UDP packets. The default value *255.255.255.255* means that the broadcast address of the first LAN interface is used. Note: If you enter the IP address of a WAN partner that can be reached over an ISDN dialup connection, you will get a large telephone bill due to frequent setting up of ISDN connections (a packet is usually sent every 5 seconds).
Client UDP Port	Port number for Activity Monitor (default value: *2107*, registered by IANA - Internet Assigned Numbers Authority).
Type	Type of information sent in the UDP packets to the Windows application. Possible values: ■ *off:* deactivates Activity Monitor (default value) ■ *physical:* only information about physical interfaces ■ *physical_virt:* information about physical and virtual interfaces
Update Interval (sec)	Update interval in seconds. Possible values: *0* to *60* (default value: *5*).

Table 10-6: ***SYSTEM*** ➧ ***EXTERNAL ACTIVITY MONITOR***

The breakdown of **X4000**'s interfaces into physical and virtual interfaces is described in detail in the Software Reference.

Note: A leased line always represents a physical interface, but a group of leased lines is displayed as both a physical and virtual interface!

To do Proceed as follows:

- Go to ***SYSTEM*** ➧ ***EXTERNAL ACTIVITY MONITOR***.
- Enter **Client IP Address**, **Client UDP Port**, **Type** and **Update Interval (sec)**.
- Press **SAVE**.

10.2 Access Security

There are several ways of restricting logging in and access to **X4000** to authorized users only:

- Logging In (chapter 10.2.1, page 325)
- Checking the Calling Party Number (CLID) (chapter 10.2.2, page 326)
- Authentication of PPP Connections (chapter 10.2.3, page 327)
- Callback (chapter 10.2.4, page 327)
- Closed User Group (chapter 10.2.5, page 330)
- Access to Remote CAPI (chapter 10.2.6, page 330)
- Network Address Translation (NAT) (chapter 10.2.7, page 331)
- Filters (chapter 10.2.8, page 335)
- Local Filters (chapter 10.2.9, page 348)
- Back Route Verification (chapter 10.2.10, page 352)
- TAF (chapter 10.2.11, page 353)
- Extended IP Routing (XIPR) (chapter 10.2.12, page 353)

10.2.1 Logging In

Password

Logging in to **X4000** can be done in several ways as described in chapter 4.2, page 76, but is always protected by a password. Every unsuccessful attempt to log in is logged with the source of the attempt by a syslog message and creates a corresponding SNMP trap. Pauses are inserted after several unsuccessful attempts to make it difficult for automatic attempts to find the password.

Caution!

All BinTec routers are shipped with the same user names and passwords. As long as the password remains unchanged, they are not protected against unauthorized use. How to change the passwords is described in "Changing the password", page 85.

- You must change the passwords as described in chapter 4.2, page 76.
- Also make sure that unauthorized persons do not have access to the **X4000** power supply, serial console and ➤➤ **Ethernet** connection.

Until you have changed the default password for the user name `admin`, a warning is always given after logging in.

Auto logout

To make unauthorized access difficult, the connection to **X4000** is disconnected if no keyboard entry is made for a period of 15 minutes. You can change the time with the command `t <time in seconds>` (see chapter 14.1, page 412).

If you carry out a software update (see chapter 11.2, page 371), you should deactivate auto logout as follows: Enter `t 0` in the SNMP shell.

You can create additional user accounts with the aid of SNMP commands (see the Software Reference). A certain password and a certain action can be assigned to a user.

10.2.2 Checking the Calling Party Number

CLID

X4000 uses Calling Line Identification (➤➤ **CLID**) to check the calling party number of an incoming call.

Screening indicator

You can also determine whether calling party numbers have been modified by the calling parties. With some connections, it is possible that another number (e.g. 5678) is displayed at the called party's terminal, instead of the calling party's own extension number (e.g. 1234). **X4000** can detect this from the

screening indicator in the setup message of the ISDN ➤➤ **D-channel**. The screening indicator has four possible values:

- *user*: The calling party number indicated originates from the far end and has not been checked by the network.
- *user_verified*: The calling party number has been checked by the exchange and is correct.
- *user_failed*: The calling party number has been checked by the exchange and is incorrect.
- *network*: The calling party number indicated originates directly from the exchange (normal case).

If you want **X4000** to check the screen indicator for incoming calls, you must enter one of the values stated in the following MIB tables or variables (only incoming calls with the corresponding screening indicator are accepted):

- ➤ For incoming PPP connections: **Screening** variable in **biboDialTable**.
- ➤ For incoming ISDN Login connections: **Screening** variable in **isdnloginAllowTable**.

10.2.3 Authentication of PPP Connections with PAP, CHAP or MS-CHAP

➤➤ **PAP**, ➤➤ **CHAP** and MS-CHAP are the common procedures used for authentication of ➤➤ **PPP** connections. These use a standard procedure to exchange a user ID and a password for checking the identity of the far end. You can find further information in chapter 7.3, page 159 and chapter 8.1.3, page 194.

10.2.4 Callback

Callback The callback mechanism can be used for each WAN partner to obtain additional security regarding the connection partner or to clearly allocate the costs of connections. A connection is then not set up until the calling party has been

clearly identified by calling back. **X4000** can answer an incoming call with a callback or dial into a WAN partner and then wait for a callback.

Identification can be based on the calling party number or PAP/CHAP/MS-CHAP authentication. Identification is made in the first case without call acceptance, as the calling party number is transferred over the ISDN D-channel, and in the second case with call acceptance.

You can find a detailed description of the callback mechanism in the Software Reference.

This is configured in ***WAN Partner*** ➧ ***Edit*** ➧ ***Advanced Settings***:

Field	Meaning
Callback	Activates the callback function.

Table 10-7: ***WAN Partner*** ➧ ***Edit*** ➧ ***Advanced Settings***

Callback offers the following selection options:

Possible values	Meaning
no	**X4000** does not call back.
expected (awaiting callback)	**X4000** calls the WAN partner to initiate callback.
yes (PPP negotiation)	**X4000** calls back with the extension entered for the WAN partner. If no number is entered, the required number can be reported by the caller in a PPP negotiation. This setting should be avoided if possible for security reasons. However, no alternative is currently available for connecting Microsoft ➤➤ **clients** over data transmission networks.
yes (delayed, CLID only)	**X4000** calls back after approx. four seconds, if requested to by the WAN partner.
yes (PPP negotiation, callback optional)	Corresponds to the value *yes (PPP negotiation)*, but contains an abort option. The Microsoft client has the option of aborting callback and maintaining the initial connection to **X4000** without callback. This is done by pressing **CANCEL** to close the dialog box that appears. Exception: This abort option cannot be used if the WAN partner dialing in uses Windows NT and his extension number is entered in **X4000**.
yes	**X4000** calls back immediately, if requested to by the WAN partner.

Table 10-8: **Callback**

If *yes (PPP negotiation)* is used as the setting for **Callback**, a B-channel is always opened, which results in costs.

To do Proceed as follows to activate callback for a WAN partner:

- Go to ***WAN Partner*** ➧ ***Edit*** ➧ ***Advanced Settings***.
- Select **Callback**.
- Confirm with **OK**.

10.2.5 Closed User Group

X4000 supports the use of the Closed User Group service feature, which you can request for your ISDN line from your telephone company. The external/ internal reachability is monitored and controlled by the exchanges if this feature is selected.

To do Proceed as follows to activate a Closed User Group for a WAN partner:

- Go to ***WAN Partner*** ➧ ***Edit*** ➧ ***WAN Numbers*** ➧ ***Edit*** ➧ ***Advanced Settings***.
- Select **Closed User Group**: *specify*.
- Enter the CUG index.
- Confirm with **OK**.

10.2.6 Access to Remote CAPI

The special features offered by BinTec routers include implementation of the ➤➤ **Remote CAPI** and Remote TAPI programming interfaces (only for PABX devices). This enables applications on computers in the LAN to use the resources of the router as if these components were installed directly in the computer.

User concept By using BinTec's user concept, you can make sure that only users authenticated by user name and password can access **X4000**'s Remote CAPI interface (see chapter 7-3, page 142).

Filters You can also prevent unauthorized access by defining filters (see chapter 10.2.8, page 335) and local filters (see chapter 10.2.9, page 348).

10.2.7 NAT (Network Address Translation)

➤➤ **NAT** is a simple-to-operate procedure that can be used for several purposes in the BinTec implementation:

- Hiding the internal host addresses of a LAN by remapping to one or more external addresses.
- Controlling external to internal access. In the external direction, the router forwards all ➤➤ **data packets** (forward NAT) and connections from external callers are only allowed if explicitly enabled.

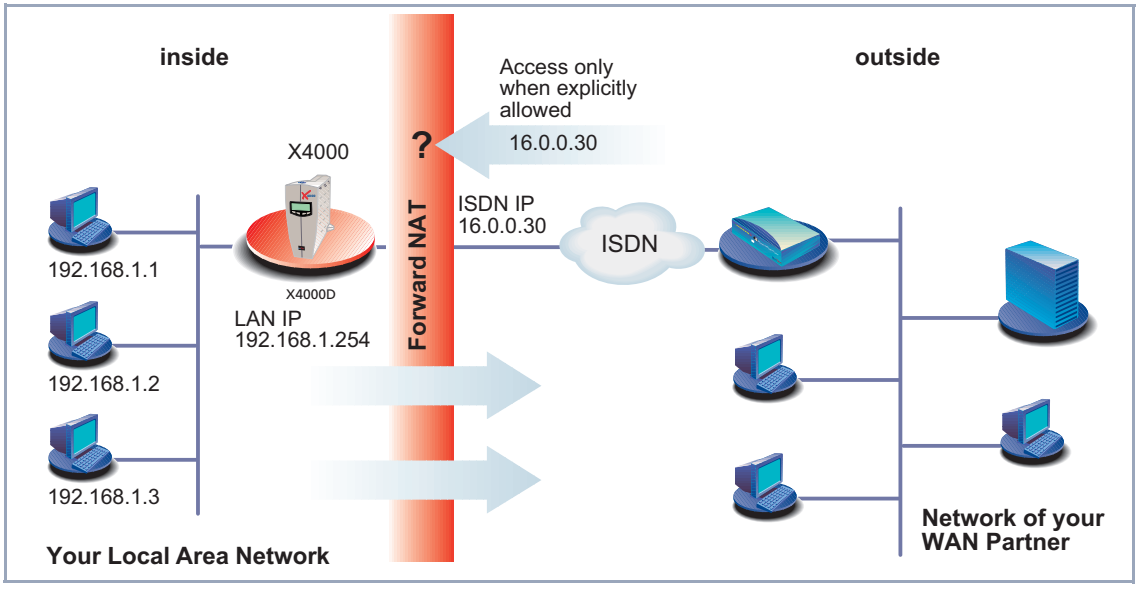


Figure 10-1: Forward NAT

- Permanent monitoring of the connections via the router with indication of the source and destination addresses and ➤➤ **ports**. See your syslog messages for this purpose!

NAT always refers to an interface. **X4000**'s LAN side is always referred to as "internal", the WAN partner as "external".

You will find more information on NAT in the Software Reference.

Configuration is made in ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION***.

IP ➧ ***NETWORK ADDRESS TRANSLATION*** lists all the **X4000** interfaces with a status display for current NAT settings:

Field	Meaning
Name	Interface name
Nat	Indicates if NAT is activated for the relevant interface. Possible values: ■ *off*: NAT not activated. ■ *on*: Forward NAT activated. ■ *reverse*: Reverse NAT activated
static mappings	If **Nat** = *on* or **Nat** = *reverse*, indicates the number of entries that have been made for the interface for enabling certain IP connections in ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** ➧ **Return** ➧ **ADD**.

Table 10-9: ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION***

Activate NAT for an **X4000** interface with ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** ➧ **EDIT**:

Field	Meaning
Network Address Translation	Defines the type of NAT for the selected interface. Possible values: ■ *off:* Do not execute NAT. ■ *on:* Execute Forward NAT. ■ *reverse:* Execute Reverse NAT.

Table 10-10: ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** ➧ **Return**

You can explicitly allow a NAT interface certain IP connections to a certain internal host in ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** ➧ ***EDIT*** ➧ **ADD**:

Field	Meaning
Service	Service allowed for connections to the host defined under **Destination**. Possible values: ■ *ftp* ■ *telnet* ■ *smtp* ■ *domain/udp* ■ *domain/tcp* ■ *http* ■ *nntp* ■ *user defined:* If you do not use any of the predefined services. Enter the required values under **Protocol** and **Port** to define a service.
Protocol	Only for **Service** = *user defined*. Defines the protocol allowed. Possible values: ■ *icmp* ■ *tcp* ■ *udp* ■ *gre* ■ *esp* ■ *ah* ■ *l2tp*

Field	Meaning
Port (-1 for any)	Only for **Service** = *user defined*. Defines the port allowed. Entering -1 allows any port for the protocol. If you specify the port, the entry must agree with the port number of the destination host in the LAN.
Destination	IP address of the host in the LAN.

Table 10-11: ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** ➧ **Return** ➧ **ADD**

To do Proceed as follows to activate NAT:

- Go to ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION***.
- Select the interface for which you want to activate NAT and confirm with **Return**.
- Select **Network Address Translation**, e.g. *on*.
  This activates NAT for the selected interface.
- Press **SAVE**.

An entry takes effect as soon as you confirm it here with **SAVE**. Never forget this, especially if you are configuring NAT from a remote host, e.g. with telnet!

Proceed as follows to allow certain connections for a NAT interface to a certain host in the LAN:

- Go to ***IP*** ➧ ***NETWORK ADDRESS TRANSLATION*** ➧ ***EDIT***.
- Add an entry with **ADD** or select an existing entry and confirm with **Return**.
- Select **Service**.
- Select **Protocol**, if applicable.
- Enter **Port (-1 for any)**, if applicable.
- Enter **Destination**.
- Press **SAVE**.

➤ Repeat these steps to define several entries for the selected NAT interface.

10.2.8 Filters (Access Lists)

IP filters (➤➤ **Access Lists**) in **X4000** are based on a concept of ➤➤ **filters**, rules and so-called chains. IP filters respond to incoming data packets, which means they can allow or deny access to **X4000** for certain data.

Filters A filter describes a certain part of the IP data traffic based on the source and/or destination IP address, ➤➤ **netmask**, protocol and source and/or destination port. If you define a filter, you are telling **X4000**: "Watch out for all data packets that match the following: ...".

Rule You use a rule to tell **X4000** what to do with the data packets it has filtered out, i.e. whether or not it should allow them to pass through. You can also define several rules, which you arrange in the form of a chain to obtain a certain sequence.

Chain There are various approaches for the definition of rules and rule chains:

- Allow all packets that are not explicitly prohibited, i.e.:
  - Deny all packets that match Filter 1.
  - Deny all packets that match Filter 2.
  - ...
  - ...
  - Allow the rest.
- Allow only what is explicitly permitted, i.e.:
  - Allow all packets that match Filter 1.
  - Allow all packets that match Filter 2.
  - ...
  - ...
  - Deny the rest.
- Combination of the two possibilities described above
  Several rule chains can be created, either completely or partly separated from each other. The common use of filters is possible and practicable.

Interface You can also define a rule chain individually for each **X4000** interface.

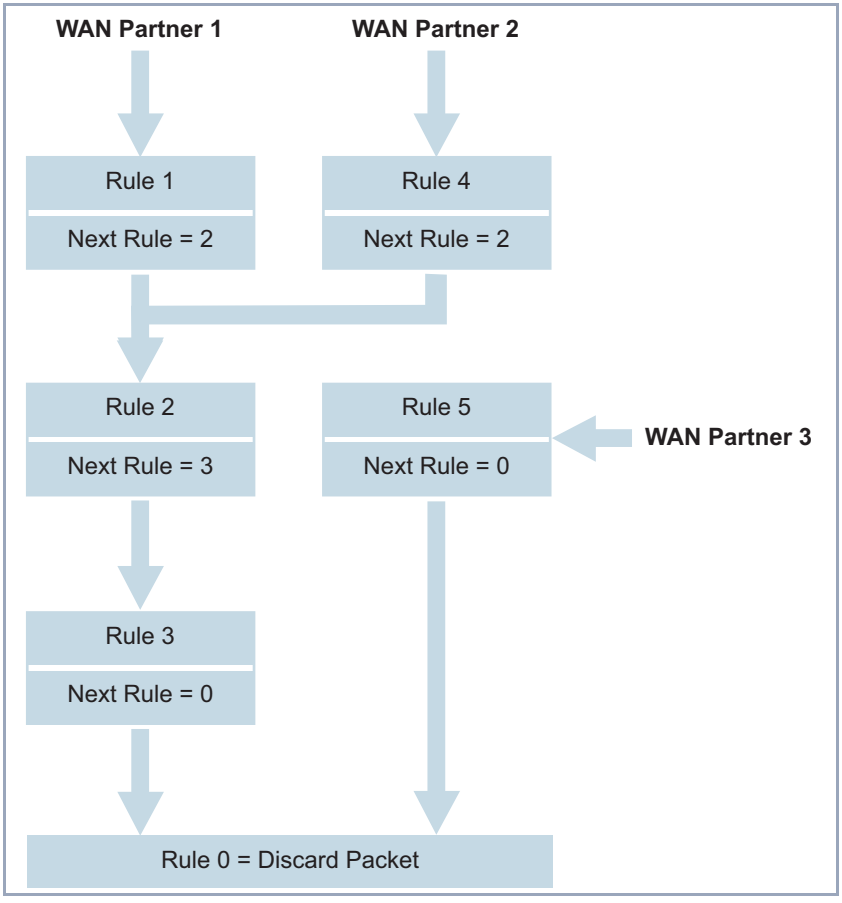


Figure 10-2: Rule chains for various interfaces

Configuration is made in:

- ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTER***
- ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES***
- ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES*** ➧ **REORG**
- ***IP*** ➧ ***ACCESS LISTS*** ➧ ***INTERFACES***

You can define filters in ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTER***:

Field	Meaning
Description	Designation of the filter. Note that only the first 10 or 15 characters are visible in other menus.
Index	Cannot be changed here. **X4000** automatically issues a number to new filters defined here.
Protocol	Defines a protocol. Possible values: *any, icmp, ggp, ip, tcp, egp, igp, pup, chaos, udp, hmp, xns_idp, rdp, rsvp, gre, esp, ah, tlsp, skip, kryptolan, iso-ip, igrp, ospf, ipip, ipx-in-ip, vrrp, l2tp.* *any* matches any protocol, *tcp* matches only TCP data packets, etc.
Type	Only if **Protocol** = *icmp*. Possible values: *any, echo reply, destination unreachable, source quench, redirect, echo, time exceeded, param problem, timestamp, timestamp reply, address mask, address mask reply.* See RFC 792.
Connection State	If **Protocol** = *tcp*, you can define a filter based on the status of the TCP connection. Possible values: ■ *established:* All TCP packets that would not open any new connection on routing over **X4000** match the filter. ■ *any:* All TCP packets match the filter.
Source Address	Source IP address of the data packets that matches the filter.
Source Mask	Source Netmask. The combination of **Source Address** and **Source Mask** describes a range of IP addresses that match the filter.
Source Port	Source port number or range of source port numbers that matches the filter.

Field	Meaning
Specify Port	If **Source Port** or **Destination Port** = *specify* or *specify range:* Enter port numbers or range of port numbers.
Destination Address	Destination IP address of the data packets that matches the filter.
Destination Mask	Destination Netmask. The combination of **Destination Address** and **Destination Mask** describes a range of IP addresses that match the filter.
Destination Port	Destination port number or range of destination port numbers that matches the filter.
Type of Service (TOS)	Type of Service
TOS Mask	Mask for Type of Service

Table 10-12: ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTER***

The fields **Source Port** and **Destination Port** offer the following selection options:

Possible values	Meaning
any	All ➤➤ **port** numbers match the filter.
specify	Permits the entry of a port number under **Specify Port**.
specify range	Permits the entry of a range of port numbers under **Specify Port**.
priv (0..1023)	Port numbers: 0 ... 1023.
server (5000..32767)	Port numbers: 5000 ... 32767.
clients 1 (1024.0.4999)	Port numbers: 1024 ... 4999.
clients 2 (32768..65535)	Port numbers: 32768 ... 65535.
unpriv (1024..65535)	Port numbers: 1024 ... 65535.

Table 10-13: **Source Port** and **Destination Port**

Port numbers

The port numbers are distributed as follows:

<table>
<tr><th>0 ... 1023</th><th>1024 ... 4999</th><th>5000 ... 32767</th><th>32768 ... 65535</th></tr>
<tr><td>Well-known ports, i.e. permanently assigned.</td><td colspan="3">The ports are created by ➤➤ clients and ➤➤ servers dynamically and have no fixed meaning (except for special agreements): unpriv (1024..65535)</td></tr>
<tr><td>priv (0..1023)</td><td>clients 1 (1024.0.4999)</td><td>server (5000..32767)</td><td>clients 2 (32768..65535)</td></tr>
</table>

Table 10-14: Ranges of port numbers

The following table contains a list of some frequently used port numbers with the services assigned to them:

Service	Protocol	Port number
File Transfer Protocol (➤➤ **FTP**) (data)	TCP	20
File Transfer Protocol (FTP) (commands)	TCP	21
Telnet	TCP	23
Simple Mail Transfer Protocol (SMTP)	TCP	25
Domain Name Server (➤➤ **DNS**)	TCP, UDP	53
Trivial File Transfer Protocol (➤➤ **TFTP**)	UDP	69
HTTP	TCP	80
POP3 (e-mail inquiry)	TCP	110
Network Time Protocol	TCP, UDP	119
➤➤ **NetBIOS** Name (NBNAME)	UDP	137
NetBIOS Datagram (NBDATA)	UDP	138
NetBIOS Session (NBSESSION)	TCP	139
Simple Network Management Protocol (SNMP) (Port Lists)	UDP	161
SNMP (Trap Port)	UDP	162
Syslog Service (SYSLOG)	UDP	514
Network File System (NFS)	UDP	2049
Remote CAPI	TCP	2662
Remote TAPI	TCP	2663

Table 10-15: Services and port numbers

Example A simplified FTP connection is used as an example to illustrate how to use source and destination ports: In addition to source and destination IP addresses, the IP protocol also uses source and destination port numbers to

uniquely identify data connections. The FTP client creates a number, e.g. xyz, which is used as source port. As destination port, the client uses the number under which the FTP server offers the FTP service, e.g. 21. The FTP server then answers with IP packets that use 21 as source port and xyz as destination port:

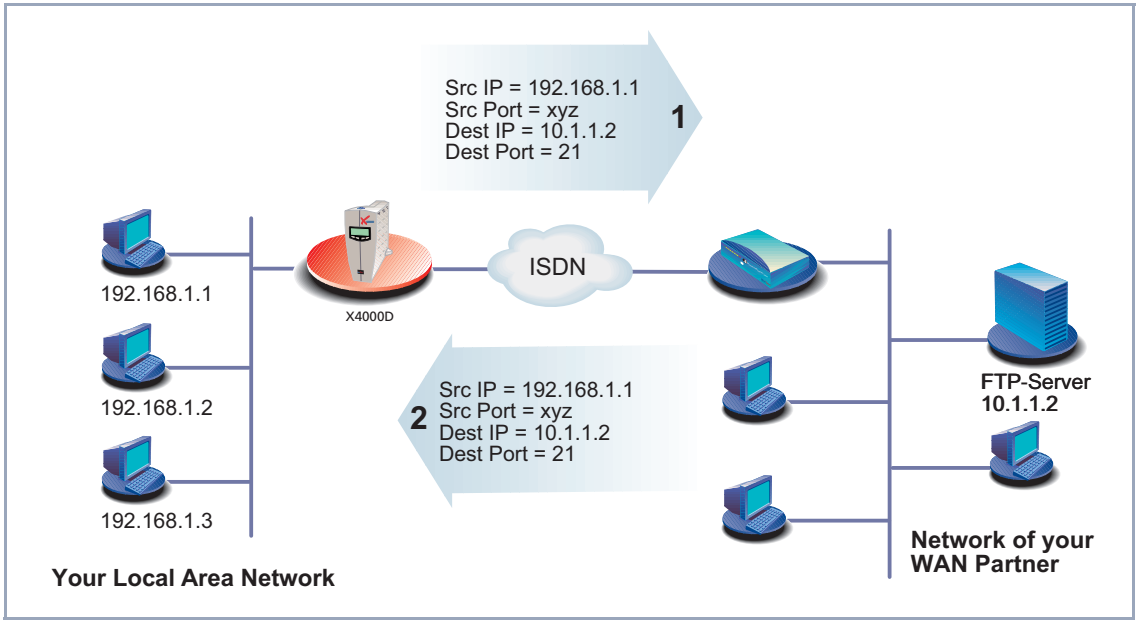


Figure 10-3: Example: FTP connection

You can define rules in ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES***:

Field	Meaning
Index	Cannot be changed. **X4000** automatically issues a number to new rules defined here or displays the **Index** of existing rules.
Insert behind Rule	Appears only if a new rule is defined. Defines the rule behind which the new rule is inserted. You start a new independent chain with *none*.
Action	Defines the action to be taken for a filtered data packet.
Filters	Filter used.
Next Rule	Appears only if an existing rule is edited. Defines the next rule to be used.

Table 10-16: ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES***

The **Action** field contains the following selection options:

Possible values	Meaning
allow M	Allow packet if it matches the filter.
allow !M	Allow packet if it does not match the filter.
deny M	Deny packet if it matches the filter.
deny !M	Deny packet if it does not match the filter.
ignore	Use next rule.

Table 10-17: **Action**

You can change the order of rules in a chain in the submenu ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES*** ➧ **REORG**:

Field	Meaning
Index of Rule that gets Index 1	Defines the first rule in the chain.

Table 10-18: ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES*** ➧ **REORG**

If you reorganize such a chain, **X4000** renumbers the remaining rules according to the selection in **Index of Rule that gets Index 1**:

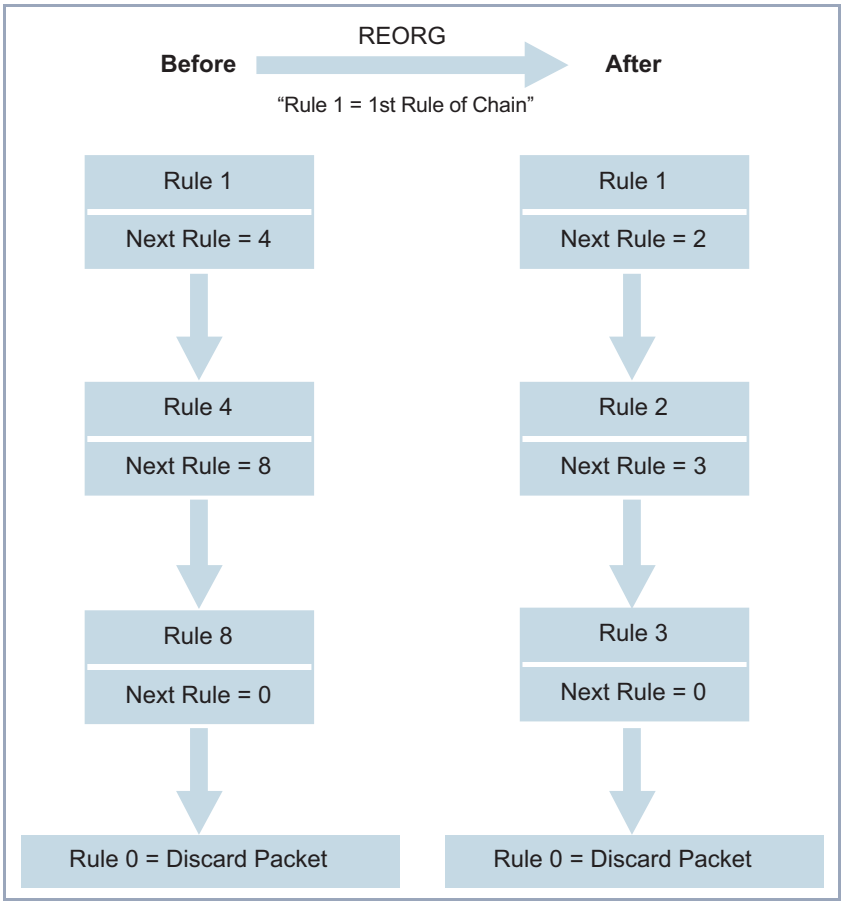


Figure 10-4: Example of chain reorganization

In ***IP*** ➧ ***ACCESS LISTS*** ➧ ***INTERFACES***, you can define which interface starts with which rule and if and how the sender of a packet is to be informed if the packet is denied by **X4000** due to a filter violation:

The rule with **Index** = *1* is normally always used as the first rule for a newly created interface (e.g. to a WAN partner).

Field	Meaning
Interface	**X4000** interface
First Rule	Defines which rule is used first for data packets that reach **X4000** via the **interface**. If you enter *none*, you specify that no filters are used for the **Interface**.
Deny Silent	Defines whether the sender of a packet is to be informed of its denial due to a filter violation. Possible values: ■ *no*: Packet is denied, sender is informed by a corresponding ICMP error message. ■ *yes*: Packet is denied, sender is not informed.
Reporting Method	Defines whether the denial of a packet due to a filter violation creates a syslog message. Possible values: ■ *none*: No syslog message. ■ *info*: A syslog message is generated with the protocol number, source IP address and source port number. ■ *dump*: A syslog message is generated with the contents of the first 64 bytes of the denied packet.

Table 10-19: ***IP*** ➧ ***ACCESS LISTS*** ➧ ***INTERFACES***

To do Proceed as follows to define filters and rules:

Ensure that you don't lock yourself out when configuring the filters. For example, if you link the first filter to a rule that executes **Action** = *Allow M*, only what you have expressly allowed with the filter actually gets through. It may easily occur that your telnet access to **X4000** is no longer allowed as soon as you enter the rule and confirm with **SAVE**.

- Do not use any filters on the LAN interface (**First Rule** = *none*) if you access **X4000** via telnet.
- If you access **X4000** via the serial interface or ISDN login, at least nothing can happen to you during configuration.

Filters

- Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTERS***.
- Add a new entry with **ADD** or select an existing entry and confirm with **Return** to change it.
- Enter **Description**.
- Select **Protocol**.
- Enter **Source Address**, if applicable.
- Enter **Source Mask**, if applicable.
- Select **Source Port**.
- Enter **Specify Port**, if applicable.
- Enter **Destination Address**, if applicable.
- Enter **Destination Mask**, if applicable.
- Select **Destination Port**.
- Enter **Specify Port**, if applicable.
- Press **SAVE**.
- Repeat these steps until you have defined all the desired filters.

Do not forget to define a filter, if necessary, for enabling the remaining data packets (**Protocol** = *any*, **Source Port** = *any*, **Destination Port** = *any*).

- Leave ***IP*** ➧ ***ACCESS LISTS*** ➧ ***FILTERS*** with **EXIT**.

Rules

- Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES*** to interconnect the filters to form rule chains.
- Add a new entry with **ADD** or select an existing entry and confirm with **Return** to change it.
- Select **Insert behind Rule** if you create a new rule.
- Select **Action**.
- Select **Filter**.
- Select **Next Rule** if you change an existing rule.
- Press **SAVE**.
- Repeat these steps until you have defined all the desired rules.

Do not forget to define the last rule in the chain, if necessary, as a rule with a suitable filter for enabling all the remaining data packets (**Action** = *allow M*).

You can open a new rule chain with **Insert behind Rule** = *none*.

- Leave ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES*** with **EXIT**.

Interface

- Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***INTERFACES***.
- Select an interface and confirm with **Return** if you wish to use a rule as the first rule for this interface that is not the rule displayed.
- Select **First Rule**.
- Select **Deny Silent**.
- Select **Reporting Method**.
- Press **SAVE**.

Reorganizing a chain

Proceed as follows to reorganize an existing chain of rules:

- Go to ***IP*** ➧ ***ACCESS LISTS*** ➧ ***RULES*** ➧ **REORG**.
- Select **Index of Rule that gets Index 1**.
- Confirm with **REORG**.

If you work with Windows PCs in your network, it is usually advisable to define a NetBIOS filter. An example of this configuration is explained step by step in chapter 7.1.5, page 132.

10.2.9 Local Filters

Access to the local UDP and TCP services on **X4000** (telnet, ➧➧ **CAPI**, trace, etc.) can be controlled via the separate Setup Tool menu ***IP*** ➧ ***LOCAL SERVICES ACCESS CONTROL***. One or more restrictions can be defined here for each service. If no entry exists for a service, there are no access restrictions for this service, i.e. access is possible to this service over all interfaces and from any source address, provided this is not prohibited by the use of NAT (see chapter 10.2.7, page 331) or global filters (see chapter 10.2.8, page 335).

Strategy

As soon as at least one entry for local filters exists in **X4000**, incoming requests for the corresponding local services of **X4000** are only allowed if

1. the source address is 127.0.0.1 (loopback address), or
2. no entry exists for the corresponding service, or
3. the incoming call is expressly allowed by at least one entry.

The existing entries are processed in the order in which they are listed in the corresponding table in the SNMP shell (**localTcpAllowTable** or **localUdpAllowTable**). If an entry in this sorted list does not apply, the next entry is checked. This enables requests over several interfaces or from several IP addresses to be admitted individually to a certain service.

If a matching entry for a request has still not been found after checking the last entry in the list, there are two alternatives:

- The request is forwarded to the relevant service if no entry in the list refers to this service.

- The request is rejected if one or more entries for this service exist in the list, but none of these matches the request.

Local filters therefore provide an additional tool that is different to handle than global filters and does not adversely affect performance in normal routing either.

Configuration is made in ***IP*** ➧ ***LOCAL SERVICES ACCESS CONTROL*** ➧ **ADD**:

Field	Meaning
Service	Defines the local **X4000** service to which access is to be controlled with this entry. Possible values: ■ *snmp(udp)* ■ *rip(udp)* ■ *bootps(udp)* ■ *dns(udp)* ■ *telnet(tcp)* ■ *trace(tcp)* ■ *snmp(tcp)* ■ *capi(tcp)* ■ *tapi(tcp)* ■ *rfc1086(tcp)* ■ *http(tcp)* ■ *nbns(udp)* ■ *statmon(udp)*
Verify IP Address	Defines if the source IP address is to be checked when an incoming call is received for the service selected under **Service**. Possible values: ■ *verify* ■ *don't verify*

Field	Meaning
IP Address	(Only if **Verify IP Address** = *verify*) Defines an IP address or network address (together with **Mask**) from which incoming requests are allowed for the service selected under **Service**. If a request has a different source address, the next entry is checked.
Mask	(Only if **Verify IP Address** = *verify*) Defines a netmask. A network address is thus defined together with the **IP Address** from which incoming requests are allowed to the service selected under **Service**. If a request has a different source address, the next entry is checked. If the value of **Mask** is *0.0.0.0* or *255.255.255.255*, the entry is a host entry, i.e. the IP address must match exactly.
Verify Interface	Defines if a check is to be made to determine which **X4000** interface is used for an incoming call received for the service selected under **Service**. Possible values: ■ *verify* ■ *don't verify*
Interface	(Only if **Verify Interface** = *verify*) Defines an interface of **X4000**. If **X4000** receives an incoming call over this interface for the service selected under **Service**, the connection is allowed. If the incoming call crosses another interface, the next entry is checked.

Table 10-20: ***IP*** ➧ ***LOCAL SERVICES ACCESS CONTROL*** ➧ **ADD**

Proceed as follows to restrict access to a local service:

If an entry defines both an address and an interface for checking, both criteria must be fulfilled for an incoming call before **X4000** accepts this call.

- Go to ***IP*** ➧ ***LOCAL SERVICES ACCESS CONTROL***.
  All the entries made until now are listed here.
- Press **ADD** to add a new entry.
- Select **Service**.
- Select **Verify IP Address**, e.g. *verify*.
- Enter **IP Address**, if applicable.
- Enter **Mask**, if applicable.
- Select **Verify Interface**, e.g. *verify*.
- Select **Interface**, if applicable.
- Press **SAVE**.
  The entry is listed.

10.2.10 Back Route Verification

This term conceals a simple but very effective **X4000** function. If Back Route Verification is activated at a WAN partner, only those data packets are transported via the interface to the WAN partner that would be routed over the same interface on the back route. You can therefore prevent packets with fake IP addresses being fed to your LAN – even without filters. This means you can easily prevent known and as yet unknown Denial-of-Service and IP spoofing attacks.

To do Proceed as follows to activate Back Route Verification for a WAN partner:

- Go to ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IP*** ➧ ***ADVANCED SETTINGS***.
- Activate **Back Route Verify** with *on*.
- Confirm with **OK**.

10.2.11 TAF Client

Personalized authentication

The Token Authentication Firewall (TAF) function permits personal authentication of IP connection partners. BinTec's solution integrates the Token Authentication mechanisms from Security Dynamics and does not allow data packets to cross the router until the associated source address has been authenticated successfully.

You can activate this function in **X4000** (with extra license) and configure the router as TAF Server or TAF Client. A detailed description of the operation and the necessary configuration steps can be found in BRICKware for Windows.

10.2.12 Extended IP Routing (XIPR)

In addition to the normal routing table, **X4000** can also make routing decisions based on an additional table called the Extended Routing Table (Extended IP Routing). Apart from the destination address, **X4000** can also include the protocol, source and destination port, type of service (TOS) and the status of the destination interface in the decision. If there are entries in the Extended Routing Table, these are treated preferentially compared with entries in the normal routing table.

Example

XIPR is useful, for example, if two networks are connected via ISDN with a LAN-LAN connection, but certain services (e.g. telnet) should be routed over an X.25 link and not over an ISDN switched connection. By making entries in the Extended Routing Table, you can allow part of the IP traffic to run over the ISDN switched connection and part of the IP traffic (e.g. for telnet) to run over an X.25 link (see also the Software Reference).

Configuration

Configuration is made in the Setup Tool menu ***IP*** ➧ ***ROUTING*** ➧ **ADDEXT** and in the MIB table **ipExtRtTable**.

A detailed description (including configuration using the MIB variables) can be found in the Software Reference. For configuration with the Setup Tool, please see the relevant additions in the next version of the User's Guide.

10.3 Line Tapping Security

You can use an encryption mechanism to obtain data security for critical PPP connections over connections with critical security, provided both connection partners support this mechanism. The following functions are possible:

- Encryption (chapter 10.3.1, page 354)
- VPN (with extra license) (chapter 10.3.2, page 357)

10.3.1 Encryption

X4000 supports encryption of PPP connections to WAN partners.

The ➤➤ **MPPE** (Microsoft Point to Point ➤➤ **Encryption**) version 1 and 2, DES and Blowfish methods are used. DES and Blowfish are implemented as BinTec proprietary solutions.

MPPE V2

The MPPE Version 2 encryption protocol, the successor to MPPE, has been developed by Microsoft and also uses a 40-bit or 56-bit key. These are generated on authentication.

If a larger key length is set in **X4000** than in the dial-in client, the connection is not set up.

If one connection partner is set to MPPE V1 as encryption protocol, MPPE V2 is also accepted on connection setup if the set key length is the same.

DES and Blowfish

If these proprietary encryption algorithms are used, either **X4000** can generate a key automatically or you can define an individual key statically in consultation with the connection partner.

The DES and Blowfish encryption algorithms are only supported if a license for VPN is entered in **X4000**.

Configuration is made in:

- ***WAN Partner*** ➧ ***Edit***

WAN PARTNER ➧ EDIT ➧ *ADVANCED SETTINGS* ➧ *EXTENDED INTERFACE SETTINGS (OPTIONAL)*

The following field in ***WAN PARTNER*** ➧ ***EDIT*** is relevant for this configuration step:

Field	Meaning
Encryption	Defines the type of encryption. Possible values: ■ *MPPE 40:* MPPE version 1 with 40-bit key ■ *MPPE 56:* MPPE version 1 with 56-bit key ■ *MPPE V2 40:* MPPE version 2 with 40-bit key ■ *MPPE V2 56:* MPPE version 2 with 56-bit key ■ *DES 56*: DES with 56-bit key ■ *Blowfish 56*: Blowfish with 56-bit key ■ *none:* No encryption These values are only available if *PPP*, *Async PPP over X.75*, *Async PPP over X.75/T.70/ BTX* or *X.25_PPP* has been selected under **Encapsulation**.

Table 10-21: ***WAN PARTNER*** ➧ ***EDIT***

If DES or Blowfish are used, the key can be generated automatically with authentication or defined statically. The following fields in the ***WAN PARTNER*** ➧ **EDIT** ➧ ***ADVANCED SETTINGS*** ➧ ***EXTENDED INTERFACE SETTINGS (OPTIONAL)*** menu are relevant for this purpose:

Field	Meaning
Encryption Key Negotiation	Defines whether a key for the connection to the WAN partner is generated automatically or defined statically. Possible values: ■ *authentication* (default value): Key is generated automatically by **X4000**. ■ *static*: The key is defined statically and must be entered under **Encryption Key (TX)** and **Encryption Key (RX)**.
Encryption Key (TX)	(Only for **Encryption Key Negotiation** = *static*) Key (in hexadecimal format) for encryption of outgoing data (must be the same as the entry under **Encryption Key (RX)** at the connection partner's).
Encryption Key (RX)	(Only for **Encryption Key Negotiation** = *static*) Key (in hexadecimal format) for encryption of incoming data (must be the same as the entry under **Encryption Key (TX)** at the connection partner's).

Table 10-22: ***WAN PARTNER*** ➧ **ADD** ➧ ***ADVANCED SETTINGS*** ➧ ***EXTENDED INTERFACE SETTINGS (OPTIONAL)***

To do Proceed as follows to exchange data in encrypted form with a WAN partner:

➤ Go to ***WAN PARTNER***.

➤ Select a WAN partner and confirm with **Return** to encrypt the PPP connections to this partner.

➤ Select **Encryption**, e.g. *DES 56*.

- Go to ***WAN PARTNER*** ➧ **EDIT** ➧ ***ADVANCED SETTINGS*** ➧ ***EXTENDED INTERFACE SETTINGS (OPTIONAL)***.
- Select **Encryption Key Negotiation**, e.g. *static* (if you wish to define the key yourself).
- Enter **Encryption Key (TX)**, if applicable, e.g. *1A35EFC17B56*.
- Enter **Encryption Key (RX)**, if applicable, e.g. *89A1288CD131*.
- Press **SAVE**.
- Confirm with **OK**.
- Press **SAVE**.

10.3.2 VPN (with extra license)

X4000 can set up a VPN (Virtual Private Network) using the PPTP (Point-to-Point Tunneling Protocol). This provides safe (encrypted) transmission of data over WAN connections, e.g. over the Internet. It can be used, for example, by field service staff to obtain low-cost access to data in the company network via Internet and laptop (dial-in via a local Internet Service Provider).

You can find detailed information and configuration instructions (with examples) in the Extended Features Reference.

10.4 Special Features

The following special features support your network security:

- Startup Procedure (chapter 10.4.1, page 358)
- Auto logout (chapter 10.4.2, page 358)
- Prevention of Denial-of-Service Attacks (chapter 10.4.3, page 358)

10.4.1 Startup Procedure

X4000 does not start its routing activities until the complete configuration is loaded, especially the defined filters. This means it is not possible to provoke a system start to make use of an intermediate system state in which perhaps routing takes place before the filters are active.

10.4.2 Auto Logout

Connections to **X4000** via telnet, ➤➤ **isdnlogin** or serial interface are disconnected automatically if no entry is made on the keyboard for a period of 15 minutes. This makes it difficult to read out or change the system configuration on "forgotten" connections. You can change the time with the command `t <time in seconds>` (see chapter 14.1, page 412).

10.4.3 Prevention of Denial-of-Service Attacks

A Denial-of-Service (DoS) attack is an attempt to flood a system or force a restart by sending certain packets. This means the system or a certain service can no longer be used.

Some Denial-of-Service attacks on the router itself are already prevented by the internal coding.

For example, all **X4000** interfaces for which you activate Network Address Translation (NAT) protect the connected PCs against some DoS attacks with

fragmented packets. The packet fragments are assembled again on passing through NAT, before the packet can pass the router.

You can prevent some DoS attacks that operate with fake source IP addresses by using the Back Route Verification function (see chapter 10.2.10, page 352).

You can counter DoS attacks that speculate on destroying the system by causing the log files to overflow (syslog messages) by suitably positioning and limiting the size of these files.

10.5 Checklist

The following list indicates the most important critical security points that you should observe when configuring **X4000**:

- Have you changed all four passwords for system access (admin, read, write, http)? See chapter 4.2, page 76.
- Are the activities of your **X4000** sufficiently accurately logged on at least one external computer and do you check the syslog messages regularly? See chapter 10.1.1, page 308.
- Have you restricted access to the local services and resources to known computers or networks? In particular, you should only allow access via CAPI, SNMP, HTTP, trace and telnet to known computers.
- Are configuration files saved by TFTP kept in a safe place?
- Have you protected all PPP accesses with a password?
- If applicable, have you activated Network Address Translation (NAT) for the connection to the Internet Service Provider (ISP)? See chapter 10.2.7, page 331.
- Have you limited the IP data traffic at critical interfaces, if necessary with the aid of filters, and prevented IP address spoofing? You should pay special attention to the interfaces you have not protected with NAT! See chapter 10.2.8, page 335.
- Have you restricted remote maintenance access via ISDN Login? Have you made an entry under ***CM1BRI, ISDN S0*** ➧ ***INCOMING CALL ANSWERING***? See "Incoming call answering", page 141.

You should also observe the following additional points:

- Do you use the Microsoft callback procedure for PPP connections? Please refer to the information in chapter 10.2.4, page 327.
- Do you use an encryption protocol for line tapping security on connections with critical security? See chapter 10.3.1, page 354.
- Do you use personal authentication on connections with critical security?

- Do you allow the influence of routing protocols (e.g. RIP) only on trustworthy networks? See chapter 8.2.8, page 229.
- Do you check what computers have access to the Remote CAPI interface, what applications are used on them and whether the connections used with these applications are desired? Do you use BinTec's user concept (chapter 7-3, page 142)?
- Are any additional user accounts created trouble-free?
- Have you prevented the interception of connections on the Ethernet by a suitable LAN infrastructure?

11 Configuration Management

In this chapter, you will find instructions on the administration of your configuration files and on updating the **X4000** software. The following areas are covered:

- Administration of Configuration Files
  - Where are the configuration files?
  - What is flash and memory?
  - How do I handle configuration files?
- Updating Software:
  - How do I keep in touch with the latest developments?
  - How do I load a new Boot Image?

11.1 Administration of Configuration Files

Flash **X4000** reads its configuration information from configuration files. These configuration files are stored in the flash EEPROM (electronically eraseable, programmable read-only memory) of **X4000**. Several different configuration files can be stored in the flash memory. The data also remains stored in the flash when **X4000** is switched off.

Memory The current configuration and all changes you set during the operation of **X4000** are stored in the working memory (RAM). The contents of the RAM are lost when **X4000** is switched off. So if you modify your configuration and want to retain these changes for the next time you start **X4000**, you have to save the modified configuration to the flash before switching off: **Exit ➧ Save as boot configuration and exit** (see chapter 7.4, page 186). This file is then saved in the flash as a boot configuration file under the name "boot". When **X4000** is started again, this very file, the configuration file with the name "boot", is loaded in the RAM and becomes operative.

Operations Imagine the flash memory as a directory of configuration files. The files in this directory can be copied, moved, erased and newly filed. It is also possible to transfer configuration files between **X4000** and a remote host by TFTP.

Windows In Windows, you can use the TFTP server of **DIME Tools** (see BRICKware for Windows). You can then, for example, save a configuration file from **X4000** on your local PC.

The names of the files to be transferred with the TFTP server of DIME Tools may only consist of a maximum of 8 characters (and a maximum of 3 characters as extension), e.g. b5104.x4a.

Unix A TFTP server is part of the system in Unix; please read the instructions included in the Software Reference.

You can perform the various operations with the help of the Setup Tool:

➤ Go to the ***CONFIGURATION MANAGEMENT*** menu.

```
X4000 Setup Tool                                BinTec Communications AG
[CONFIG]:Configuration Management                                MyRouter


    Operation                    get  (TFTP --> FLASH)

    TFTP Server IP Address       192.168.1.1
    TFTP File Name               b5104.x4a

    Name in Flash                boot

    Type of last operation       get (TFTP --> FLASH)
    State of last operation      done

        START OPERATION                         EXIT

Use <Space> to select
```

The menu contains the following fields:

Field	Meaning
Operation	Operation you want to perform.
TFTP Server IP Address	The IP address or host name (if the host name can be resolved) of the TFTP server which you want to transfer a configuration file from or to.
TFTP File Name	Name of the configuration file on the TFTP server (without path data).
Name in Flash	Name of the configuration file in the flash.
New Name in Flash	Name of the configuration file to be newly created in the flash (with **Operation** = *move* or *copy*).
Type of Last Operation	Type of previous operation (since the last **X4000** start).
State of last operation	The state of the last operation executed.

Table 11-1: ***CONFIGURATION MANAGEMENT***

The **Operation** field contains the following selection options:

Possible values	Meaning
save (MEMORY --> FLASH)	Save all current settings from memory to flash as configuration file <Name in Flash>. <Name in Flash> is overwritten or recreated.
load (FLASH --> MEMORY)	Loading the configuration file <Name in Flash> from flash to memory. The settings in <Name in Flash> take immediate effect.
move (FLASH --> FLASH)	Rename configuration file <Name in Flash> to <New Name in Flash>.
copy (FLASH --> FLASH)	Copy configuration file <Name in Flash> as <New Name in Flash>.
delete (FLASH)	Delete configuration file <Name in Flash>.
put (FLASH --> TFTP)	Transfer configuration file <Name in Flash> from flash to TFTP host with the IP address <TFTP Server IP Address>. <TFTP File Name> is then overwritten or recreated on the TFTP host with the contents of <Name in Flash>. <TFTP File Name> is saved in ASCII format and can be edited.
get (TFTP --> FLASH)	Transfer configuration file <TFTP File Name> from TFTP host with the IP address <TFTP Server IP Address> to flash. <Name in Flash> is then overwritten and recreated with the contents of <TFTP File Name>. As the configuration file is transferred to flash and not to memory, the file must then be loaded (FLASH --> MEMORY), so that the settings can take effect on **X4000**.
state (MEMORY --> TFTP)	Save all current settings in the memory as <TFTP File Name> on the TFTP host with the IP address <TFTP Server IP Address>. <TFTP File Name> is then overwritten or recreated.

Possible values	Meaning
reboot	Restart **X4000**. All settings in the memory are replaced by boot settings from the flash.

Table 11-2: **Operation**

The **State of last operation** field can display the following:

Possible values	Meaning
todo	The operation has not yet been started.
running	The operation is being executed.
done	The operation has been executed successfully.
error	The operation could not be fully executed (see syslog message).

Table 11-3: **State of last operation**

If an error should occur while running *get (TFTP --> FLASH)* and the operation is aborted, the file to be overwritten in the flash is deleted. So if you transfer a "boot" file, **X4000**'s boot file will be deleted and **X4000** cannot load a configuration on restarting. If necessary, rename the file to be transferred!

To run *put (Flash --> TFTP), get (TFTP --> Flash)* and *state (MEMORY --> TFTP)*, you need a TFTP server on the host to or from which you can transfer a configuration file.
If the TFTP host is a Windows PC, click **Program** ➧ **BRICKware** ➧ **DIME Tools** in the Windows Start menu to open **DIME Tools** and activate the TFTP server with **File** ➧ **TFTP Server** before you run the operation in question.

If you want to use your Windows PC as a TFTP host but are not sure what the IP address of the PC is, proceed as follows:

For Windows 95:

- Click **Run** in the Windows Start menu.
- Type in `winipcfg`.

  A window opens where you can see the IP address of your PC and other network information.

For Windows NT:

- Click **Program** ➧**Command Prompt** in the Windows Start menu.
- Enter `ipconfig` or `ipconfig/all` to request the IP address of your PC and other network information.

Running an operation

To run an operation, proceed as follows:

- Select **Operation**.
- Activate a TFTP server if you have selected *put*, *get* or *state* as the **Operation**.
- Select or type in the necessary settings in ***CONFIGURATION MANAGEMENT***.
- Select **START OPERATION** and press **Return**.

  As long as the operation is being carried out, *OPERATING* appears in the help line of the Setup Tool; **State of last operation** displays *running.*

  When the operation has been executed successfully, the operation is displayed under **Type of last operation**, **State of last operation** assumes the value *done*.

If *error* is displayed under **State of last operation**, check your settings:

- Have you entered an incorrect IP address under TFTP Server IP Address?
- Does the name of the configuration file consist of more than 8 characters and the extension of more than 3 (when using DIME Tools)?
- Does the host not support TFTP (did you forget to start the TFTP server of DIME Tools before starting the operation)?
- Is the source file not in the configured directory of the TFTP path of DIME Tools (when **Operation** = *get*)? To change the TFTP path, refer to BRICKware for Windows.
- If none of these points applies, proceed as follows to find the cause of the problem:

➤ Leave the Setup Tool.

➤ Type in the following in the SNMP shell: `debug config &`.

➤ Reopen the Setup Tool with `setup`.

➤ Carry out the desired operation in ***CONFIGURATION MANAGEMENT***.

If an error occurs, an error message with the cause of the error appears in the help line of the Setup Tool.

➤ Solve the problem and carry out the operation again.

➤ Leave ***CONFIGURATION MANAGEMENT*** with **EXIT**.

Example You have created the configuration file brick.cf, e.g. with the help of the Configuration Wizard. You have not transferred the file to **X4000** over the serial interface; brick.cf can be found in the directory C:\BRICK on your PC. Your PC has the IP address 192.168.1.1. If you want to transfer brick.cf from your PC to **X4000**, proceed as follows:

➤ For a Windows PC: Click the Windows Start button then **Program** ➧ **BRICKware** ➧ **DIME Tools** to start **DIME Tools**. The TFTP server must be active.

➤ Activate a TFTP server under Unix: see the Software Reference.

➤ Go to ***CONFIGURATION MANAGEMENT***.

TFTP host --> flash

- Select **Operation**: *get (TFTP --> FLASH)*.
- Type in **TFTP Server IP Address**, e.g. *192.168.1.1*.
- Type in **TFTP File Name**: *brick.cf*.
- Type in **Name in Flash**, e.g. *boot*.
- Select **START OPERATION** and press **Return**.

  As long as the operation is being carried out, *OPERATING* appears in the help line of the Setup Tool; **State of last operation** displays *running.*

  When the operation has been successfully executed, *get (TFTP --> FLASH)* is displayed under **Type of last operation**; **State of last operation** assumes the value *done*.

  The configuration file brick.cf is saved, for example, in **X4000**'s flash under the name boot.

To make the settings of brick.cf take immediate effect in **X4000**, proceed as follows:

Flash --> memory

- Reselect **Operation**: *load (FLASH --> MEMORY)*.
- Select **Name in Flash**, e.g. *boot*.
- Select **START OPERATION** and press **Return**.

  As long as the operation is being carried out, *OPERATING* appears in the help line of the Setup Tool; **State of last operation** displays *running.*

  When the operation has been successfully executed, *load (FLASH --> MEMORY)* is displayed under **Type of last operation**; **State of last operation** assumes the value *done*.

  The configuration file boot has been loaded to **X4000**'s memory and the settings have been activated.

- Leave ***CONFIGURATION MANAGEMENT*** with **EXIT**.

  You have returned to the main menu.

There is another way to transfer configuration files using the XMODEM protocol over the serial interface. The procedure for this is explained in the Software Reference.

11.2 Updating Software

As BinTec Communications AG is constantly improving the software for all its products and you certainly want to use the latest features of **X4000**, this chapter tells you how to update your software.

www.bintec.de

If you want to update your software, load a new software image in **X4000** (boot image). Every boot image includes new features, better performance and any necessary bugfixes from the previous version. The latest software images are available free of charge from BinTec Communications AG on the World Wide Web at http://www.bintec.de. Here you can also find current product-specific documentation (Release Notes, handbooks, quick install guides) and general product information (Software Reference, Extended Features Reference, BRICKware for Windows).

If you want to update software, make sure you read the corresponding Release Notes. The release notes describe the changes provided by the new boot image.

update

There are various ways to update software. This chapter will show you how to update with the help of the update command in the SNMP shell, which is described step for step. The alternatives to this method can be found in the Software Reference and in the Chapter: Boot Sequence chapter 3.5, page 66.

Caution!

An additional update of the module logic, BOOTmonitor and/or firmware logic is recommended in isolated cases. If this should be the case with a new release, this is clearly noted in the corresponding release notes. The procedure and recommendation can then be found in the "BOOTmonitor and Firmware Logic Update" release notes under www.bintec.de (Section: "Download").
The result of incorrect updating operations (e.g. power cut during the update) could be that **X4000** no longer boots!

➤ Update the module logic, Bootmonitor or firmware logic only if BinTec Communications AG explicitly recommends such action!

To do To update the software (boot image), proceed as follows:

Do not turn **X4000** off during the update!

Before starting the update, deactivate auto logout by entering `t 0` in the SNMP shell.

- Type in the URL `www.bintec.de` in your browser (e.g. Internet Explorer or Netscape Navigator).

  The BinTec home page opens.

- Click "Solutions and Products" and then "Download".

  Here you will find the latest software and documentation for BinTec products.

- Click "X4000".

  Here you will find the latest software and documentation for **X4000**.

- Click the current boot image with the right mouse button, e.g. Boot Image Rel. 5.1 Rev. 4.

- In the context menu, click **Save link as...**

- Type in the directory and name under which the new boot image should be saved on your PC. The directory is normally C:\BRICK for Windows PCs and /tftpboot for Unix workstations. You can use this name.

- Press **SAVE**.

  The boot image is saved on your PC.

- Activate a TFTP server on your PC.
  For a Windows PC: Click the Windows Start menu and then **Program** ➧ **BRICKware** ➧ **DIME Tools** to start **DIME Tools** (for installation of **DIME Tools**, see chapter 6.2, page 112). Activate the TFTP server.
  For a Unix computer: Follow the instructions in the Software Reference.

- Log in to **X4000**, if you have not already done so.

- Deactivate auto logout with `t 0`.

- In the SNMP shell, type in `update <IP address> <file name>`.
  The `<IP address>` is the IP address of the TFTP server, e.g. the IP address of your Windows PC on which the TFTP server of DIME Tools is

running and on which you have saved the new boot image (e.g. 192.168.1.1).

`<file name>` is the name of the boot image you have saved on your PC.

The file <file name> is first transferred to the memory of **X4000** and checked.

The following appears in the SNMP shell: Perform update (y or n)?

➤ Enter `y` and confirm with **Return**.

The software update process is executed and the new boot image is loaded to the flash memory.

X4000 requires a connected block of working memory that is somewhat larger than the new software image. If insufficient memory is available on **X4000**, **X4000** offers an incremental update, in which the image is loaded directly in "chunks" to the flash memory without checking. Proceed as follows:

If insufficient memory is available, a query will appear in the SNMP shell:
Do you want to perform an incremental update (y or n)?

➤ First enter `n`.

➤ Enter `update -v <IP address> <file name>`.

The image is checked, but not yet loaded.

➤ Type in `update <IP address> <file name>`.

The following appears in the SNMP shell: Perform update (y or n)?

➤ Enter `y` and confirm with **Return**.

X4000 performs an incremental update and the image is saved to the flash memory. This procedure takes longer than a normal update!

The following appears in the SNMP shell: Reboot now (y or n)?

➤ Enter `y` and confirm with **Return**.

X4000 starts with the new boot image. The previous configuration is overwritten.

12 Troubleshooting

Tips If you are having problems with **X4000**, the following tips should help you to overcome some of the more usual stumbling blocks:

- Log in to **X4000** and enter in the SNMP shell:
  `debug all`
  This makes available all the debugging information in the SNMP shell.
- Check the syslog messages created by **X4000** (see chapter 10.1.1, page 308). It is wise to forward syslog messages to an external host and save them to be able to evaluate the outputs for a longer period of time.

To interpret debugging information and syslog messages, see the Software Reference.

This chapter shows you what the causes of particular problems can be and how to determine these causes. It is structured as follows:

- Aids to Troubleshooting
- Typical Errors

12.1 Aids to Troubleshooting

Here you can find methods to help narrow down the possible causes of your problem:

- Input keys and display for operating the Man-Machine Interface (MMI)
- Local SNMP Shell Commands
- External Aids

12.1.1 Man-Machine Interface (MMI)

You can use the MMI to show information about the status of **X4000** (basic unit and expansion card) on the display, without having to log in on the equipment. For example, you can quickly obtain the version of the current software release or the current operating status of the interfaces.

The MMI is easy to use and the display messages are intuitive. This is explained in detail in chapter 5, page 93.

12.1.2 Local SNMP Shell Commands

These commands are entered directly in **X4000**'s SNMP shell:

debug

You can use the `debug` command for troubleshooting in one or more subsystems of **X4000**. A detailed explanation of the syntax and options can be found in chapter 14.1, page 412.

Examples:

- Enter `debug all` to display debugging information for all subsystems.
- Enter `debug config &` for tracking down configuration management problems (see chapter 11, page 363).

If you add & to an SNMP shell command, the program runs in the background.

isdnlogin

You can use the `isdnlogin` command to verify that an ISDN connection can be made. This is explained in chapter 14.1, page 412.

Example:

- Enter `isdnlogin 1234 telephony` to establish a connection to the telephone in your local office with the number 1234.

  If a connection is made, the telephone will ring.

trace

The `trace` command can be used to display and interpret data packets sent or received over ISDN (D and B-channels) and over the LAN. An explanation of the syntax can be found in chapter 14.1, page 412.

Examples:

- Enter `trace -ip next` to display data packets that are to run over the next B-channel to be opened.
- Enter `trace -x -s me -d 0:a0:f9:d:5:a 0 0 1` to output data packets sent from **X4000**'s MAC address over the LAN to the host with the MAC address 0:a0:f9:d:5:a.

12.1.3 External Aids

You can analyze connections to **X4000** using the following utility programs on a Windows PC or Unix workstation.

DIME Tracer (Windows)

The DIME Tracer enables you to trace **X4000**'s ISDN and CAPI data traffic from a Windows PC. DIME Tracer is a part of DIME Tools. A detailed explanation can be found in BRICKware for Windows.

bricktrace (Unix)

The bricktrace program enables data sent over **X4000**'s ISDN channels to be inspected at a Unix workstation. bricktrace is part of BRICKtools for UNIX on your BinTec Companion CD. A detailed explanation can be found in chapter 14.2, page 419.

12.2 Typical Errors and Procedure

A compilation of typical error situations with instructions for error detection and clearance is given below. Try to narrow down the causes of the problem. These situations are broken down into the following categories:

- System errors
- ISDN connections
- IPX routing

12.2.1 System Errors

I have forgotten my password.

You must return **X4000** to the unconfigured ex works state:

➤ Connect your router over the serial interface to **X4000** as explained in chapter 3.3, page 59.

➤ Switch **X4000** off and then switch it on again.

You see various selftests and then "Press <sp> for BOOTmonitor or any other key to boot system".

➤ Now press the Space bar.

A BOOTmonitor menu is displayed.

➤ Select "(4) Delete Configuration" and press **Return**. Note and confirm the following safety prompts.

The password as well as the complete configuration of **X4000** are deleted.

➤ Select "(1) Boot System".

X4000 is restarted.

➤ Reconfigure **X4000**.

I can’t reach X4000 in the LAN.

➤ Use the MMI to check whether you have entered an IP address.

If an IP address has been entered, try to set up a serial connection:

- Connect your PC to **X4000** over the serial interface.
- Log in as the user `admin` with the corresponding password.
- Start the Setup Tool with `setup`.
- Check if a configuration error is the cause: Have you entered a filter under ***IP*** ➧ ***ACCESS LISTS*** that is locking you out? If so, make the required corrections.

If a serial connection does not work either:

- Check the settings of the terminal program (see chapter 4.1.2, page 71). If you have changed the default settings in BOOTmonitor, adjust your terminal settings accordingly.
- If this doesn't succeed, proceed as described under "I have forgotten my password.", page 379.

12.2.2 ISDN Connections

Here you will find possible causes of errors in ISDN connections.

Your telephone bill is unusually high.

Use the Credits Based Accounting System (see chapter 10.1.3, page 316). This enables you to set a limit for connections to **X4000** to prevent unnecessary charges accumulating as a result of mistakes made during configuration.

X4000 possibly has ISDN connections that remain connected or unwanted ISDN connections are set up, which cause additional costs.

- Use `debug all` or `trace` to check if a PC in the LAN is using a different netmask from the one entered on **X4000**.
- Use `debug all` or `trace` to check if a PC in the LAN is configured for Remote CAPI with an incorrect IP address (destination port 2662).

- Use ***SYSTEM*** ➧ ***EXTERNAL SYSTEM LOGGING*** to check if **X4000** is configured so that syslog messages are sent to a host outside the LAN (destination port 514).
- Use ***IP*** ➧ ***STATIC SETTINGS*** to check if an IP address located outside the LAN has been entered for **X4000** under **Time Server**.
- Check the MIB table **biboAdmTrapHostTable** to determine if **X4000** is configured so that SNMP traps are sent to a host outside the LAN (destination ports 161, 162).
- Check if the second B-channel is frequently set up and cleared for connections with dynamic channel bundling due to fluctuating traffic.
- Use `debug all` or `trace` to check if a PC in the LAN is configured for the WINS server with an incorrect IP address (destination ports 137-139). If necessary, configure the PC properly or set the corresponding filters.
- Use `debug all` or `trace` to check if a PC in the LAN is configured for the resolution of NetBIOS names with the help of DNS (it is accessed from a client port to destination port 53). Do not try to resolve NetBIOS names with DNS!
- Use `debug all` or `trace` to check if an application on a PC in the LAN is trying to resolve names that the name server at the Internet provider does not know (it is accessed from a client port to destination port 53). Install a local HOSTS file in the Windows directory that can carry out name resolution.
- Use `debug all` or `trace` to check if NetBIOS over IP is configured on a PC in the LAN (it is accessed from source port 137 to destination port 53). An attempt is thus made to resolve NetBIOS names over DNS. Disable NetBIOS over IP or insert filters (configuration of the corresponding filters can be found in chapter 10.2.8, page 335 or use the simple NetBIOS filter of the Configuration Wizard, see chapter 6, page 109).
- Check if you have configured Callback (see chapter 10.2.4, page 327) and in doing so entered an incorrect number (**Number** under ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***WAN NUMBERS*** ➧ ***EDIT***).
- Check if you left a trace program running over an ISDN-PPP connection. This would cause packets to be sent constantly over ISDN and the connection would remain permanently open.

Outgoing calls cannot be made.

- Use `isdnlogin` to check if outgoing calls are possible.
- Check ***MONITORING AND DEBUGGING*** ➧ ***ISDN MONITOR*** to see if any outgoing calls have been recorded at all, if the number dialed is correct and if the call was connected.
- Check if ISDN syslog messages with "disconnect cause" have been recorded.
- Check if **Encapsulation** in ***WAN PARTNER*** ➧ ***EDIT*** is the same for both connection partners.
- Check if **Authentication** in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***PPP*** is the same for both connection partners.
- Use `trace` to check what is being sent over the ISDN channels.
- Check in the MIB table **isdnStkTable** if the MIB variable **Status** has the value *loaded*.
- Make sure your own number is correctly entered in ***CALLS*** ➧ ***ADD***. This also applies to outgoing calls.

Incoming calls cannot be made.

- Check ***MONITORING AND DEBUGGING*** ➧ ***ISDN MONITOR*** to see if an incoming call has been recorded.
- Check ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***WAN NUMBERS*** to see if a suitable number for incoming calls has been entered.
- Check the MIB variables **DSS1Cause** and **LocalCause** in the MIB table **isdnCallHistoryTable**. To interpret the entries, see the Software Reference.
- Check ***CALLS*** to determine if you have made the necessary entries for incoming calls.
- Check if **Encapsulation** in ***WAN PARTNER*** ➧ ***EDIT*** is the same for both connection partners.
- Check if **Authentication** in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***PPP*** is the same for both connection partners.

12.2.3 IPX Routing

Here you will find some problems that could crop up with IPX routing together with suggestions on how they can be solved.

- Use the Setup Tool or MMI to check if you have entered the right license.
- Use the Setup Tool to check in ***IPX*** if the entry under **Internal Network Number** is unique in the LAN.

A server exists in a remote LAN (LAN-LAN connection over ISDN), but is "invisible" for clients in the local LAN.

The server could be invisible for clients because SAP packets are not received from the server:

- Check the entries in **Update Time** and **Age Multiplier** in ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IPX***. The settings must be compatible with the settings on the servers in **X4000**'s LAN.
- Check if a router between them filters out the SAP packets.
- Check with isdnlogin if an ISDN connection can be made between client and server.
- Check if you have made the correct entries in **Local IPX NetNumber** and **Encapsulation** under ***CM-100BT, FAST ETHERNET*** and if the server can receive them.

When the client tries to reach a server in a remote network over a PPP connection, he must wait a long time and the connection is possibly terminated.

In some cases, the local router erroneously tells the client that a server can be reached.

- Check if the server has crashed and that the aging interval has not yet expired. If necessary, change the setting of **Send RIP/SAP Updates** under ***WAN PARTNER*** ➧ ***EDIT*** ➧ ***IPX***.
- Check if the server and the router in the remote network are simultaneously inactive (e.g. because of a power cut). Briefly set the WAN interface of the corresponding WAN partner with the command `ifconfig` to *down* and

then back to *dialup,* in order to delete the routes and services learned by the WAN partner.

I can’t change to a network drive on the client station.

- The file server may be "invisible" to the client. Proceed as described under "A Server exists in a remote LAN ...".
- Check if all the licenses available on the server are in use.

ISDN connections are constantly reconnected.

It is not only RIP/SAP packets that cause ISDN connections to be set up.

- Check if there is an entry in the MIB table **ipxDenyTable** that is preventing Novell serialization packets from being sent over the dialup connection.
- Check under ***IPX*** if you have activated **enable IPX spoofing** and **enable SPX spoofing** with *yes*.
- Check if any RCONSOLE is running with a constantly changing screen (e.g. MONITOR, IPXCON, TCPCON, screensaver, etc.).
- Check if NetBIOS over IPX is used in the LAN (Windows for Workgroups, NT, Win 95). If necessary, select *no* or *on LAN only* under ***IPX*** for **NetBIOS Broadcast replication**.
- Check if NDS Replica Synchronization is active (for Netware 4.1 servers and higher).
- Evaluate the syslog messages (**Level** = *debug*) and, if applicable, filter out the IPX packets indicated in the messages as causing unwanted connections to be set up.

The MIB variable ipxAdmSpxConns shows more connections than are actually active.

X4000 may not be receiving SPX disconnect messages from the server.

- Enter the command `reset router` on the console of the respective server.

  All inactive connections between the server and **X4000** are cleared.

- If the disconnect for the client is lost, SPX connections could remain until timeout. These connections would then be displayed in **ipxAdmSpxConns** until timeout.

12 Troubleshooting

13 Technical Data

General product features:

Feature	Description
Dimensions: Desktop unit 19-inch built-in unit	W x H x D in mm 105 x 260 x 300 220 x 44 x 290
Weight: Desktop unit 19-inch built-in unit	 2.6 kg 2.1 kg
Transport weight (incl. documentation, cabling, packaging): Desktop unit 19-inch built-in unit	 5.1 kg 4.6 kg
Ambient requirements: Storage temperature Operating temperature Relative humidity Room classification	 -20 °C to 50 °C 0 °C to 40 °C 20 to 90 % non-condensing in operation 5 to 95 % non-condensing in storage Operate only in dry rooms
Printed documentation supplied with equipment	User's Guide

Table 13-1: **X4000** technical data

13.1 Mains Unit

Connect the IEC AC socket of the mains unit to the power supply using the power cord supplied with the equipment.

	Electrical ratings
Mains unit	Wide-range mains unit without fan
Mains voltage	100 to 240 V AC
Mains frequency	50 to 60 Hz
Max. current drawn	800 mA

Table 13-2: Technical data for mains unit

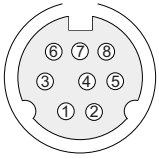
13.2 Features of Basic Unit

Feature	Description
Processor	Motorola MPC860T RISC CPU
Memory	16 MB SDRAM 4 MB flash ROM
Interfaces Console interfaces Ethernet/LAN interface WAN interfaces	 Serial, mini-DIN 10/100 Base-T auto sensing, RJ45 socket ISDN interface BRI S/T, RJ45 socket 2 x X.21/V.35/V.36/X.21bis, 26-pole mini Delta ribbon socket, up to 2048 kbps
Displays	Illuminated green 122 x 132-pixel LC display with illuminated input keys Blue Power LED on the front panel of **X4000** 2 Status LEDs, green and red, on the back of **X4000**
Extension capability	Slot for an **X4000** expansion card

Table 13-3: Features of basic unit

13.2.1 Serial Console Interface

Pin assignment of serial console interface of basic unit (8-pole mini-DIN socket):

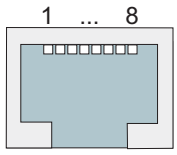


1	For test purposes	5	RXD
2	For test purposes	6	NC
3	TXD	7	NC
4	GND	8	NC

Figure 13-1: Serial console interface with pin assignment

13.2.2 Ethernet/LAN Interface

Pin assignment of 10/100 Base-T Ethernet/LAN interface of basic unit (RJ45 socket):



1	T+	5	Shield
2	T-	6	R-
3	R+	7	Shield
4	Shield	8	Shield

Figure 13-2: 10/100 Base-T Ethernet/LAN interface (RJ45 socket) of basic unit with pin assignment

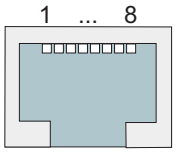
The LAN cable used must have the following technical features:

- 100 Base-T cable CAT5 STP (Shielded Twisted Pair)
- 8-pole RJ45 plug fully shielded at both ends
- 4 twisted wire pairs; the following wires are twisted:
  - Pin 1+2
  - Pin 3+6
  - Pin 4+5
  - Pin 7+8

  Outer shielding for all four pairs.

13.2.3 ISDN BRI Interface

Pin assignment of ISDN BRI interface (RJ45 socket):



1	NC	5	R-
2	NC	6	T-
3	T+	7	NC
4	R+	8	NC

Figure 13-3: ISDN BRI interface (RJ45 socket) of basic unit with pin assignment

13.2.4 Serial WAN Interfaces:

The **X4000** basic unit is equipped with two serial WAN interfaces:

- The first serial port (Setup Tool menu ***CM-SERIAL, SERIAL*** ➧ ***UNIT 0***) can be used as interface type
  - X.21/V.11
  - V.35/V.11
  - V.36/V.11

  The setting in the Setup Tool **Connector** field (see Table 7-11, page 153) enables the port to be changed so that **X4000** can be operated in both DCE and DTE Mode.

Making the relevant settings in the Setup Tool **Connector** field physically reverses the signal direction and the pin functions.

- The second serial port (Setup Tool menu ***CM-SERIAL, SERIAL*** ➧ ***UNIT 1***) can be used as interface type
  - X.21bis/V.28

  Changing this port from DCE to DTE Mode and vice versa is only possible using a DCE or DTE cable.

The cables to be used are not supplied with **X4000**, but can be ordered from your dealer.

We recommend you use original BinTec cables, which you can buy from your dealer.

The use of other cables may cause damage to your equipment and invalidates the guarantee!

The description below first deals with the plugs that are generally used for X.21, V.35, V.36 and X.21bis interfaces:

- "DB-15 Plug for X.21", page 395
- "M34 Plug for V.35", page 396
- "DB-37 Plug for V.36", page 397

- "DB-25 Plug for X.21bis", page 399

This is followed by a description of the two serial **X4000** ports used for implementing the stated interfaces in **X4000**:

- "26-Pole Mini Delta Ribbon Socket for X.21, V.35 and V.36", page 400
- "20-Pole Mini Delta Ribbon Socket for X.21bis", page 403

DB-15 Plug for X.21

A DB-15 plug to ISO 4903 is normally used for an X.21 interface:

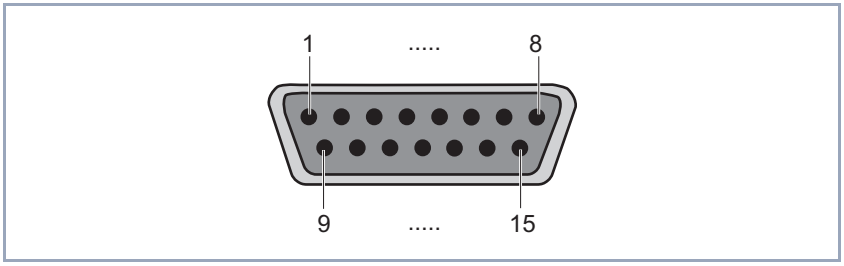


Figure 13-4: DB-15 plug (DTE)

The DB-15 plug (DTE) and socket (DCE) have the following pin assignment:

Variable Connector=DTE		Signal direction Pin no.	Variable Connector=DCE	
ITU-T	Signal		Signal	ITU-T
101	PG	—— 1 ——	PG	101
102	SG	—— 8 ——	SG	102
103	T+	9 ——–>	R+	104
103	T-	2 ——–>	R-	104
104	R+	<———11	T+	103
104	R-	<——— 4	T-	103
105	C+	10 ——–>	I+	106
105	C-	3 ——–>	I-	106
106	I+	<——— 12	C+	105
106	I-	<——— 5	C-	105
115	S+	<——— 13	S+	114
115	S-	<——— 6	S-	114

Table 13-4: Pin assignment of DB-15 plug for X.21 (ISO 4903)

M34 Plug for V.35

An M34 plug to ISO 2593 is normally used for a V.35 interface:

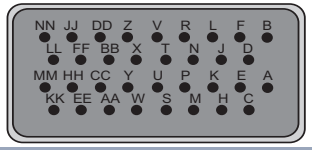


Figure 13-5: M34 plug

The M34 plug has the following pin assignment:

Variable Connector=DTE		Signal direction Pin no.	Variable Connector=DCE	
ITU-T	Signal		Signal	ITU-T
101	ChGND	—— A ——	ChGND	101
102	SigGND	—— B ——	SigGND	102
103	TDA	P ———>	RDA	104
103	TDB	S ———>	RDB	104
104	RDB	<——— R	TDB	103
104	RDA	<——— T	TDA	103
105	RTS	C ———>	CTS	106
106	CTS	<——— D	RTS	105
115	RCA	<——— V	TCA	114
115	RCB	<——— X	TCB	114
108/2	DTR	H ———>	DSR	107
109	DCD	<——— F	DCD	109
107	DSR	<——— E	DTR	108/2
114	TCB	<——— Y	TCB	114
114	TCA	<——— AA	TCA	114

Table 13-5: Pin assignment of M34 plug for V.35 (ISO 2593)

DB-37 Plug for V.36

A DB-37 plug to ISO 4902 is normally used for a V.36 interface:

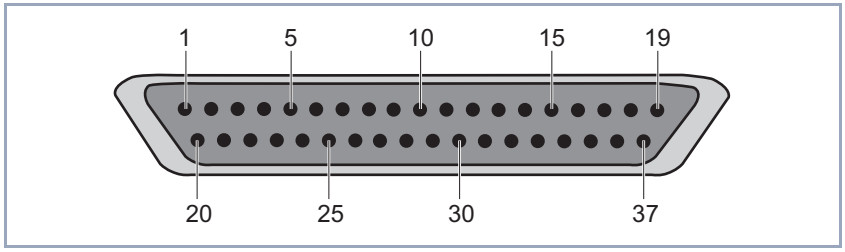


Figure 13-6: DB-37 plug

The DB-37 plug has the following pin assignment:

Variable Connector=DTE		Signal direction Pin no.	Variable Connector=DCE	
ITU-T	Signal		Signal	ITU-T
101	ChGND	—— 1 ——	ChGND	101
102	SigGND	—— 19 ——	SigGND	102
103	TDB	22 ——>	RDB	104
103	TDA	4 ——>	RDA	104
104	RDB	<—— 24	TDB	103
104	RDA	<—— 6	TDA	103
105	RTSB	25 ——>	RTSB	106
105	RTSA	7 ——>	CTSA	106
106	CTSB	<—— 27	RTSB	105
106	CTSA	<—— 9	RTSA	105
115	RCB	<—— 26	TCB	114
115	RCA	<—— 8	TCA	114
108/2	DTRB	30 ——>	DSRB	107
108/2	DTRA	12 ——>	DSRA	107
109	DCDB	<—— 31	DCDB	109
109	DCDA	<—— 13	DCDA	109
107	DSRB	<—— 29	DTRB	108/2
107	DSRA	<—— 11	DTRA	108/2
114	TCB	<—— 23	TCB	114
114	TCA	<—— 5	TCA	114

Table 13-6: Pin assignment of DB-37 plug for V.36 (ISO 4902)

DB-25 Plug for X.21bis

A DB-25 plug to ISO 2110 is normally used for an X.21bis interface:

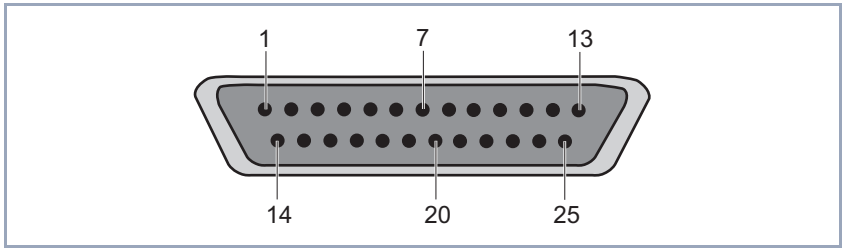


Figure 13-7: DB-25 plug

The DB-25 plug has the following pin assignment:

DTE cable		Signal direction Pin no.	DCE cable	
ITU-T	Signal		Signal	ITU-T
101	ChGND	——— 1 ———	ChGND	101
103	TD	2 ———>	RD	104
104	RD	<——— 3	TD	103
105	RTS	4 ———>	CTS	106
106	CTS	<——— 5	RTS	105
107	DSR	<——— 6	DTR	108/2
102	SigGND	——— 7 ———	SigGND	102
109	DCD	<——— 8	DCD	109
114	TxC	<——— 15	TxC	114
115	RxC	<——— 17	RxC	115
108/2	DTR	20 ——>	DSR	107
113	XTC	24 ——>	RxC / TxC	114/115
	VCC +5V	——— 25 ———	VCC +5V	

Table 13-7: Pin assignment of DB-25 plug for X.21bis (ISO 2110)

26-Pole Mini Delta Ribbon Socket for X.21, V.35 and V.36

The serial X.21/V.35/V.36 interface of **X4000** is designed as a 26-pole mini Delta ribbon socket. The interface can be used for X.21, V.35 or V.36, depending on the setting under **Interface Type**.

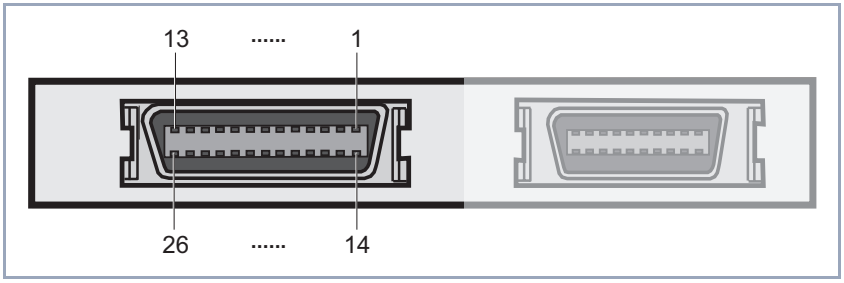


Figure 13-8: 26-pole mini Delta ribbon socket (first serial port, left)

The 26-pole mini Delta ribbon socket has the following pin assignment in DTE Mode (**Connector** = *DTE*):

ITU-T	Direction and pin no.	X.21 pin (DB-15)		V.35 pin (M34)		V.36 pin (DB-37)	
101	—— 1 ——	1	PG	A	ChGND	1	ChGND
102	—— 2 ——	8	SG	B	SigGND	19	SigGND
103	3 ——>	9	T+	S	TDB	22	TDB
103	4 ——>	2	T-	P	TDA	4	TDA
104	<—— 5	11	R+	T	RDB	24	RDB
104	<—— 6	4	R-	R	RDA	6	RDA
105	7 ——>	10	C+			25	RTSB
105	8 ——>	3	C-	C	RTS	7	RTSA
106	<—— 9	12	I+			27	CTSB
106	<—— 10	5	I-	D	CTS	9	CTSA
115	<—— 11	13	S+	X	RCB	26	RCB
115	<—— 12	6	S-	V	RCA	8	RCA
108/2	15 ——>					30	DTRB
108/2	16 ——>			H	DTR	12	DTRA
109	<—— 17					31	DCDB
109	<—— 18			F	DCD	13	DCDA
107	<—— 19					29	DSRB
107	<—— 20			E	DSR	11	DSRA
114	<—— 21			AA	TCB	23	TCB
114	<—— 22			Y	TCA	5	TCA
VCC+5V	—— 25 ——						

Table 13-8: Pin assignment of 26-pole mini Delta ribbon socket (DTE Mode)

The 26-pole mini Delta ribbon socket has the following pin assignment in DCE Mode (**Connector** = *DCE*):

ITU-T	Direction and pin no.	X.21 pin (DB-15)		V.35 pin (M34)		V.36 pin (DB-37)	
101	—— 1 ——	1	PG	A	ChGND	1	ChGND
102	—— 2 ——	8	SG	B	SigGND	19	SigGND
104	3 ——>	9	R+	S	RDB	22	RDB
104	4 ——>	2	R-	P	RDA	4	RDA
103	<—— 5	11	T+	T	TDB	24	TDB
103	<—— 6	4	T-	R	TDA	6	TDA
106	7 ——>	10	I+			25	RTSB
106	8 ——>	3	I-	C	CTS	7	CTSA
105	<—— 9	12	C+			27	RTSB
105	<—— 10	5	C-	D	RTS	9	RTSA
114	<—— 11	13	S+	X	TCB	26	TCB
114	<—— 12	6	S-	V	TCA	8	TCA
107	15 ——>					30	DSRB
107	16 ——>			H	DSR	12	DSRA
109	<—— 17					31	DCDB
109	<—— 18			F	DCD	13	DCDA
108/2	<—— 19					29	DTRB
108/2	<—— 20			E	DTR	11	DTRA
114	<—— 21			AA	TCB	23	TCB
114	<—— 22			Y	TCA	5	TCA
VCC+5V	—— 25 ——						

Table 13-9: Pin assignment of 26-pole mini Delta ribbon socket (DCE Mode)

20-Pole Mini Delta Ribbon Socket for X.21bis

The serial X.21bis interface of **X4000** is a 20-pole mini Delta ribbon socket.

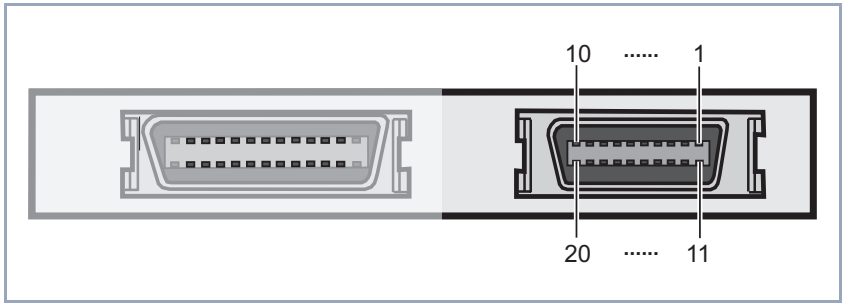


Figure 13-9: 20-pole mini Delta ribbon socket (second serial port, right)

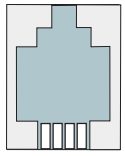
The 20-pole mini Delta ribbon socket has the following pin assignment (a DTE cable is required for DTE Mode and a DCE cable for DCE Mode):

DTE/DCE			
ITU-T	**Signal**	**Signal direction Pin no.**	**X.21bis (DB-25)**
101	ChGND	—— 1 ——	1
103	TD	2 ——>	2
104	RD	<—— 3	3
105	RTS	4 ——>	4
106	CTS	<—— 5	5
107	DSR	<—— 6	6
102	SigGND	—— 7 ——	7
109	DCD	<—— 8	8
108/2	DTR	9 ——>	20
113	XTC	11 ——>	24
114	TxC	<—— 12	15
115	RxC	<—— 13	17
	VCC +5V	—— 14 ——	

Table 13-10: Pin assignment of 26-pole mini Delta ribbon socket

13.2.5 Display Interface

The RJ11 socket for the display plug has the following pin assignment:



1	VDD: +3.3V Supply Voltage	3	SDA: I^2C Serial Data
2	SCL: I^2C Serial Data	4	GND

Figure 13-10: RJ11 socket for display plug with pin assignment

13.3 Features of Expansion and Resource Cards

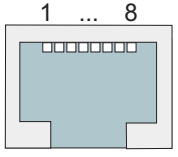
13.3.1 X4E-2/3BRI – WAN Interface Card for ISDN BRI (Basic Rate Interface)

Feature	Description
Interfaces	3 x ISDN interfaces BRI S/T
Operating temperature	0 °C to 40 °C
Relative humidity	20 to 90 % non-condensing in operation 5 to 95 % non-condensing in storage
Extensions	Slot for resource card with digital modems Slot for resource card for encryption and compression

Table 13-11: Features of BRI expansion card

Pin assignment

The ISDN BRI interfaces (RJ45 sockets) have the following pin assignment:



1	NC	5	R-
2	NC	6	T-
3	T+	7	NC
4	R+	8	NC

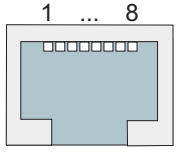
Figure 13-11: ISDN BRI interface (RJ45 socket) of BRI expansion card

13.3.2 X4E-1/2PRI – WAN Interface Card for ISDN PRI (Primary Rate Interface) and/or G.703

Feature	Description
Interfaces	2 x interfaces for ISDN PRI/G.703 with 2 sockets each (IN and OUT) If **X4000** is switched off, the IN socket is looped to the OUT socket.
Data compression and encryption	Integrated hardware support for encryption and compression
Operating temperature	0 °C to 40 °C
Relative humidity	20 to 90 % non-condensing in operation 5 to 95 % non-condensing in storage
Extensions	2 slots for resource card with digital modems

Table 13-12: Features of PRI/G.703 expansion card

Pin assignment The ISDN PRI/G.703 interfaces have the following pin assignment:



1	R+	5	T-
2	R-	6	NC
3	NC	7	NC
4	T+	8	NC

Figure 13-12: ISDN PRI/G.703 interface (RJ45 socket) of PRI/G.703 expansion card

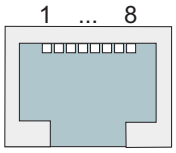
13.3.3 X4E-2FE – LAN Interface Card for 10/100 Mbps

Feature	Description
Interfaces	2 x 10/100 Base-T auto-sensing
Operating temperature	0 °C to 40 °C
Relative humidity	20 to 90 % non-condensing in operation 5 to 95 % non-condensing in storage
Extensions	Slot for resource card for encryption and compression

Table 13-13: Features of LAN expansion card

Pin assignment

The LAN interfaces (RJ45 sockets) have the following pin assignment:



1	T+	5	Shield
2	T-	6	R-
3	R+	7	Shield
4	Shield	8	Shield

Figure 13-13: LAN interface (RJ45 socket) of LAN expansion card

13.3.4 XTR-S/M/L – Resource Cards with Digital Modems

The resource cards with digital modems are available in the following versions for X4E-3BRI and X4E-2PRI:

- XTR-S with 8 digital modems

- XTR-M with 12 digital modems
- XTR-L with 30 digital modems

Feature	Description
Operating temperature	0 °C to 40 °C
Relative humidity	20 to 90 % non-condensing in operation 5 to 95 % non-condensing in storage

Table 13-14: Features of resource cards with digital modems

If you are using an expansion card with resource card(s) in the **X4000** built-in unit, BinTec Communications AG recommends that you use the fan unit obtainable as optional equipment.

13.3.5 XTR-ENC – Resource Card for Encryption and Compression

The resource cards for encryption and compression offer hardware support for STAC compression and symmetric encryption. Encryption processes supported: DES, 3DES, CAST, Twofish and Blowfish.

Feature	Description
Operating temperature	0 °C to 40 °C
Relative humidity	20 to 90 % non-condensing in operation 5 to 95 % non-condensing in storage

Table 13-15: Features of resource card for encryption and compression

The ISDN PRI or G.703 expansion card is equipped as standard with hardware support for encryption and compression. The ISDN BRI expansion card and the LAN expansion card can be optionally equipped with an appropriate resource card.

Due to export and import regulations, it is not always possible to guarantee delivery of resource cards for encryption and compression.

If you are using an expansion card with resource card(s) in the **X4000** built-in unit, BinTec Communications AG recommends that you use the fan unit obtainable as optional equipment.

14 Important Commands

This chapter describes the following commands:

- SNMP shell commands:
  - telnet
  - ping
  - trace
  - isdnlogin
  - debug
  - ifconfig
  - ifstat
  - netstat
  - date
  - t
  - nslookup
- BRICKtools for Unix commands:
  - bricktrace
  - capitrace

14.1 SNMP Shell Commands

X4000 contains several pre-installed programs that can be started directly from the SNMP shell. A short description of the most commonly used programs and the associated command lines for starting the respective programs in the SNMP shell are given below.

Entering ? displays a list of the most important commands available on **X4000**.

Please note:
Parameters shown in the command lines inside square brackets [ ] represent optional values. Terms inside angle brackets < > can have several values.
Do not enter any brackets!

telnet

```
telnet [-f] <host> [<port>]
```

Is used to communicate with another host.

- `-f:` specifies that the telnet session should be transparent. This option is especially useful for establishing connections to non-telnet ports (e.g. uucp or smtp).
- `host`: IP address or name of host.
- `port`: port number.

ping

```
ping [-i] [-f <precount>] [-d <msec>] [-c <count>] <target>
[<size>]
```

Is used to test communication to another host.

- `-i:` sends each packet one byte larger.
- `-f <precount>:` <precount> packets are sent first. The next packet is sent as soon as a packet has been received.
  Output: a dot appears on the screen for each packet sent and a dot is

deleted for each packet received.
`-f 1` without the additional parameter `-d <msec>` causes approx. half the equipment's bandwidth to be loaded by sending and receiving packets.

– `-d <msec>:` waits <msec> until the next packet is sent, default: 1000 millisecondsn
– `-c <count>`: limits the number of packets sent, `<count>` sets the number of packets.
– `target`: IP address or name of host to which echo_request packets are sent.
– `size`: sets the length of the packets to be sent.

If you do not specify `-c <count>`, packets will be sent to the host until you stop the operation, e.g. by pressing `Ctrl-C`.

trace

For WAN interfaces:

```
trace [-h23aFADtpiNxX] [-T <tei>] [-c <cref>]
[<channel> <unit> <slot> | next | <ifcname>]
```

For LAN interfaces:

```
trace [-h23iNxX1] [-d <destination MAC filter>] [-o]
[-s <source MAC filter>]0 0 <slot>
```

Is used to display and interpret data packets sent and received over ISDN (D- and B-channels) or the LAN.

– `-h`: hexadecimal output.
– `-2`: layer 2 output
– `-3`: layer 3 output
– `-a`: asynchronous HDLC (B-channel only)
– `-F`: fax (B-channel only)
– `-A`: fax and AT commands (B-channel only)
– `-D`: additional time parameter (delta)
– `-t`: output in ASCII text (B-channel only)
– `-p`: PPP (B-channel only)

- `-i`: IP output (B-channel only)
- `-N`: Novell IPX output (B-channel only)
- `-x:` raw dump mode.
- `-X`: asynchronous PPP over X.75 (B-channel only)
- `-T <tei>`: set TEI filter (D-channel only)
- `-c <cref>`: set callref filter (D-channel only)
- `channel`: 0 = D-channel or X.21 interface, 1 ... 31 = Bx-channel
- `unit`: 0 ... 1. selects the physical interface for modules with two interfaces (e.g. CM-2BRI)
- `slot`: 1 ... 2. indicates the slot in which the module is installed
- `next`: only display information for the next B-channel opened
- `<ifcname>`: name or index of the interface (see "ifstat", page 416).
- `-d <destination MAC filter>`: set destination MAC address filter (LAN only).
- `-s <source MAC filter>`: set source MAC address filter (LAN only).
- `-o`: combine two or more -d filters or -s filters with a logical OR operation.
- specific `<MAC filter>`: `me` = **X4000**'s MAC address, `bc` = broadcast packets.

You can combine a -d MAC filter and an -s MAC filter with a logical AND operation by simply specifying them both.

To combine two or more -d and -s MAC filters with a logical OR operation, specify the filters and separate them with `-o`.

isdnlogin

```
isdnlogin [-c <stknumber>] [-C] [-s <service>]
[-a <addinfo>] [-b <bits>] isdn-number [isdn-service]|
layer1-protocol]
```

Is used to open a remote login shell on **X4000** over ISDN.

- `-c <stknumber>`: defines the ISDN stack (if several ISDN cards are used).
- `-C`: tries to use compression (V.42bis).

- `-b <bits>`: use only <bits> bits for transmission (e.g. enter `-b 7` for 7-bit ASCII transmission).
- `isdn-number`: isdn number of the ISDN partner you want to log in to.
- `isdn-service`: the ISDN service you want to use (data, telephony, fax g3, fax g4, btx).
- `layer1-protocol`: Possible values: v110_1200, v110_2400, v110_4800, v110_9600, v110_19200, v110_38400, modem, dovb56k, telephony.

debug

```
debug [show]|[[-q] all|acct|system|<subs> [<subs> ...]]
```

Is used to selectively display debugging information originating from one of **X4000**'s subsystems.

- `show`: displays all possible subsystems that can be debugged.
- `-q`: no timestamp attached before each debugging message.
- `all`: displays debugging information for all subsystems.
- `acct`: displays debugging information for the accounting subsystem.
- `system`: displays debugging information for all subsystems except the accounting subsystem.
- `subs`: subsystem for which debugging information is to be displayed. Several entries are possible (separated by a space).

ifconfig

```
ifconfig <interface> [destination <destaddrs>] [<address>]
[netmask <mask>] [up | down | dialup] [-] [metric <n>]
```

Assigns the IP address and the associated netmask to the interface `<interface>` and configures the associated parameters. The routing table is changed accordingly.

If you only enter `ifconfig <interface>`, the current interface parameters are displayed.

- `interface`: name of the interface (**ifDescr**).
- `destination <destaddrs>`: destination IP address of a host. This adds a host route for this host in the routing table (**ipRouteDest**).

- `address`: **X4000**'s IP address for the interface (**ipRouteNextHop**).
- `netmask <mask>`: netmask of the interface (**ipRouteMask**).
- `up`: sets the interface to the up status.
- `down`: sets the interface to the down status.
- `dialup`: sets the interface to the dialup status.
- `-`: does not define its own IP address (**ipRouteNextHop** = *0.0.0.0*).
- `metric <n>`: sets route metric to n (**ipRouteMetric1**).

ifstat

```
ifstat [-lur] [<ifcname>]
```

Is used to display status information for the system's interfaces, based on the contents of the MIB table **ifTable**.

- `-l`: displays the full length of the interface information (normally the information is only displayed up to the twelfth character).
- `-u`: only displays information on interfaces that are in the up status.
- `-r`: displays the filters defined for the interface.
- `ifcname`: only displays information on interfaces whose names start with the characters entered (e.g. `ifstat en1` will display information on the interfaces en1, en1-IIc and en1-snap).

netstat

```
netstat [[-i | -r | -p [<interface>]] | -d <dest. IP addr.>]
```

Is used to display a short list of system information.

- `-i`: displays a list of the interfaces.
- `-r:` displays a list of routing table entries.
- `-p`: displays a list of WAN partners.
- `interface`: limits the information displayed to the selected interface.
- `-d <dest. IP addr.>`: displays routes to the IP address entered.

date

```
date [YYMMDDHHMMSS]
```

X4000 has a software clock. Entering `date` displays the time set.

Entering `date YYMMDDHHMMSS` sets the clock to the corresponding value (year, month, day, hour, minute, second).

t

`t [<seconds>]`

Is used to define the auto logout time for the current login session (a connection to **X4000** over telnet, isdnlogin or serial interface is normally disconnected automatically if no entry is made on the keyboard for 15 minutes).

- `seconds`: auto logout is activated after `seconds`. Entering `t 0` deactivates auto logout.

nslookup

`nslookup [-an] [-t <type>] [-w <sec>] [-r <ret>] ipaddr | name [<server>]`

Is used to check how a name or an IP address is resolved by **X4000** or another name server.

- `-a`: displays all the data received.
- `-n`: prevents the resolution of the indicated name server address (without this option, an attempt is made to resolve the address of the name server).
- `-t <type>`: executes <type> requests. Possible values for type: 0, A, NS, MD, MF, CNAME, SOA, MB, MG, MR, NULL, WKS, PTR, HINFO, MINFO, MX, TXT, ANY or any decimal number.
- `-w <sec>`: wait <sec> before sending a new request (default value: 3).
- `-r <ret>`: send a request maximum <ret> times (default value: 5).
- `ipaddr`: IP address to be resolved.
- `name`: name to be resolved.
- `<server>`: IP address of the name server that is to be asked for (default value: 127.0.0.1). An attempt is made to have this name server address resolved by the local DNS proxy.

Entering `-?` usually provides syntax help.

The `update` command can be found in chapter 11.2, page 371.

Further SNMP commands can be found in the Software Reference.

14.2 BRICKtools for Unix Commands

The bricktrace and capitrace programs are included in BRICKtools for UNIX on the BinTec Companion CD. They are started on a Unix workstation by entering the following commands.

bricktrace

```
bricktrace [-h23aeFpiNtxs] [-T <tei>] [-c <cref>]
[-r <cnt>] [-H <host>] [-P <port>] <channel> <unit> <slot>
```

Is used to trace and evaluate ISDN messages (D- and B-channels).

- `-h`: hexadecimal output
- `-2`: layer 2 output
- `-3`: layer 3 output
- `-a`: asynchronous HDLC (B-channel only)
- `-e`: ETS300075 (Euro File Transfer) output
- `-F`: fax (B-channel only)
- `-p`: PPP (B-channel only)
- `-i`: IP output (B-channel only)
- `-N`: Novell IPX output (B-channel only)
- `-t`: output in ASCII text (B-channel only)
- `-x`: raw dump mode
- `-s`: Check **X4000** for available trace channels.
- `-T <tei>`: set TEI filter (D-channel only)
- `-c <cref>`: set callref filter (D-channel only)
- `-r <cnt>`: only receive cnt bytes
- `-H <host>`: IP address or name of IP host
- `-p <port>`: specify trace TCP port (default: 7000).
- `channel`: `0` = D-channel or X.21 interface, `1` ... `31` Bx-channel
- `unit`: `0` ... `1`. selects the physical interface for modules with two interfaces (e.g. CM-2BRI)
- `slot`: `1` ... `2`. indicates the slot in which the module is installed

capitrace

```
capitrace [-h] [-s] [-l]
```

Is used to trace and evaluate CAPI messages. All CAPI messages sent or received by **X4000** are displayed. The IP address of **X4000** must be entered as the environment variable CAPI_HOST.

- `-h`: hexadecimal output.
- `-s`: short output. Only the application ID, a connection identifier and the name of the CAPI message are displayed at the end of the information line.
- `-l`: long output (default). A detailed interpretation is given for each parameter in the CAPI message.

Each CAPI message is preceded by a line containing the following information:

- Timestamp ("seconds.milliseconds" local time)
- Sent/received flag (X = sent, R = received)
- Name of the CAPI message (ASCII string)
- Command of the CAPI message (0xABXY, AB = <subcommand> XY = <command>)
- Number of the tracer message (#<decimal>)
- Length of the CAPI message ([<decimal>])
- Application ID (ID = <decimal>)
- Number of the CAPI message (no. (<decimal>))
- Short output only: connection identifier (ident = 0x<hexadecimal>)

15 General Safety Precautions in 15 Different Languages

Allgemeine Sicherheitshinweise in deutsch

In den nachfolgenden Abschnitten finden Sie Sicherheitshinweise, die Sie beim Umgang mit Ihrem Gerät unbedingt beachten müssen.

Transport und Lagerung

- Transportieren und lagern Sie **X4000** nur in der Originalverpackung oder in einer anderen geeigneten Verpackung, die Schutz gegen Stoß und Schlag gewährt.

Aufstellen und in Betrieb nehmen

- Beachten Sie vor dem Aufstellen und Betrieb von **X4000** die Hinweise für die Umgebungsbedingungen (vgl. Technische Daten). Verwenden Sie eine feste und ebene Unterlage.
- Elektrostatische Aufladungen können zu Geräteschäden führen. Tragen Sie daher eine geerdete Manschette um das Handgelenk oder berühren Sie eine geerdete Fläche, bevor Sie Buchsen oder Erweiterungskarten von **X4000** berühren. Berühren Sie die Erweiterungskarten grundsätzlich nur an den Rändern und fassen Sie nicht auf Bauteile oder Leiterbahnen.
- Halten Sie den nicht benutzten Erweiterungssteckplatz mit der Blindabdeckung verschlossen, damit keine Gegenstände ins Innere des Gerätes gelangen können. Befinden sich während des Betriebs Fremdgegenstände im Gerät, besteht Stromschlag- und Kurzschlußgefahr.
- Achten Sie darauf, daß keine spitzen Gegenstände das Fenster des Displaymoduls beschädigen. Schützen Sie das Displaymodul vor Stoß und Fall und schließen Sie es nur an die dafür vorgesehene RJ11-Buchse von **X4000** an, um Schäden an **X4000** und dem Displaymodul zu vermeiden.
- Achten Sie bei der Verkabelung darauf, daß die Lüftungsschlitze des Geräts nicht verdeckt werden und die Lüftung nicht behindert wird. Durch Beeinträchtigung der Lüftung von **X4000** kann es zu Schäden am Gerät kommen. Durch mangelnde Lüftung entstandene Schäden führen zum Garantieverlust.

- Öffnen Sie nicht das Grundgerät und nehmen Sie keinerlei Manipulationen am Netzteil vor, da sonst Lebensgefahr durch einen Stromschlag besteht. Entfernen Sie keine Befestigungsschrauben des Grundgerätes.
- Wenn das Gerät aus kalter Umgebung in den Betriebsraum gebracht wird, kann Betauung sowohl am Geräteäußeren als auch im Geräteinneren auftreten. Warten Sie, bis Ihr Gerät temperaturangeglichen und absolut trocken ist, bevor Sie es in Betrieb nehmen. Beachten Sie die Umweltbedingungen in den Technischen Daten.
- Prüfen Sie, ob die örtliche Netzspannung mit den Nennspannungen des Netzteils übereinstimmt. Das Gerät darf unter folgenden Bedingungen betrieben werden:
  – 100 - 240 VAC
  – 50 - 60 Hz
- Stellen Sie sicher, daß die Schutzkontakt-Steckdose der Installation frei zugänglich ist. Zur vollständigen Netztrennung muß der Netzstecker gezogen werden.
- Beachten Sie beim Verkabeln die Reihenfolge, wie im Handbuch beschrieben. Verwenden Sie nur Kabel, die den Spezifikationen in diesem Handbuch genügen oder original mitgeliefert wurden. Falls Sie andere Kabel verwenden, übernimmt BinTec Communications AG für auftretende Schäden oder Beeinträchtigung der Funktionalität keine Haftung. Die Gerätegaranie erlischt in diesen Fällen.
- Beachten Sie beim Anschluß des Geräts die Hinweise im Handbuch.
- Verlegen Sie Leitungen so, daß sie keine Gefahrenquelle (Stolpergefahr) bilden und nicht beschädigt werden.
- Schließen Sie Datenübertragungsleitungen während eines Gewitters weder an noch ziehen Sie sie ab oder berühren Sie diese.

Bestimmungsgemäße Verwendung, Betrieb

- **X4000** ist für den Einsatz in einer Büroumgebung bestimmt. Als Multiprotokoll-Router baut **X4000** in Abhängigkeit von der Systemkonfiguration WAN-Verbindungen auf. Um ungewollte Gebühren zu vermeiden, sollten Sie das Produkt unbedingt überwachen.

- **X4000** entspricht den einschlägigen Sicherheitsbestimmungen für Einrichtungen der Informationstechnik für den Einsatz in einer Büroumgebung.
- Der bestimmungsgemäße Betrieb gemäß IEC 950/EN 60950 des Systems ist nur bei komplett montiertem Blechgehäuse gewährleistet (Kühlung, Brandschutz, Funkentstörung).
- Die Umgebungstemperatur darf 50 °C nicht übersteigen. Vermeiden Sie direkte Sonneneinstrahlung.
- Achten Sie darauf, daß keine Gegenstände (z. B. Büroklammern) oder Flüssigkeiten ins Innere des Geräts gelangen (elektrischer Schlag, Kurzschluß). Achten Sie auf ausreichende Kühlung.
- **X4000** enthält keine Bauteile, die vom Benutzer getauscht werden dürfen oder Schalter/Jumper, die der Benutzer einstellen muß.
- Unterbrechen Sie in Notfällen (z. B. beschädigtes Gehäuse oder Bedienelement, Eindringen von Flüssigkeit oder Fremdkörpern) sofort die Stromversorgung und verständigen Sie den Service.

Reinigung und Reparatur

- Das Gerät darf nur von einer BinTec-autorisierten Servicestelle geöffnet werden. Vor Öffnen des Geräts unbedingt den Netzstecker ziehen. Durch unbefugtes Öffnen und unsachgemäße Reparaturen können erhebliche Gefahren für den Benutzer entstehen (z. B. Stromschlag). Lassen Sie Reparaturen am Gerät nur von einer BinTec-autorisierten Servicestelle durchführen. Wo sich die Servicestelle befindet, erfahren Sie von Ihrem Händler. In allen anderen Fällen erlöschen jegliche Garantieansprüche.
- Das Gerät darf auf keinen Fall naß gereinigt werden. Durch eindringendes Wasser können erhebliche Gefahren für den Benutzer (z. B. Stromschlag) und erhebliche Schäden am Gerät entstehen.
- Niemals Scheuermittel, alkalische Reinigungsmittel, scharfe oder scheuernde Hilfsmittel benutzen.

Yleiset turvallisuusmääräykset

Seuraavista kappaleista löydät turvallisuusmääräykset, joita on ehdottomasti noudatettava reittivalitsinta käytettäessä.

Kuljetus ja varastointi

- Kuljeta ja varastoi **X4000** vain alkuperäispakkauksessaan tai muussa sopivassa pakkauksessa, joka suojaa töytäisyiltä ja iskuilta.

Asennus ja käyttöönotto

- Tarkista ennen **X4000** -laitteen asennusta ja käyttöä, että ympäristöolosuhteista annettuja ohjeita (kts. lukua Tekniset tiedot) on noudatettu. Aseta laite tukevalle, tasaiselle alustalle.
- Sähköstaattiset varaukset voivat johtaa laitteen vioittumisen. Pidä siksi ranteen ympärillä maadoitettua ranneketta tai kosketa maadoitettua pintaa, ennen kuin kosket **X4000**:n liittimiä tai laajennuskortteja. Kosketa laajennuskortteja periaatteessa vain reunoista äläkä tartu rakenneosiin tai johdinratoihin.
- Pidä käyttämättömät laajennuskorttipaikat suojuksilla suljettuina, jotta mitkään esineet eivät voi joutua laitteen sisälle. Jos laitteessa on käytön aikana vieraita esineitä, siitä aiheutuu sähköisku- ja oikosulkuvaara.
- Huolehdi siitä, että mitkään terävät esineet eivät vahingoita näyttömodulin ikkunaa. Suojaa näytömoduli iskuja ja putoamista vastaan. Liitä se vain **X4000**:n tähän tarkoitukseen varattuun RJ11-liittimeen **X4000**:n ja näyttömodulin vaurioitumisen välttämiseksi.
- Huomaa kaapeloitaessa, että laitteen tuuletusraot eivät peity ja tuuletus ei esty. **X4000**:n tuuletuksen estyessä laitteeseen voi syntyä vaurioita. Puutteellisesta tuuletuksesta aiheuneet vauriot johtavat takuun raukeamiseen.
- Älä avaa peruslaitetta äläkä muuntele verkkolaitetta mitenkään, sillä siitä aiheutuu sähköisku- ja hengenvaara. Älä poista yhtää kiinnitysruuvia peruslaitteesta.
- Kun laite tuodaan kylmästä ympäristöstä käyttötiloihin, sen ulko- sekä sisäpinnoille voi syntyä kastetta. Odota, että laitteen lämpötila on asettunut ja laite on ehdottoman kuiva, ennen kuin otat sen käyttöön. Huomioi ympäristövaatimukset, jotka on esitetty teknisissä tiedoissa.
- Tarkista, vastaako paikallinen verkkojännite verkkolaitteen nimellisjännitteitä. Laitetta saa käyttää seuraavissa olosuhteissa:

- 100 - 240 VAC
- 50 - 60 Hz

- Varmista, että suko-pistorasia on asennusta varten vapaasti tavoitettavissa. Verkkopistoke on vedettävä pistorasiasta laitteen irrottamiseksi täydellisesti verkosta.
- Huomaa kaapeloitaessa käsikirjassa kuvailtu järjestys. Käytä vain kaapelia, joka vastaa tämän käsikirjan spesifikaatioita tai joka toimitettiin alunperin laitteen mukana. Jos käytät toista kaapelia, BinTec Communications AG ei ota vastuuta vahingoista tai toiminnan huonontumisesta. Tällaisissa tapauksissa laitetakuu raukeaa.
- Noudata laitetta liittäessäsi käsikirjan ohjeita.
- Vedä kaapelit sellaisiin paikkoihin, että ne eivät aiheuta vaaratilanteita (kompastumisia) eivätkä vahingoitu.
- Älä liitä, irrota tai kosketa tiedonsiirtokaapeleita ukonilman aikana.

Määräystenmukainen käyttö, käyttö

- **X4000** on tarkoitettu käytettäväksi toimistoympäristössä. **X4000** on moniprotokollareititin, jonka avulla voidaan luoda järjestelmäkonfiguraatiosta riippuen WAN-yhteyksiä. Jotta ei-toivotuilta maksuilta vältytään, laitetta tulee ehdottomasti valvoa.
- **X4000** vastaa toimistotiloissa käytettäville tietotekniikan laitteistoille asetettuja asiaankuuluvia turvallisuusmääräyksiä.
- Järjestelmän IEC 950/EN 60950 mukainen käyttö on taattu ainoastaan, mikäli peltikotelo on asennettu täydellisesti (jäähdytys,palosuoja, kipinäsuoja).
- Ympäristön lämpötila ei saa nousta yli 50 °C:een. Vältä suoraa auringonpaistetta.
- Varo, ettei mitään vieraita esineitä (esim. paperiliittimiä) tai nesteitä pääse laitteen sisäpuolelle (sähköisku, lyhytsulku). Huolehdi siitä, että laitteen jäähdytys on riittävä.
- **X4000** :ssa ei ole mitää rakenneosia, jotka täytyy vaihtaa. Laitteessa ei ole myöskään kytkimiä tai jumppereita, jotka käyttäjän täytyy säätää.

- Keskeytä hätätilanteessa (esim. särkynyt kotelo tai käyttölaite, nesteen tai vieraiden esineiden joutuminen laitteen sisään) virransyöttö välittömästi ja ota yhteyttä huoltopalveluun.

Puhdistus ja korjaus

- Vain BinTec:in valtuuttama huoltokorjaamo saa avata laitteen. Verkkopistoke on ehdottomasti vedettävä seinästä ennen laitteen aukaisemista. Asiaton aukaiseminen ja asiantuntemattomat korjaukset voivat aiheuttaa käyttäjälle huomattavia vaaroja (esim. sähköisku). Anna vain BinTec:in valtuuttaman huoltokorjaamon korjata laitetta. Huoltokorjaamoa koskevia tietoja saat laitemyyjältäsi. Muissa tapauksissa kaikkinaiset takuuvaatimukset evätään.
- Älä missään tapauksessa puhdista laitetta runsaalla vedellä. Sen sisään tunkeutunut vesi saattaisi aiheuttaa vakavia vaaroja (esim. sähköisku) käyttäjälle ja vaurioittaa laitetta pahasti.
- Älä koskaan käytä puhdistamiseen hankausaineita, alkalisia puhdistusaineita taikka syövyttäviä tai hankaavia tehoaineita.

Consignes de sécurité générales en français

Vous trouverez, dans les paragraphes suivants, les consignes de sécurité que vous devez absolument respecter lors de l'utilisation de votre router.

Transport et entreposage

- Transportez et entreposez **X4000** uniquement dans son emballage d'origine ou un autre emballage approprié lui garantissant une bonne protection contre les chocs et les coups.

Installation et mise en service

- Avant de procéder à l'installation et à la mise en service de **X4000**, veuillez vous référer aux indications concernant les conditions d'environnement (cf. Caractéristiques techniques). Utilisez un support stable et plat.
- Des charges électrostatiques peuvent endommager l'appareil. Il est donc important que vous portiez un bracelet antistatique ou que vous touchiez une surface mise à la terre avant de saisir des prises ou des cartes d'extension de **X4000**. Il est impératif de ne saisir les cartes d'extension que par les bords et de ne pas toucher aux composants ni aux circuits conducteurs .
- Refermez les emplacements des cartes d'extension non utilisées avec des caches borgnes de manière à ce que rien ne puisse pénétrer à l'intérieur de l'appareil. Si des objets se trouvent dans l'appareil en fonctionnement, il y a risque d'électrocution et de court-circuit.
- Veillez à ce qu'aucun objet pointu n'endommage la fenêtre du module d'affichage. Protégez le module d'affichage contre les chocs et les chutes ; ne le raccordez qu'à la prise RJ11 **X4000** prévue à cet effet, afin d'éviter tout dommage du **X4000** et du module d'affichage.
- Lors du câblage, veillez à ne pas recouvrir les fentes d'aération de l'appareil de manière à ne pas entraver la ventilaton. Le droit à la garantie est annulé lorsque les dommages résultent d'une ventilation insuffisante.
- N'ouvrez pas l'appareil de base et n'effectuez aucune manipulation sur le bloc d'alimentation, sous risque de danger de mort par électrocution. Ne retirez aucune vis de fixation sur l'appareil de base.
- Si l'appareil est transporté dans une pièce où la température est plus élevée que l'endroit d'où il provient, de la condensation risque de se former à l'extérieur comme à l'intérieur de l'appareil. Avant de mettre votre appareil

en service, attendez qu'il soit à la même température que la pièce et qu'il soit absolument sec. Veuillez respecter les indications concernant les conditions d'environnement (cf. Caractéristiques techniques).

- Vérifiez si la tension secteur locale correspond aux tensions nominales du bloc d'alimentation. L'appareil ne devra fonctionner que dans les conditions ci-après :
  – 100 - 240 Vca
  – 50 - 60 Hz
- Vérifiez si la prise de courant de sécurité pour l'installation est librement accessible. Il faut retirer la fiche de contact pour garantir la déconnexion du secteur.
- Lors du câblage, respectez les étapes indiquées dans le manuel. N'utilisez que les câbles correspondants aux spécifications indiquées dans ce manuel ou les câbles d'origine joints à la livraison. Dans le cas où vous utiliseriez d'autres câbles que ces derniers, la société BinTec Communications AG décline toute responsabilité pour des dommages éventuels ou pour tout défaut de fonctionnement pouvant en résulter. Dans de tels cas, la garantie s'annule.
- Pour le raccordement de l'appareil, respectez les indications du manuel.
- Posez les câbles de telle sorte qu'ils ne puissent pas être à l'origine de risques (risques de trébuchement) ou être endommagés.
- Pendant un orage, ne connectez pas les lignes de transmission des données, ne les débranchez pas et ne les touchez pas.

Utilisation conforme, fonctionnement

- **X4000** est conçu pour l'utilisation dans les bureaux. En tant que router multi-protocoles, **X4000** établit les connexions WAN en fonction de la configuration existante. Pour éviter des frais de taxation indésirables, il est impératif de placer ce produit sous contrôle.
- **X4000** est conforme aux prescriptions de sécurité relatives aux équipements de la technique de l'information pour l'utilisation dans les bureaux.

- Le fonctionnement de ce système conformément aux normes CEI 950/ EN 60950 ne peut être garanti que si le boîtier métallique est monté au complet (refroidissement, protections anti-incendie et antiparasite).
- La température ambiante ne doit pas dépasser 50 °C. Evitez le rayonnement direct du soleil sur l'appareil.
- Veillez à ce qu'aucun objet (des agrafes par ex.) ni aucun liquide ne s'introduise à l'intérieur de l'appareil (risque d'électrocution ou de court-circuit). Veillez à ce que l'appareil ait suffisamment refroidi.
- **X4000** ne contient aucun composant devant être remplacé par l'utilisateur et aucun commutateur/fil volant ayant besoin d'être réglé.
- Dans les cas d'urgence extrême (si le boîtier ou des éléments de commande sont endommagés, lorsque du liquide ou des corps étrangers se sont introduits dans l'appareil, par ex.), déconnectez immédiatement l'alimentation en courant et contactez le service après-vente.

Nettoyage et réparations

- L'appareil doit être ouvert uniquement par un point de service après-vente agréé par BinTec. Il est impératif de retirer la fiche secteur avant d'ouvrir l'appareil. L'ouverture non autorisée de l'appareil ainsi que des réparations non conformes exposent l'utilisateur à des risques graves (risque d'électrocution par ex.). Les réparations ne doivent être exécutées que un point de service après-vente agréé par BinTec. Votre concessionnaire vous fera part de l'adresse à laquelle vous pourrez contacter le service après-vente. Tout autre cas annule le droit à la garantie.
- L'appareil ne doit être en aucun cas nettoyé à l'eau. Une pénétration d'eau dans l'appareil pourrait entraîner des risques graves pour l'opérateur (risque d'électrocution par ex.) et des dommages importants de l'appareil.
- Ne jamais utiliser de produits récurants, de produits de nettoyage alcalins, ni d'outils tranchants ou grattants.

ÃåíéêÝò ïäçãßåò áóöáëåßáò óôá Åëëçíéêü

Στις ακόλουθες παραγράφους θα βρείτε τις οδηγίες ασφαλείας, τις οποίες θα πρέπει να λάβετε οπωσδήποτε υπ' όψιν σας κατά τη χρήση του Router.

Μεταφορά και αποθήκευση

- Να μεταφέρετε και να αποθηκεύετε το **X4000** μόνο στη γνήσια συσκευασία ή σε μία άλλη κατάλληλη συσκευασία, η οποία να εξασφαλίζει προστασία από τις κρούσεις και τα χτυπήματα.

Εγκατάσταση και έναρξη της λειτουργίας

- Πριν την εγκατάσταση και την έναρξη της λειτουργίας του **X4000** να λάβετε υπ' όψιν σας τις οδηγίες σχετικά με τις συνθήκες περιβάλλοντος (βλέπε Τεχνικά στοιχεία). Χρησιμοποιήστε ένα σταθερό και επίπεδο υπόβαθρο.
- Ηλεκτροστατικά φορτία μπορούν να προκαλέσουν βλάβη στη συσκευή. Γι αυτό, πριν έρθετε σε επαφή με τις υποδοχές ή της πλατίνες αναβάθμισης του **X4000** θα πρέπει να φοράτε ένα αντιστατικό μανικέτι γύρω από το χέρι σας ή να αγγίζετε μία γειωμένη επιφάνεια. Αγγίζετε τις πλατίνες αναβάθμισης μόνο στις άκρες και μη πιάνετε καλώδια η εξαρτήματα.
- Να διατηρείτε κλειστές τις μη χρησιμοποιημένες υποδοχές αναβάθμισης με το τυφλό κάλυμμα, ώστε να μην μπορούν να εισέλθουν αντικείμενα στο εσωτερικό της συσκευής. Αν κατά την διάρκεια της λειτουργίας υπάρχουν μέσα στην συσκευή ξένα αντικείμενα υπάρχει κίνδυνος ηλεκτροπληξίας και βραχυκυκλώματος.
- Να προσέχετε ώστε η οθόνη της μονάδας ενδείξεων να μην υποστεί ζημιές από αιχμηρά αντικείμενα. Να προστατεύετε την μονάδα ενδείξεων από χτυπήματα και πτώσεις και να την συνδέετε μόνον στην προβλεπόμενη υποδοχή RJ11 του **X4000**, για να αποφύγετε τις ζημιές στο **X4000** και στην μονάδα ενδείξεων.
- Κατά την καλωδίωση προσέξτε ώστε να μην καλύπτονται οι σχισμές εξαερισμού της συσκευής και να μην εμποδίζεται ο αερισμός. Από τον μειωμένο αερισμό του **X4000** μπορούν να προκληθούν ζημιές στην συσκευή. Οι βλάβες που προκύπτουν από ελλιπή αερισμό συνεπάγονται την απώλεια της εγγύσης.

- Μη ανοίγετε τη βασική συσκευή και μην κάνετε μετατροπές στον ρευματολήπτη, διότι υπάρχει κίνδυνος θάνατος απο ηλεκτροπληξία. Μη βγάζετε της βίδες στερέωσης της βασικής συσκευής.
- Όταν η συσκευή μεταφέρεται από ψυχρό περιβάλλον στον χώρο λειτουργίας μπορεί να παρουσιασθεί τήξη τόσο στο εξωτερικό όσο και στο εσωτερικό της συσκευής. Πριν την θέσετε σε λειτουργία περιμένετε μέχρι που η συσκευή να αποκτήσει την ίδια θερμοκρασία και να είναι τελείως στεγνή. Προσέξτε τις συνθήκες περιβάλλοντος στο Τεχνικά στοιχεία.
- Εξετάστε αν η τάση του τοπικού ηλεκτρικού δικτύου συμφωνεί με την ονομαστική τάση του ρευματολήπτη. Η λειτουργία της συσκευής επιτρέπεται μόνο με τις ακόλουθες προϋποθέσεις:
  - 100 - 240 VAC
  - 50 - 60 Hz
- Βεβαιωθείτε πως η πρίζα σούκο της εγκατάστασης είναι προσιτή. Για την πλήρη αποσύνδεση από το ρεύμα πρέπει να βγάζετε το φις από την πρίζα.Κατά την καλωδίωση προσέξτε την σειρά που περιγράφεται στο εγχειρίδιο. Να χρησιμοποιείτε μόνον καλώδια που πληρούν τα χαρακτηριστικά στο εγχειρίδιο ή τα γνήσια που παραλάβατε. Αν χρησιμοποιείτε άλλα καλώδια, τότε η BinTec Communications AG δεν αναλαμβάνει καμία ευθύνη για ζημιές ή βλάβες στην λειτουργικότητα. Σε αυτές τις περιπτώσεις παύει να ισχύει η εγγύηση της συσκευής.
- Κατά την σύνδεση της συσκευή λάβετε υπόψη σας τις υποδείξεις στο εγχειρίδιο.
- Διαστρώστε τα καλώδια κατά τέτοιον τρόπο, ώστε να μην προκύψουν σημεία κινδύνου (κίνδυνος παραπατήματος) και ώστε να μη μπορούν να υποστούν ζημιά.
- Κατά την διάρκεια μιας καταιγίδας ούτε να συνδέετε ούτε να βγάζετε τα καλώδια μεταφοράς δεδομένων, ούτε να τα ακουμπάτε.

Προβλεπόμενη χρήση, λειτουργία

- Το **X4000** προορίζεται για χρήση σε περιβάλλον γραφείου. Σαν Router πολλαπλών πρωτοκόλλων (Multi-Protokoll) το **X4000** σε εξάρτηση από την διαμόρφωση του συστήματος δημιουργεί συνδέσεις WAN.

Για να αποφύγετε πρόσθετα τέλη θα πρέπει οπωσδήποτε να επιτηρείτε την συσκευή.

- Το **X4000** ανταποκρίνεται στις σχετικές διατάξεις ασφαλείας για εγκαταστάσεις τεχνολογίας πληροφοριών κατά τη χρήση σε περιβάλλον γραφείου.
- Η καθορισμένη λειτουργία του συστήματος σύμφωνα με το IEC950/ EN60950 διασφαλίζεται μόνο με εγκαταστημένο περικάλυμμα (ψύξη, ασφάλεια πυρκαγιάς, εξάλειψη παρασίτων).
- Η θερμοκρασία περιβάλλοντος δεν επιτρέπεται να υπερβαίνει τους 50 °C. Αποφύγετε την έκθεση σε άμεση ηλιακή ακτινοβολία.
- Να προσέχετε, ώστε να μην εισέλθουν αντικείμενα (π.χ. συνδετήρες) ή υγρά στο εσωτερικό της συσκευής (κίνδυνος ηλεκτροπληξίας, βραχυκυκλώματος). Θα πρέπει να εξασφαλίζεται η επαρκής ψύξη.
- Το **X4000** δεν περιλαμβάνει εξαρτήματα που μπορούν να αντικατασταθούν από τον χρήστη ούτε διακόπτες ή Jumper, που πρέπει να ρυθμίσει ο χρήστης.
- Σε έκτακτες περιπτώσεις (π.χ. όταν έχει προκληθεί βλάβη στο κέλυφος ή στη μονάδα χειρισμού ή όταν έχουν εισέλθει υγρά ή αντικείμενα) να διακόπτετε αμέσως την παροχή ρεύματος και να έρχεστε σε επαφή με το κατάλληλο συνεργείο.

Καθαρισμός και επισκευή

- Η συσκευή επιτρέπεται να ανοιχτεί μόνον από συνεργεία που έχουν εξουσιοδοτηθεί από την BinTec. Πριν το άνοιγμα της συσκευής θα πρέπει οπωσδήποτε να βγάλετε τον ρευματολήπτη. Αναρμόδιο άνοιγμα και λανθασμένη επισκευή της συσκευής προκαλεί μεγάλο κίνδυνο για τον χρήστη (Ηλεκτροπληξία). Συνιστάται η επισκευή της συσκευής να γίνεται μόνο στο σέρβις του BinTec. Που υπάρχει σέρβις κοντά σας το μαθαίνετε απο τον έμπορο σας. Σε κάθε άλλη περίπτωση χάνεται κάθε δικαίωμα αξίωσης αποζημιώσεων.
- Η συσκευή δεν επιτρέπεται σε καμία περίπτωση να καθαριστεί. Από την ενδεχόμενη είσοδο νερού μπορεί να προκύψουν σημαντικοί κίνδυνοι για το χρήστη (π.χ. ηλεκτροπληξία) και σοβαρές ζημιές στη συσκευή.

- Να μη χρησιμοποιείτε ποτέ συρμάτινα σφουγγαράκια και αιχμηρά ή αδρά βοηθητικά μέσα καθαρισμού.

Istruzioni generali di sicurezza

Nei seguenti paragrafi si trovano elencate le istruzioni generali di sicurezza da osservare rigorosamente nell'uso del Router.

Trasporto e immagazzinaggio

- Trasportare ed immagazzinare **X4000** soltanto nell'imballaggio originale o in altro imballaggio adeguato a garantire protezione da urti e colpi.

Installazione e azionamento

- Prima di installare ed usare **X4000** fare attenzione alle istruzioni sulle condizioni ambientali (cfr. Dati tecnici). Utilizzare un ripiano stabile e piano.
- Le cariche elettrostatiche possono provocare danni all'apparecchio. Indossare quindi un polsino elettrostatico o toccare una superficie collegata a terra prima di afferrare prese o schede di espansione di **X4000**. Tenere sempre le schede di espansione soltanto per i bordi e non toccare gli elementi costruttivi né le guide per i conduttori.
- Proteggere lo slot per la scheda di espansione non utilizzato con la copertura, per evitare che penetrino oggetti nell'apparecchio. Se nell'apparecchio ci sono corpi estranei durante il funzionamento, sussiste pericolo di scosse elettriche e di corto circuito.
- Fare in modo che nessun oggetto appuntito possa danneggiare la finestra del modulo di visualizzazione. Proteggere il modulo di visualizzazione da urti e cadute e collegarlo soltanto all'apposito attacco RJ11 di **X4000** , per evitare danni a **X4000** e al modulo stesso.
- Durante il collegamento dei cavi occorre accertarsi che le fessure di ventilazione dell'apparecchio non vengano coperte e che la ventilazione non sia ostacolata. L'impedimento della ventilazione di **X4000** può danneggiare l'apparecchio. Danni provocati dalla carenza di ventilazione causano la perdita del diritto di garanzia.
- Non aprire l'apparecchio base e non effettuare alcuna modifica sull'alimentatore, poiché sussiste pericolo di morte causata da scosse elettriche. Non rimuovere le viti di fissaggio dell'apparecchio base.
- Quando l'apparecchio viene trasferito da un ambiente freddo nel locale di esercizio, l'involucro esterno e l'interno dell'apparecchio possono presentare tracce di condensazione. Attendere finché l'apparecchio ha superato lo sbalzo di temperatura ed è assolutamente asciutto, prima di

metterlo in funzione. Attenersi alle condizioni ambientali riportate nei dati tecnici

- Verificare se la tensione di rete locale corrisponde alle tensioni nominali dell'alimentatore. L'apparecchio deve essere impiegato alle seguenti condizioni:
  - 100 - 240 V c. a.
  - 50 - 60 Hz
- Accertarsi che la presa con contatto di terra dell'installazione sia accessibile. Per la completa separazione dell'apparecchio dalla rete di alimentazione è necessario estrarre la spina.
- Per il cablaggio si deve seguire la sequenza descritta nel manuale. Utilizzare soltanto i cavi rispondenti alle specifiche riportate in questo manuale o quelli originali forniti in dotazione. Se si utilizzano altri cavi, la BinTec Communications AG non risponde dei danni o della riduzione di funzionalità che ne risultano. In questi casi decade la garanzia per l'apparecchio.
- Per il collegamento dell'apparecchio ci si deve attenere alle istruzioni del manuale.
- Disporre i collegamenti in modo che non costituiscano fonte di pericolo (pericolo d'inciampo) e che non possano essere danneggiati.
- Non collegare né disconnettere, né toccare i cavi di trasferimento dati durante un temporale.

Utilizzazione conforme alla destinazione, funzionamento

- **X4000** è concepito per l'impiego negli uffici. Come Router per reti multiprotocollo **X4000** stabilisce collegamenti WAN in rapporto alla configurazione del sistema. Per evitare canoni indesiderati, si consiglia di controllare assolutamente il prodotto.
- **X4000** è conforme alle relative disposizioni di sicurezza per impianti della tecnica informatica impiegati in ambiente d'ufficio.
- Il funzionamento regolamentare del sistema secondo le disposizioni IEC950/EN60950 è garantito (raffreddamento, protezione antincendio, schermatura contro radiodisturbi) solo se è completamente montato l'involucro di lamiera.

- La temperatura ambiente non deve superare 50 °C. Non esporre l'apparecchio all'azione diretta dei raggi solari.
- Fare attenzione che nessun oggetto (p. es. fermagli) o liquido penetri all'interno dell'apparecchio (scossa elettrica, corto circuito). Provvedere ad un sufficiente raffreddamento.
- **X4000** non contiene elementi costruttivi che possono essere sostituiti dall'utente né interruttori/ponticelli che devono essere regolati dal cliente.
- In casi d'emergenza (p. es. danneggiamento dell'involucro o dell'elemento di comando, infiltrazione di liquido o di corpi estranei) staccare immediatamente la corrente ed informare il servizio assistenza.

Pulizia e riparazione

- L'apparecchio deve essere aperto soltanto da un centro di assistenza BinTec autorizzato. Prima di aprire l'apparecchio estrarre assolutamente la spina di alimentazione. L'apertura da parte di personale non autorizzato e riparazioni non corrette possono esporre l'utilizzatore a notevoli pericoli (p. e. scossa elettrica). Affidare l'esecuzione delle riparazioni all'apparecchio soltanto ad un centro di assistenza BinTec autorizzato. Il rivenditore di fiducia può fornire informazioni sulle sedi di questi centri. In tutti gli altri casi decade ogni diritto alla garanzia.
- L'apparecchio non deve assolutamente essere pulito con acqua. L'infiltrazione di acqua può causare gravi pericoli per l'utente (p. es. scossa elettrica) nonché gravi danni all'apparecchio.
- Non utilizzare in nessun caso abrasivi, detergenti a base alcalina, attrezzatura affilata o abrasiva.

Algemene veiligheidsinstructies in het Nederlands

In de volgende paragrafen vindt u veiligheidsinstructies, die u bij de omgang met uw router absoluut moet in acht nemen.

Transport en bewaring

- Transporteer en bewaar **X4000** alleen in de originele verpakking of in een andere geschikte verpakking, die bescherming biedt tegen schokken en stoten.

Opstellen en in bedrijf nemen

- Let voor het opstellen en het bedrijf van **X4000** op de instructies voor de omgevingsvoorwaarden (vergelijk technische gegevens). Gebruik een harde en vlakke ondergrond.
- Elektrostatische opladingen kunnen schade aan het toestel veroorzaken. Draag daarom een geaarde manchet rond de pols of raak een geaard oppervlak aan vooraleer u de bussen of uitbreidingskaarten van **X4000** aanraakt. Raak de uitbreidingskaarten enkel aan de randen aan en neem geen componenten of conductoren vast.
- De uitbreidingsslots die niet gebruikt worden met de blinde afdekking gesloten houden, zodat er geen voorwerpen in het inwendige deel van het toestel terecht kunnen komen. Als er zich tijdens het gebruik vreemde voorwerpen in het toestel bevinden, dan bestaat er gevaar voor stroomstoten en kortsluiting.
- Zorg ervoor dat het displayvenster van de displaymodule niet door scherpe voorwerpen beschadigd wordt. Beveilig de displaymodule tegen het stoten en vallen en sluit de module enkel aan de daarvoor bestemde RJ11-bus van **X4000** aan om schade aan de **X4000** en de displaymodule te vermijden.
- Zorg er bij de bedrading voor dat de ventilatie-openingen van het toestel niet afgedekt worden en de ventilatie niet gehinderd wordt. Door het hinderen van de ventilatie van de **X4000** kan het toestel beschadigd worden. We kunnen geen garantie geven voor schade die veroorzaakt werd door een gebrekkige ventilatie.
- Het basistoestel nooit openen en nooit manipuleren aan het netdeel omdat er anders gevaar voor stroomstoten bestaat. Geen schroeven van de bevestiging van het basistoestel verwijderen.

- Als het toestel vanuit een koude omgeving in de bedrijfsruimte gebracht wordt, kan er aan de buiten- en binnenkant van het toestel condensatie optreden. Wacht tot uw toestel zich aan de temperatuur heeft aangepast en helemaal droog is vooraleer u het in gebruik neemt. Neem de milieuvoorschriften in de technische gegevens in acht.
- Ga na of de plaatselijke netspanning overeenstemt met de nominale spanningen van het netdeel. Het toestel mag onder de volgende voorwaarden gebruikt worden:
  – 100 - 240 VAC
  – 50 - 60 Hz
- Zorg ervoor dat de veiligheidscontactdoos van de installatie vrij toegankelijk is. Om het toestel helemaal van het net te scheiden moet de netstekker uitgetrokken worden.
- Let bij de aansluiting van de kabels op de volgorde, zoals in het handboek wordt beschreven. Gebruik enkel kabels die aan de specificaties in dit handboek voldoen of die meegeleverd werden. Indien u andere kabels gebruikt, is BinTec Communications AG niet aansprakelijk voor mogelijke schade of het slecht functioneren van het toestel. In dit geval vervalt de garantie.
- Bij de aansluiting van het toestel de voorschriften in de handleiding in acht nemen.
- Leg de kabels zodanig, dat zij geen gevaarsbron (struikelgevaar) vormen en niet worden beschadigd.
- Tijdens een onweer de datatransmissielijnen niet aansluiten, uittrekken of aanraken.

Doelmatig gebruik, bedrijf

- **X4000** is enkel voor het gebruik in een bureau-omgeving geschikt. Als multi-protocol-router bouwt **X4000** afhankelijk van de systeemconfiguratie WAN-verbindingen op. Om ongewenste kosten te vermijden, moet het product absoluut gecontroleerd worden.
- **X4000** voldoet aan de gebruikelijke veiligheidsbepalingen voor inrichtingen van informatietechniek voor toepassing in een kantooromgeving.

- De reglementaire werking volgens IEC950/EN60950 van het systeem is alleen gegarandeerd bij een volledig gemonteerde blikken omhulling (koeling, brandbeveiliging, ontstoring.
- De omgevingstemperatuur mag niet hoger zijn dan 50 °C. Vermijd direct zonlicht.
- Let erop, dat er geen voorwerpen (bijv. paperclips) of vloeistoffen in het inwendige van het apparaat geraken (elektrische schok, kortsluiting). Let op voldoende koeling.
- **X4000** bevat geen modules die door de gebruiker vervangen mogen worden of schakelaars/jumpers die de gebruiker moet instellen.
- Onderbreek in noodgevallen (bijv. beschadigd huis, of bedienelement, binnendringen van vloeistof of vreemde voorwerpen) onmiddellijk de stroomverzorging en neemt u contact op met de service-dienst.

Reiniging en reparatie

- Het toestel mag alleen door een door BinTec geautoriseerde servicedienst geopend worden. Voor het openen van het toestel in elk geval de netstekker uittrekken. Door onbevoegd openen en ondeskundige reparaties kan er groot gevaar voor de gebruiker ontstaan. (b. v. stroomstoten). Reparaties aan het toestel enkel door een door BinTec geautoriseerde servicedienst laten uitvoeren. Waar zich deze servicedienst bevindt, weet uw handelaar. In alle andere gevallen vervalt de aanspraak op garantie.
- Het apparaat mag in geen geval nat worden gereinigd. Door binnendringend water kunnen er aanzienlijke gevaren ontstaan voor de gebruiker (bijv. elektrische schok) en kan er aanzienlijke schade ontstaan aan het apparaat.
- Gebruik nooit schuurmiddelen, alkalische reinigingsmiddelen, scherpe of schurende hulpmiddelen.

Generelle sikkerhetshenvisninger på norsk

I de følgende avsnittene finner du sikkerhetshenvisninger som du absolutt må ta hensyn til ved omgangen med din router.

Transport og lagring

- Du må kun transportere og lagre **X4000** i originalemballasjen eller i en annen egnet emballasje som beskytter mot støt og slag.

Oppstilling og ibruktaking

- Før oppstilling og drift av **X4000** må du ta hensyn til henvisningene når det gjelder omgivelsesbetingelsene (sml. tekniske data). Bruk et fast og jevnt underlag.
- Elektrostatisk oppladning kan føre til skader på apparatet. Bruk derfor en jordet mansjett rundt håndleddet eller berør en jordet flate før du berører kontakter eller utvidelseskort på **X4000**. Utvidelseskortene skal prinsipielt kun gripes i kantene, ta ikke på komponenter eller lederbaner.
- Hold utvidelses-stikkplassene som ikke er i bruk stengt med blinddekselet, slik at ingen gjenstander kan komme inn i apparatets indre. Hvis det finnes uvedkommende gjenstander i apparatet under drift, er det fare for elektrisk støt og kortslutning.
- Pass på at ikke spisse gjenstander forårsaker skader på displaymodulens displayvindu. Utsett ikke displaymodulen for støt eller fall, og kople den kun til den hertil tiltenkte RJ11-kontakt på **X4000**, slik at du unngår skader på **X4000** og displaymodulen.
- Under tilkoplingen må du passe på at apparatets ventilasjonsåpninger ikke blir tildekket og at ventilasjonen ikke blir hindret. Ved nedsatt ventilasjon av **X4000** kan det oppstå skader på apparatet. Skader som oppstår på grunn av manglende ventilasjon fører til tap av garantien.
- Åpne ikke basisapparatet og utfør ingen manipulasjoner på nettdelen, ettersom det i så fall er livsfare på grunn av elektrisk støt. Fjern ingen festeskruer på basisapparatet.
- Dersom apparatet blir tatt fra en kald omgivelse og inn i rommet der det skal brukes, kan det oppstå kondens både på utsiden og på innsiden av apparatet. Vent til routeren har tilpasset seg temperaturen og er helt tørr før du tar den i bruk.

- Kontroller at nettspenningen på stedet er identisk med nettdelens merkespenning. Apparatet kan tas i drift under følgende betingelser:
  – 100 - 240 VAC
  – 50 - 60 Hz
- Kontroller at det er fri tilgang til installasjonens jordete stikkontakt. Nettstøpselet må trekkes ut for at apparatet skal være fullstendig frakoplet nettet.
- Følg den rekkefølgen som er beskrevet i håndboken under tilkopling. Bruk kun kabler som svarer til spesifikasjonene i denne håndboken eller som fulgte med i original i leveringen. Hvis du bruker andre kabler, påtar seg BinTec Communications AG intet ansvar for eventuelle skader eller nedsatt funksjonalitet. Garantien på apparatet oppheves i slike tilfeller.
- Følg instruksene i håndboken under tilkoplingen av apparatet.
- Legg opp ledningene slik at de ikke kan bli skadet og at de ikke danner farekilder (fare for å snuble).
- I tordenvær må du verken tilkople dataoverføringsledningene eller frakople eller berøre dem.

Forskriftsmessig bruk, drift

- **X4000** er beregnet på bruk i et kontorlandskap. I egenskap av multiprotokoll-router bygger **X4000** opp WAN-forbindelser, avhengig av systemkonfigurasjonen. Det er tvingende nødvendig å overvåke produktet for å unngå utilsiktede gebyrer..
- **X4000** oppfyller gjeldende sikkerhetsbestemmelser for innretninger innen informasjonsteknikk for bruk i kontorlanskapp.
- Forskriftsmessig bruk IEC950/EN60950 av systemet er kun gitt ved komplett montert metalldeksel (kjøling, brannbeskyttelse, radio-støydempning).
- Omgivelsestemperaturen må ikke overskride 50 °C. Unngå direkte sollys.
- Pass på at ingen gjenstander (f. eks. binders) eller væsker kan komme inn i apparatet (fare for elektrisk støt, kortslutning). Pass på tilstrekkelig avkjøling.
- **X4000** inneholder ingen komponenter som kan byttes ut av brukeren, eller brytere/jumpere som brukeren må innstille.

- I nødstilfeller (f.eks. skadet hus eller betjenings-elementer, når væske eller fremmedlegemer er kommet inn) må du straks bryte strømforsyningen og tilkalle service.

Rengjøring og reparasjon

- Apparatet skal kun åpnes av et BinTec-autorisert serviceverksted. Trekk ut nettstøpselet før apparatet åpnes. Ved uautorisert åpning og usakkyndige reparasjoner kan det oppstå alvorlige risikoer for brukeren (f. eks. fare for elektrisk støt). Se til at reparasjoner på apparatet kun utføres av et BinTec-autorisert serviceverksted. Din forhandler kan fortelle deg hvor nærmeste serviceverksted er. I alle andre tilfeller tapes garantien.
- Apparatet må under ingen omstendighet rengjøres med vann. Dersom vann trenger inn, kan det oppstå alvorlige risikoer for brukeren (f. eks. elektrisk støt) og alvorlige skader på apparatet.
- Bruk aldri skuremidler, alkaliske rengjøringsmidler, skarpe eller skurende hjelpemidler.

Considerações genéricas em matéria de segurança em português

Nos parágrafos que se seguem, encontra considerações em matéria de segurança que terá de respeitar estritamente ao lidar com o Router.

Transporte e armazenamento

- Transporte e armazene o **X4000** apenas na embalagem original ou noutra adequada para o efeito que o proteja contra embates fortes e pancadas.

Instalação e colocação em funcionamento

- Antes de proceder à instalação e à colocação em funcionamento do **X4000** tenha em conta as indicações relativas às condições ambientais (cf. Dados técnicos). Utilize uma base consistente e lisa.
- As cargas electrostáticas podem causar danos nos aparelhos. Por conseguinte, use um punho de ligação terra à volta do pulso ou então toque numa superfície ligada à terra antes de mexer nas tomadas ou placas de expansão do **X4000** . Toque apenas nos bordos das placas de expansão e não toque nos componentes ou circuitos impressos.
- Mantenha a slot de expansão não utilizada fechada com a cobertura cega, de modo a que não possa entrar qualquer objecto no interior do aparelho. Se, durante o funcionamento, houver algum objecto estranho dentro do aparelho, existe perigo de choque eléctrico e de curto-circuito.
- Tenha cuidado para que nenhum objecto pontiagudo danifique a janela do módulo de display. Para evitar danos no **X4000** e no módulo de display, proteja o módulo de display contra embates fortes e quedas e conecte o mesmo à tomada RJ11 do **X4000** destinada a esse fim.
- Durante a cablagem, tenha atenção para que as ranhuras de ventilação do aparelho não fiquem tapadas e a ventilação não seja obstruída. A obstrução da ventilação do **X4000** pode causar danos no aparelho. Os danos causados por uma ventilação insuficiente têm como consequência a perda da garantia.
- Não abra o aparelho base, nem mexa no equipamento de alimentação de rede, uma vez que existe perigo de morte devido a choque eléctrico. Não retire quaisquer parafusos de fixação do aparelho base.
- Quando o aparelho é deslocado de um local frio para o local de funcionamento, poderá haver formação de condensação tanto no exterior como no interior do aparelho. Aguarde até o aparelho se encontrar à

temperatura ambiente e completamente seco antes de o colocar em funcionamento. Tenha em atenção as indicações relativas às condições ambientais nos Dados técnicos.

- Verifique se a tensão de rede local corresponde às tensões nominais do equipamento de alimentação de rede. O aparelho pode ser operado nas seguintes condições:
  – 100 - 240 VAC
  – 50 - 60 Hz
- Certifique-se de que a tomada de contacto de segurança da instalação está acessível. Para desligar completamente a corrente do aparelho, retire a ficha de rede.
- Ao proceder à cablagem, respeite a sequência tal como está descrita no manual. Utilize unicamente cabos que correspondam às especificações contidas neste manual ou cabos originais que tenham sido fornecidos. Se usar outros cabos, a BinTec Communications AG não se responsabiliza por danos daí decorrentes ou por limitações de funcionamento. Nestes casos, a garantia do aparelho é anulada.
- Aquando da conexão do aparelho, respeite as indicações constante do manual.
- Instale os cabos de maneira a não constituírem uma fonte de perigo (perigo de tropeçar) nem se danificarem.
- Em caso de trovoada, não ligue, retire ou toque nos cabos de transmissão de dados.

Utilização conforme com as especificações, Operação

- O **X4000** destina-se à utilização em escritórios. Como Router de protocolos múltiplos, o **X4000** constrói ligações WAN de acordo com a configuração do sistema. Para evitar custos indesejados, controle o produto.
- O **X4000** corresponde às normas de segurança habituais relativas a dispositivos de informática para utilização em escritórios.
- Só é possível assegurar o funcionamento adequado do sistema em conformidade com IEC950/EN60950 se a caixa de chapa estiver completamente montada (refrigeração, protecção contra incêndio, supressão de interferências).

- A temperatura ambiente não pode exceder os 50 °C. Evite expor o aparelho à luz solar directa.
- Tenha o cuidado de não deixar entrar objectos (por ex. clipes) ou líquidos para o interior do aparelho (choque eléctrico, curto-circuito). Verifique se a refrigeração é suficiente.
- O **X4000** não contém componentes que possam ser substituídos pelo utilizador ou interruptores/conectores que o utilizador tenha de regular.
- Em caso de emergência (por ex. caixa ou elemento de comando danificado, entrada de líquido ou de corpos estranhos), interrompa imediatamente a alimentação de corrente e recorra ao serviço de assistência técnica.

Limpeza e reparação

- O aparelho só pode ser aberto num serviço de assistência técnica BinTec autorizado. Antes de abrir o aparelho é indispensável retirar a ficha de rede. A abertura não autorizada e as reparações inadequadas podem representar riscos graves para o utilizador (por ex. choque eléctrico). Mande efectuar as reparações do aparelho apenas nos serviços de assistência técnica BinTec autorizados. O seu fornecedor indicar-lhe-á a localização dos referidos serviços. Caso contrário, perderá todos os direitos de garantia.
- O aparelho nunca pode ser limpo a húmido. A infiltração de água pode constituir perigo para o utilizador (por ex. choque eléctrico) e danos de monta no aparelho.
- Nunca utilizar abrasivos, produtos de limpeza alcalinos, objectos afiados ou que risquem.

Ogólne zasady bezpieczeństwa w języku polskim

Poniżej podano zasady bezpieczeństwa, których należy bezwzględnie przestrzegać przy obchodzeniu się z routerem.

Transport i magazynowanie

- Urządzenie **X4000** należy transportować i magazynować wyłącznie w opakowaniu oryginalnym lub innym nadającym się do tego celu opakowaniu, zapewniającym ochronę przed obiciami i uderzeniami.

Ustawianie i uruchamianie

- Przed ustawieniem i uruchomieniem urządzenia **X4000** należy zastosować się do wskazówek dotyczących warunków otoczenia (por. Parametry techniczne). Urządzenie należy ustawić na trwałym i równym podłożu.
- Elektrostatyczna różnica potencjałów może doprowadzić do uszkodzenia urządzenia. Przed przystąpieniem do pracy należy założyć na przegub ręki antyelektrostatyczną opaskę zabezpieczającą lub dotknąć uziemionej powierzchni zanim dojdzie do kontaktu dłoni z puszkami lub kartami rozszerzenia **X4000** Karty poszerzające chwytać zawsze na obrzeżach; nie dotykać bezpośrednio ścieżek drukowanych oraz elementów elektronicznych.
- Nie używane pole do dodatkowych wcisków zamknąć zaślepkami zabezpieczającymi które zapobiegają dostaniu się do wnętrza niepożądanych przedmiotów. Obecność obcych elementów w urządzeniu w czasie jego eksploatacji stanowi zagrożenie porażenia prądem lub prowadzi do spięcia elektrycznego.
- Zwrócić szczególną uwagę aby okienko displaya (pola wyświetlającego) w module displaya nie zostało uszkodzone ostrymi przedmiotami. Należy chronić moduł displaya przed uderzeniami i upadkiem i zamykać w do tego celu przeznaczonej puszce RJ11**X4000**, aby nie dopuścić do szkód na **X4000** i module displaya.
- Okablowanie powinno być tak prowadzone, żeby szczeliny wentylacyjne i otwory w obudowie nie zostały przysłonięte i w konsekwencji nie doszło do zakłócenia właściwego chłodzenia urządzenia. Niewystarczające przewietrzanie **X4000**może doprowadzić do awarii urządzenia. Uszkodzenia wynikające z niedostatecznej wentylacji mogą wiązać się z utratą reklamacji.

- Otwieranie urządzenia głównego i dokonywanie manipulacji w części przewodowej jest niedozwolone i grozi śmiertelnym porażeniem prądem. Zabronione jest odkręcanie śrub mocujących z urządzenia głównego.
- W momencie przemieszczenia urządzenia z zimnego otoczenia do pomieszczenia eksploatacyjnego, może wystąpić pokrycie parą zarówno części zewnętrznych jak i wewnętrznych. Należy odczekać aż urządzenie przejmie nową temperaturę i całkowicie wyschnie, dopiero wtedy możliwa jest jego eksploatacja. Należy przestrzegać warunków środowiskowych opisanych w danych technicznych urządzenia.
- Konieczne jest sprawdzenie zgodności napięcia sieci zasilającej z napięciem znamionowym zasilacza prądowego. Urządzenie może być eksploatowane pod następującymi warunkami:
  - 100 - 240 VAC
  - 50 - 60 Hz
- Należy upewnić się, czy gniazdko kontaktu bezpieczeństwa instalacji elektrycznej jest łatwo dostępne. Aby przerwać w pełni zasilanie prądem, wtyczka musi być wyciągnięta z gniazdka.
- Przy przyłączaniu przewodów należy przestrzegać kolejności opisanej w instrukcji obsługi. Należy używać tylko takich kabli których specyfikacje odpowiadają danym z niniejszej instrukcji obsługi lub też są dostarczone wraz z urządzeniem. W przypadku zastosowania innych przewodów firma BinTec Communications AG nie ponosi odpowiedzialności za poniesione szkody. Tym samym umowa gwarancyjna staje się nieaktualna.
- Podczas podłączania urządzenia do sieci należy przestrzegać wskazówek zawartych w instrukcji obsługi.
- Przewody należy ułożyć tak, aby nie występowało niebezpieczeństwo potykania się o nie oraz ich uszkadzania.
- Podczas burzy nie wolno podłanczać przewodów przenoszenia danych, ani też dotykać ich lub wyłanczać.

Zgodne z przeznaczeniem stosowanie, eksploatacja

- **X4000** przeznaczona jest do pracy w otoczeniu biurowym. Jako Multi-Protokoll-Router buduje **X4000** niezależnie od konfiguracji systemowej połączenia WAN. Aby zapobiec nieprzewidzianym opłatom, powinno się go strzec.

- Urządzenie **X4000** spełnia obowiązujące zasady bezpieczeństwa dla urządzeń informatycznych przeznaczonych do stosowania w otoczeniu biurowym.
- Zgodna z przeznaczeniem eksploatacja systemu zgodnie z IEC950/EN60950 jest zagwarantowana tylko w przypadku kompletnie zamontowanej obudowy blaszanej (chłodzenie, ochrona przeciwpożarowa, eliminacja zakłóceń w eterze).
- Temperatura otoczenia nie powinna przekraczać 50°C. Należy unikać bezpośredniego działania promieni słonecznych.
- Należy uważać, aby do wnętrza urządzenia nie wnikały żadnego rodzaju przedmioty (np. spinacze biurowe) bądź ciecze (udar prądowy, zwarcia). Zapewnić wystarczające chłodzenia urządzenia.
- **X4000**nie zawiera żadnych części budowy które musiałyby być wymieniane przez użytkownika, nie zawiera też żadnych przełączników czy też innych elementów które trzeba ustawiać.
- W sytuacjach awaryjnych (np. uszkodzona obudowa lub element obsługi, wniknięcie cieczy bądź ciał obcych) należy natychmiast przerwać zasilanie urządzenia prądem elektrycznym i zawiadomić serwis.

Oczyszczanie i naprawa

- Urządzenie może być otwarte tylko przez fachowca z autoryzowanego serwisu BinTec. Przed otwarciem urządzenia koniecznie wyjąć wtyczkę z gniazdka sieciowego. Otwarcie przez osoby nieupoważnione i niefachowo przeprowadzone naprawy mogą pociągnąć za sobą powstanie poważnych zagrożeń dla użytkownika (np.porażenie prądem). Naprawy mogą być wykonywane tylko przez autoryzowany serwis naprawczy BinTec. Adresy warsztatów serwisowych można uzyskać w placówkach handlowych. W pozostałych przypadkach wszelkie umowy gwarancyjne będą uznane za nieważne.
- Urządzenia pod żadnym pozorem nie wolno czyścić na mokro. Dostanie się wody do wnętrza urządzenia może wywoływać poważne zagrożenia dla użytkownika (np. porażenie prądem) oraz poważne uszkodzenia produktu.
- Nigdy nie stosować środków do szorowania, zasadowych środków czyszczących, ostrych lub szorujących środków pomocniczych.

Instrucciones generales de seguridad

En los párrafos siguientes encontrará unas instrucciones de seguridad. Es imprescindible tener las mismas en cuenta a la hora de manejar su router.

Transporte y almacenamiento

- Transporte y almacene su **X4000** únicamente en su embalaje original o en otro embalaje adecuado que garantice su protección contra golpes y choques.

Colocación y puesta en servicio

- Antes de la colocación y puesta en servicio de **X4000**, observe las instrucciones acerca de las condiciones ambientales (ver "Datos técnicos"). Utilice una superficie firme y plana.
- Las cargas electrostáticas pueden ocasionar daños en los aparatos. Por ello, lleve un puño puesto a tierra alrededor de la muñeca o entre en contacto con una superficie puesta a tierra antes de tocar hembrillas o tarjetas de expansión de **X4000**. Toque las tarjetas de expansión sólo en los bordes y no entre en contacto con componentes ni con redes de circuitos impresos.
- Mantenga cerrada la ranura de expansión con la cubierta ciega para que no pueda penetrar ningún objeto en el interior del aparato. Si durante el servicio hubiera dentro algún objeto extraño, se correría peligro de electrocución y de cortocircuito.
- Preste atención a que ningún objeto afilado dañe la ventana de display del módulo de display. Proteja este módulo frente a golpes y caída y conéctelo únicamente a la hembrilla RJ11 prevista en **X4000** a fin de evitar daños en **X4000** y en el módulo de display.
- Al instalar los cables, preste atención a no cubrir las rendijas de ventilación del aparato para no impedir la ventilación. Si la ventilación de **X4000** resultase afectada, podrían ocasionar daños en el aparato. Los daños producidos a causa de una ventilación insuficiente conllevan la pérdida de garantía.
- No abra el aparato base, ni manipule de ningún modo el bloque de alimentación, ya que en caso contrario se corre peligro de muerte por electrocución. No retire ninguno de los tornillos de fijación del aparato base.
- Si el aparato proviene de un ambiente frío, al introducirlo en el local de trabajo se puede producir deshielo tanto en su exterior como en su interior.

Por ello, antes de ponerlo en funcionamiento espere a que su temperatura se haya igualado y a que esté totalmente seco. Preste atención a las condiciones medioambientales expuestas en el apartado de Datos Técnicos.

- Asegúrese de que la tensión de la red local coincida con las tensiones nominales del bloque de alimentación. El aparato puede funcionar bajo las siguientes condiciones:
  - 100 - 240 VCA
  - 50 - 60 Hz
- Asegúrese de que no quede obstaculizado el acceso a la caja de enchufe con puesta a tierra de la instalación. Para desconectar totalmente el aparato de la red es necesario desenchufar el enchufe de la red.
- Al instalar los cables respete el orden descrito en el manual. Utilice únicamente cables que cumplan las especificaciones expuestas en este manual o que hayan venido incluidos en el volumen de suministro. Si utiliza otros cables, BinTec Communications AG no se hará responsable en el caso de que se produzcan daños o una merma en el funcionamiento. En estos casos la garantía pierde su validez.
- Al conectar el aparato, respete las indicaciones dadas en el manual.
- Coloque los cables de manera que no constituyan un peligro (tropezones) y no puedan ser deteriorados.
- Durante una tormenta, no enchufe ni desenchufe los conductos de transmisión de datos, ni los toque.

Utilización prevista, servicio

- **X4000** está concebido para ser utilizado en oficinas. Como router multiprotocolo, **X4000** establece conexiones WAN dependiendo de la configuración del sistema. Para evitar que se produzcan gastos de conexiones indeseadas, es absolutamente necesario vigilar el producto.
- **X4000** corresponde a las disposiciones de seguridad pertinentes para equipos informáticos utilizados en oficinas y despachos.
- El servicio correspondiente al destino según IEC 950/EN 60950 del sistema está sólo asegurado al estar montada completamente la caja de chapa (refrigeración, protección contra incendios, antiparasitaje).

- La temperatura ambiente no debe ser superior a los 50 °C. Evite que el aparato quede expuesto a la luz solar directa.
- Procure que ningún objeto (p. ej. clips) o líquido entre en el interior del aparato (descargas eléctricas, cortocircuitos) y que exista una refrigeración suficiente.
- El usuario de **X4000** no puede cambiar ningún componente, ni debe ajustar ningún interruptor/puente.
- En casos de emergencia (p. ej. caja o elemento de mando deteriorados, penetración de líquidos o de cuerpos extraños), interrumpa inmediatamente la alimentación de energía y avise al servicio técnico.

Limpieza y reparación

- Sólo personal de un servicio técnico autorizado por Bin Tec puede abrir el aparato. Antes de abrirlo, es imprescindible desconectar el enchufe de la red. Si se abre de forma no autorizada o las reparaciones no se efectúan como es debido, esto puede suponer riesgos considerables para el usuario (p. ej., electrocución). Por ello, encargue siempre los trabajos de reparación a un servicio técnico autorizado por BinTec, cuya dirección se la proporcionará su distribuidor. De otro modo, perderá todo el derecho de garantía.
- En ningún caso, el aparato debe limpiarse en húmedo. Al penetrar agua, puede existir un peligro considerable para el usuario (p. ej., descargas eléctricas) y pueden producirse daños considerables en el aparato.
- No utilizar jamás productos abrasivos, detergentes alcalinos, ni instrumentos afilados o abrasivos.

Allmänna säkerhetsanvisningar på svenska

Beakta alltid nedanstående säkerhetsanvisningar för användning av apparaten.

Transport och förvaring

- **X4000** får endast transporteras och förvaras i originalförpackningen eller i en annan likvärdig förpackning som ger ett fullvärdigt skydd mot stötar och slag.

Installation och start

- Beakta uppgifterna om omgivningsförhållanden (se Tekniska data) innan **X4000** installeras och startas. Installera den på ett stabilt och jämnt underlag.
- Elektrostatisk uppladdning kan förorsaka skador på apparaten. Bär därför en antistatisk manschett runt handleden, eller rör alltid vid en jordad yta innan Du vidrör uttag/kontakter eller utbyggnadskort till **X4000**. Tag endast på utbyggnadskortens kanter, vidrör aldrig ledningarna och komponenterna.
- Täck över en ej använd utbyggnadsinsticksplats med täckskivan så att inga främmande föremål kan komma in i apparaten. Risk för strömstötar och kortslutning om främmande föremål finns i apparaten under drift.
- Säkerställ att displaymodulens displayfönster inte kan skadas av några spetsiga föremål. Installera displaymodulen så att den inte kan falla ned resp utsättas för stötar och slag. Anslut den endast till härför avsett RJ11-uttag **X4000** , annars kan **X4000** och displaymodulen ta skada.
- Säkerställ, under kabeldragningen, att apparatens ventilationsslitsar inte täcks över och att ventilationen inte påverkas. En reducerad ventilationseffekt kan medföra skador på **X4000**. Tillverkaren övertar inget garantiansvar för skador som uppstår p g a bristfällig ventilation.
- Öppna inte basenheten, utför inga som helst förändringar på nätdelen; risk för strömstötar, livsfara. Tag inte bort några montageskruvar från basenheten.
- Om enheten flyttas från en kall till en varm omgivning kan det bildas kondensvatten på och i apparaten. Tag apparaten i drift först när den har nått rumstemperatur och har torkat helt. Beakta uppgifterna över omgivningsförhållanden i Tekniska data.

- Kontrollera att spänningen på plats överensstämmer med nätdelens märkspänning. Under följande villkor får apparaten användas:
  – 100 - 240 VAC
  – 50 - 60 Hz
- Säkerställ att det jordade vägguttaget alltid är fritt tillgängligt. För separering från nätet måste nätkontakten dras ut.
- Utför kabeldragningen i den ordningsföljd som anges i handboken. Använd endast medlevererade originalkablar eller kablar som överensstämmer med specifikationerna i denna handbok. BinTec Communications AG påtar sig inget ansvar för eventuella skador eller brister på apparaten om den används tillsammans med andra kablar. I detta fall gäller inte garantin längre.
- Beakta anvisningarna i handboken vid anslutning av apparaten.
- Drag kablarna så att de inte kan utgöra någon fara (de får inte ligga så att man kan snubbla över dem) och så att de inte kan skadas.
- Dataöverföringskabeln får inte anslutas, dras ut eller vidröras under ett åskväder.

Ändamålsenlig användning, drift

- **X4000** är avsedd för användning i kontorslokaler. **X4000** är en multi-protokoll-router som, beroende på systemkonfiguration, upprättar WAN-förbindelser. Produkten bör övervakas så att inte onödiga kostnader uppstår.
- **X4000** uppfyller kraven i alla relevanta säkerhetsbestämmelser för informationsteknikutrustning i kontorslokaler.
- Ändamålsenlig användning av systemet enligt IEC 950/EN 60950 säkerställs endast om plåthöljet är komplett monterat (kylning, brandskydd, radioavstörning).
- Omgivningstemperaturen bör inte vara högre än 50°C . Undvik direkt solljus.
- Säkerställ att det inte kan komma in några föremål (t ex häftklammer) eller någon vätska i apparaten (strömstötar, kortslutning). Sörj för fullgod kylning.

- **X4000** har inga komponenter som användaren kan byta ut, och inga kontakter/jumpers som måste ställas in.
- Koppla genast ifrån strömförsörjningen i nödsituationer (t ex skadat hölje eller skadade manöverelement, eller om vätska eller främmande föremål har kommit in i apparaten) och tag kontakt med serviceavdelningen.

Rengöring och reparation:

- Apparaten får endast öppnas av en av BinTEc auktoriserad serviceverkstad. Drag alltid ut nätkontakten innan apparaten öppnas. Obehörigt öppnande resp ej sakkunniga reparationer på apparaten kan medföra fara för användaren (t ex elektriska stötar). Reparationer får bara utföras av en av BinTec auktoriserad serviceverkstad. Återförsäljaren tillhandahåller information om närmaste serviceverkstad. I annat fall upphör garantiansvaret att gälla.
- Apparaten får aldrig våtrengöras. Vatten som kommer i enheten kan medföra fara för användaren (t ex elektriska stötar) och förorsaka skador på apparaten.
- Använd inget skurpulver, inga alkaliska rengöringsmedel, använd inga vassa resp repande hjälpmedel.

Genel güvenlik bilgileri türkçe

Müteakip bölümlerde cihazınızı kullanırken mutlaka dikkat etmeniz gereken genel güvenlik bilgilerini bulabilirsiniz.

Taşıma ve Depolama

- **X4000** cihazı sadece orjinal ambalajı içinde veya çarpmaya ve darbeye karşı koruyan uygun başka bir ambalajla taşıyıp depolayınız.

Kurulması ve Çalıştırılması

- **X4000** cihazını kurup çalıştırmadan önce çevre koşulları hakkındaki bilgileri dikkate alınız (bak. Teknik Bilgiler). Sağlam ve düz bir altlık kullanınız.
- Elektrostatik yüklenmeler cihazın zarar görmesine neden olabilir. Bu yüzden el bileğinize antistatik bir manşet takınız veya **X4000** cihazının soketleri ve modüllerine dokunmadan önce, topraklı bir yüzeye dokununuz. Modülleri yalnız kenarlarından tutunuz, yapı parçalarına veya hatlara dokunmayınız.
- Cihazın içine yabancı cisimlerin girmesini engellemek için kullanılamayan modül soketlerini körtapalarla kapatınız. Kullanım esnasında cihazın içinde yabancı cisimler bulunuyorsa, elektrik çarpması ve elektrik bağlantılarının kısa devre yapma tehlikesi bulunmaktadır.
- Sivri aletlerin display modülünün display penceresine zarar vermemesine dikkat ediniz. Display modülünü çarpma ve düşmeden koruyunuz ayrıca **X4000** cihazına ve display modülüne zarar gelmemesi için, sadece bunun için ön görülmüs olan **X4000** cihazının RTJ11 soketine bağlayınız.
- Kabloları yerleştirirken, cihazın havalandırma deliklerinin kapanmamasına ve havalandırmanın engellenmemesine dikkat ediniz. **X4000** cihazının havalandırması engellendiği takdirde cihaza zarar gelebilir. Yetersiz havalandırmanın yol açtığı zararlar, cihazın garanti hakkının kaybına sebeb verir.
- Ana cihazı kesinlikle açmayınız ve elektrik çarpması sonucunda hayati tehlike bulunduğundan, elektrik kablosunda hiçbir işlem yapmayınız. Ana cihazdan tespit vidalarını sökmeyiniz.
- Cihaz, çalıştırılacağı odaya soğuk bir ortamdan getirilmiş ise, cihazın dışında ve içinde çiylenme olabilir. Cihazınızı çalıştırmadan önce

tamamen kurumasını ve oda sıcaklığına uyum sağlamasını bekleyiniz. Teknik Bilgiler'deki çevre koşullarını dikkate alınız.

- Yerel şebeke geriliminin, şebeke parçasının nominal gerilimine uygun olup olmadığını kontrol ediniz. Cihaz, aşağıdaki koşullar doğrultusunda çalıştırılabilir:
  - 100 - 240 VAC
  - 50 - 60 Hz
- Koruyucu kontak prizinin montaj için rahatlıkla ulaşılabilecek durumda olmasını sağlayınız. Şebekeden tamam kopmak için, elektrik fişinin prizden çekilmeşi gerekir.
- Kabloları takarken el kitapcığındaki sıralamaya dikkat ediniz. Sadece el kitapcığında belirtilen verilere uygun veya cihazla birlikte gönderilen kabloları kullanınız. Başka kablo kullandığınız takdirde, BinTec Communications AG meydana gelen hasar veya fonksiyonlardaki olumsuz etkilerden dolayı sorumluluk üstlenmez. Bu durumlarda garanti hakkı ortadan kalkar.
- Cihazı bağlarken el kitapcığındaki açıklamalara dikkat ediniz.
- Kabloları, tehlike kaynağı olamayacak ve zarar görmeyecek şekilde (takılma tehlikesi) döşeyiniz.
- Fırtına esnasında veri iletişim hatlarını ne bağlayınız, ne çıkartınız, ne de bunlara dokununuz.

Belirlenmiş şekilde kullanım, işletim

- **X4000** cihazı büro ortamında kullanım için tasarlanmıştır. Multi-Protokol-Router olarak **X4000** cihazı sistem konfigurasyonuna bağlı olarak WAN-bağlantıları kurmaktadır. Istenmeyen masrafları önlemek için, ürünü mutlaka kontrol altında tutunuz.
- **X4000** cihazı, büro ortamında kullanılan enformasyon teknik donanımları için geçerli olan güvenlik talimatnamelerine kesinlikle uymaktadır.
- IEC 950/EN 60950 uyarınca, sistemin belirlenmiş şekilde kullanımı sadece saç kasnağı tamamiyle monte edildiğinde sağlanabilir (soğutma, yangın önleme, parazit giderme).
- Çevre sıcaklığı kesinlikle 50°C'yi geçmemeli. Cihazı direk gelen güneş ışınlarından koruyunuz.

- Cihazın içine yabancı cisimlerin (örneğin ataç) veya sıvıların girmesini önleyiniz (elektrik çarpması, kısa devre). Cihazın yeterli oranda soğutulmasına dikkat ediniz.
- **X4000** cihazında, kullanıcı tarafından değiştirilebilecek herhangi bir yapı elemanı veya kullanıcının ayarlaması gereken şalter/jumper bulunmamaktadır.
- Acil durumlarda (örneğin hasarlı cihaz kasası veya kullanım parçası, cihazın içine sıvı veya yabancı maddelerin girmesi) derhal elektrik akımını kesip servise haber veriniz.

Temizlik ve Tamir

- Cihaz sadece BinTec'in yetkili servisi tarafından açılabilir. Cihazı açmadan önce, mutlaka elektrik fişini prizden çekiniz. Müsaade edilen işlemler dışında açılması ve uygun olmayan şekilde tamir edilmesi, kullanıcı için büyük tehlikeler doğurabilir (örneğin elektrik çarpması). Cihazın tamiratını sadece BinTec yetkili servisi tarafından yaptırınız. Yetkili servis yerlerini nerede bulabileceğinizi satıcınızdan öğrenebilirsiniz. Diğer durumlarda garanti hakkı kaybolmaktadır.
- Cihazın su ile temizlenmesi kesinlikle yasaktır. Suyun cihaz içine kaçması, kullanıcı için büyük tehlikeler doğurabilir (örneğin elektrik çarpması) ve cihaza da ciddi zararlar verebilir.
- Kesinlikle temizleme tozları, alkalik temizlik maddeleri, keskin veya aşındırıcı yardımcı maddeler kullanmayınız.

Általános biztonsági útmutató

A következő fejezetekben olyan biztonsági útmutatásokat talál, amelyeket a készüléke alkalmazása során feltétlenül figyelembe kell vennie.

Szállítás és tárolás

- Az **X4000** csak az eredeti vagy egy más, arra alkalmas csomagolásban szállítandó és tárolandó, amely lökések és ütések ellen védelmet biztosít.

Felállítás és üzembe helyezés

- Az **X4000** felállítása és üzembe helyezése előtt vegye figyelembe a környezeti feltételekre vonatkozó utasításokat (v.ö. a műszaki adatokkal). A készüléket szilárd és sík alapon alkalmazza.
- Az elektrosztatikus töltések kisülése a berendezés meghibásodásához vezethet. Ezek megelőzése céljából viseljen földelt csuklópántot, vagy érintsen meg egy földelt felületet, mielőtt az **X4000** csatlakozóhüvelyeihez vagy bővítőkártyáihoz hozzáérne. A bővítőkártyákat mindig csak a szélükön érintse meg, sose érjen alkatrészekhez vagy vezető vonalakhoz.
- A nem használt slotokat mindig zárja le vakfedéllel, hogy ne kerülhessenek idegen tárgyak a készülék belsejébe. Amennyiben idegen tárgyak kerülnek a készülék belsejébe, áramütés és rövidzárlat veszélye áll fenn.
- Ügyeljen arra, hogy a displaymodul display-jét semmilyen hegyes tárgy ne sérthesse meg. Óvja a displaymodult lökésektől és leeséstől. A displaymodult csak az **X4000** erre kijelölt RJ11 csatlakozóhüvelyére csatlakoztassa, hogy az **X4000** készüléken és a displaymodulon emiatt keletkező meghibásodásokat elkerülje.
- A vezetékezésnél ügyeljen arra, hogy a készülék szellőzőnyílásai ne legyenek letakarva, a szellőzés zavartalanul működjék. A nem megfelelő szellőzés az **X4000** meghibásodásához vezethet. A nem megfelelő szellőzés miatt fellépő károk esetében garanciaigénye megszűnik.
- Ne nyissa ki a készülék burkolatát, és ne végezzen semmilyen átalakítást a tápegységen, mert ezáltal életveszélyes áramütés veszélye áll fenn. Ne távolítsa el a készülék rögzítő csavarjait.
- Ha a készülék hideg környezetből kerül az üzemeltetési helyére, akkor a készülék külsején és belsejében lecsapódhat a nedvesség. Az üzembe helyezés előtt várja meg, amíg a készülék el nem éri a szobahőmérsékletet,

és teljesen meg nem szárad. Vegye figyelembe a műszaki adatoknál megadott környezeti feltételeket.

- Ellenőrizze, hogy a helyi hálózati feszültség megegyezik-e a tápegység névleges feszültségével. A készülék az alábbi feltételek mellett üzemeltethető:
  – 100 - 240 VAC
  – 50 - 60 Hz
- Gondoskodjon róla, hogy a védőérintkezős csatlakozó aljzat a telepítésnél hozzáférhető legyen. A hálózatról való teljes leválasztáshoz húzza ki a hálózati csatlakozót.
- A vezetékezés során vegye figyelembe a kézikönyvben megadott sorrendet. Csak olyan vezetékeket alkalmazzon, amelyek a kézikönyvben megadott specifikációknak megfelelnek, vagy amelyek a készülék szállítási terjedelmében találhatók. Amennyiben más vezetékeket alkalmaz, az emiatt fellépő károkért vagy a működésben fellépő változásokért a BinTec Communications AG nem vállal felelősséget. Ebben az esetben megszűnik a garanciajogosultsága.
- Vegye figyelembe a készülék csatlakoztatásánál a kézikönyvben leírt ide vonatkozó utasításokat.
- A vezetékeket úgy fektesse le, hogy azok ne lehessenek veszélyek forrásai (botlásveszély), azokban pedig kár ne keletkezhessen.
- Az adatátvivő vezetékeket vihar esetében ne csatlakoztassa, ne húzza le, ne érintse meg.

Rendeltetésszerű alkalmazás, üzemeltetés

- Az **X4000** irodai környezetben való alkalmazásra készült. Az **X4000**, mint multi-protokoll-router, a rendszerkonfigurációtól függően a WAN-összeköttetésekre épül. A nem kívánt telefondíjak elkerülése végett, a terméket feltétlenül tartsa megfigyelés alatt.
- Az **X4000** megfelel az idevágó - irodai környezetben való használatra alkalmas információtechnikai berendezésekre vonatkozó - biztonsági előírásoknak.
- Az A rendszer rendeltetésszerű üzemeltetése az IEC 950/EN 60950 szabályzatnak megfelelően csak a teljesen összeszerelt fémburkolattal biztosítható (hűtés, tűzvédelem, zavarszűrés).

- A környezeti hőmérséklet nem haladhatja meg az 50 °C-t. Kerülje a közvetlen napsütést.
- Ügyeljen arra, hogy semmilyen tárgy (pl. gémkapocs) vagy folyadék ne kerülhessen a készülék belsejébe (áramütés, rövidzárlat). Ügyeljen a megfelelő hűtésre.
- Az **X4000** nem tartalmaz alkatrészeket, amelyeket a felhasználó kicserélhet, vagy kapcsolókat, jumpereket, amelyeket a felhasználónak kellene beállítania.
- Vészhelyzetben (pl. sérült burkolat vagy kezelőegység, folyadék vagy idegen test behatolása esetén) azonnal szakítsa meg az áramellátást, és értesítse a szervizt.

Tisztítás és javítás

- A készüléket csak a BinTec által feljogosított szervizek nyithatják fel. A készülék felnyitása előtt feltétlenül húzza ki a hálózati csatlakozót. A készülék jogtalan felnyitása és a helytelen javítás révén a felhasználó számára jelentős veszélyforrások keletkezhetnek (pl. áramütés). A készüléken szükséges javításokat ezért csak a BinTec által feljogosított szervizekkel végeztesse. A szervizek címét érdeklődje meg a szakkereskedőjénél. Ellenkező esetben a mindennemű garanciaigénye megszűnik.
- A készüléket semmi esetre sem szabad nedvesen tisztítani. A behatoló víz jelentős veszélyforrásokat jelenthet a felhasználó számára (pl. áramütés), és jelentős károkat okozhat a készüléken.
- Sohasem szabad súrolószereket, lúgos tisztítószereket, éles vagy karcoló segédeszközöket alkalmazni.

Všeobecné bezpečnostní pokyny

V následujících odstavcích jsou uvedeny bezpečnostní pokyny, které se při používání přístroje musí zásadně dodržovat.

Doprava a uskladnění

- **X4000** dopravujte a skladujte pouze v originálním obalu anebo v jiném vhodném obalu, který jej chrání proti nárazům.

Instalace a uvedení do provozu.

- Před instalací a provozem **X4000** přihlížejte k pokynům, které se týkají podmínek okolního prostředí (srovn. Technické údaje). Předpokládá se pevný a rovný podklad.
- Elektrostatické náboje mohou způsobit poškození přístroje. Použijte proto uzemněnou manžetu připevnenou kolem zápěstí anebo se nejprv dotkněte některé uzemněné plochy, než se budete dotýkat konektorových zásuvek nebo rozširujících desek **X4000**. Rozšiřovacích desek se zásadně dotýkejte pouze na okrajích a nesahejte na součásti nebo vodivé spoje.
- Uzavírejte nepoužívaný rozšiřovací slot záslepkou tak, aby do vnitřku přístroje nemohly vniknout cizí předměty. Pokud se během provozu v přístroji nacházejí cizí předměty, hrozí nebezpečí zasažení elektrickým proudem nebo zkratu.
- Dbejte na to, aby okno displeje u displejového modulu nebylo poškozeno ostrými, špičatými předměty. Chraňte displejový modul před poškozením nárazy a pádem a připojte jej pouze na příslušný konektor RJ11 u **X4000** , aby se zabránilo poškození **X4000** a displejového modulu.
- Při kabeláži dbejte na to, aby nedošlo k zakrytí větracích otvorů přístroje a aby nebyla omezována funkce větrání. V důsledku omezení větrání **X4000** by mohlo dojít k poškození přístroje. Škody vzniklé v důsledku nedostatečného větrání vedou ke ztrátě nároků z ručení.
- Neotevírejte základní přístroj a síťový zdroj nepodrobujte žádným manipulacím, jinak hrozí životní nebezpečí zasažením elektrickým proudem. Neodstraňujte žádné šrouby u upevnění základního přístroje.
- Pokud se přístroj přemístí z chladného prostředí do provozního prostoru, může se vyskytnout orosení jak na vnějších částech tak i uvnitř přístroje. Vyčkejte teplotní přizpůsobení přístroje a jeho absolutní vysušení, než jej

uvedete do provozu. Přihlížejte k podmínkám okolního prostředí uvedeným v Technických údajích.

- Kontrolujte, zda se napětí místní sítě shoduje s hodnotami jmenovitého napětí síťového zdroje. Přístroj lze provozovat za těchto podmínek:
  - 100 - 240 VAC
  - 50 - 60 Hz
- Postarejte se o to, aby zásuvka s ochranným kontaktem byla při instalaci volně přístupná. Pro úplné odpojení od sítě je třeba vytáhnout síťovou zástrčku.
- Při propojování dbejte na pořadí tak, jak je popsáno v příručce. Používejte pouze kabely, jež odpovídají specifikacím v této příručce anebo dodané originální kabely. Pokud použijete jiné kabely, odmítá BinTec Communications AG ručení za vzniklé škody nebo za omezenou funkčnost. Ručení za přístroj v těchto případech zaniká.
- Při připojování přístroje dbejte na pokyny uvedené v příručce.
- Vedení ukládejte tak, aby se nestala zdrojem nebezpečí (např. zakopnutím) a aby se nepoškodily.
- Během bouřky nepřipojujte vedení na přenos dat, neodpojujte je a ani se jich nedotýkejte.

Použití, provoz podle stanoveného účelu

- **X4000** je určen pro použití v kancelářském prostředí. Jako MultiProtocol Router sestavuje **X4000** v závislosti na systémové konfiguraci spojení WAN. Chcete-li zabránit účtování nežádoucích poplatků, měli byste výrobek bezpodmínečně hlídat.
- **X4000** odpovídá příslušným bezpečnostním předpisům pro zařízení informační techniky používaná v kancelářském prostředí.
- Provoz systému odpovídající stanovenému účelu podle IEC 950/EN 60950 je zaručen pouze při kompletní montáži plechového krytu (chlazení, protipožární ochrana, odrušení).
- Teplota okolí nesmí překročit 50 °C. Zabraňte přímému ozáření sluncem.

- Dbejte na to, aby do vnitřku přístroje nemohly vniknout žádné předměty (např. kancelářské svorky) anebo kapaliny (elektrický výboj, zkrat). Dbejte na dostatečné chlazení.
- **X4000** neobsahuje žádné součásti, které by uživatel směl vyměňovat, nebo spínače/propojky, které by uživatel musel nastavovat.
- V nouzových případech (např. poškozená skříň anebo ovládací prvek, vniknutí kapaliny nebo cizích těles) okamžitě přerušte přívod proudu a informujte servis.

Čištění aopravy

- Přístroj smí otvírat pouze autorizovaný servis firmy BinTec. Před otevřením se přístroj zásadně musí odpojit od sítě (vytáhnout zástrčku). Nepovolaným otevíráním a neodbornými opravami se uživatel vystavuje značnému ohrožení (např. zasažení elektrickým proudem). Provedením oprav přístroje pověřujte pouze autorizovaný servis firmy BinTec. Adresu servisu Vám sdělí Váš obchodník. Ve všech ostatních případech zanikají veškeré nároky ze záruky.
- Přístroj se zásadně nesmí čistit mokrým způsobem. Vnikající voda může uživatele vystavit značnému ohrožení (např. zasažení elektrickým proudem) a může způsobit značné poškození přístroje.
- Nikdy nepoužívejte prostředky na mechanické čištění, alkalické čisticí prostředky, agresivní a drhnoucí pomůcky.

Generelle sikkerhedsforskrifter på dansk

Nedenstående afsnit indeholder sikkerhedsforskrifter, som ubetinget skal overholdes ved brugen af apparatet.

Transport og opbevaring

- Transportér og opbevar kun **X4000** i originalemballage eller i anden egnet emballage, der beskytter mod stød og slag.

Opstilling og ibrugtagning

- Læs og overhold forskrifterne for de omgivende betingelser, før **X4000** opstilles og tages i brug (se Tekniske data). Brug et fast og jævnt underlag.
- Statisk elektricitet kan medføre apparatskader. Bær derfor en antistatisk manchet om håndleddet eller rør ved en flade med jordforbindelse, inden du rører ved stik eller udvidelseskort på **X4000**. Berør kun udvidelseskort i kanten og tag ikke fat om konstruktionsdele eller ledninger.
- Luk den ubenyttede udvidelsesmodulplads med blindafdækningen, så der ikke kan komme genstande ind i apparatets indre. Er der fremmede genstande i apparatet under driften, er der fare for elektriske stød og kortslutninger.
- Sørg for, at ingen spidse genstande beskadiger displaymodulets displayrude. Beskyt displaymodulet mod stød og fald og slut det kun til den dertil beregnede RJ11-bøsning på **X4000** for at undgå skader på **X4000** og displaymodulet.
- Ved ledningsføringen skal du sørge for, at apparatets udluftningsslidser ikke dækkes til og at der ikke skabes hindringer for ventilationen. Begrænsning af ventilationen for **X4000** kan medføre skader på apparatet. Skader, som skyldes manglende ventilation, dækkes ikke af garantien.
- Undlad at åbne basisapparatet og foretag ingen manipulationer med netdelen, da der ellers kan opstå livsfare ved elektrisk stød. Fjern ingen af basisapparatets fastgørelsesskruer.
- Hvis apparatet bringes fra kolde omgivelser ind i det rum, hvor det skal bruges, kan der opstå kondensvand både udvendigt og indvendigt på apparatet. Vent, indtil apparatet har tilpasset sig temperaturen og er absolut tørt, før du tager det i brug. Overhold omgivelsesbetingelserne i Tekniske data.

- Kontrollér, om den lokale netspænding stemmer overens med netdelens mærkespænding. Apparatet må anvendes under følgende betingelser:
  – 100 - 240 VAC
  – 50 - 60 Hz
- Kontrollér, at der er fri adgang til installationens jordede sikkerhedsstikkontakt. For at opnå fuld afbrydelse fra strømnettet skal netstikket trækkes ud.
- Følg den rækkefølge, der angives i denne håndbog, for tilslutningen af kablerne. Brug kun kabler som opfylder specifikationerne i denne håndbog eller de originale, medfølgede kabler. BinTec Communications AG hæfter ikke for evt. skader eller funktionsbegrænsninger ved brug af andre kabler. I sådanne tilfælde bortfalder apparatets garanti.
- Overhold henvisningerne i denne håndbog mht. apparatets tilslutning.
- Ledningerne skal trækkes på en sådan måde, at de ikke beskadiges og at de ikke er til fare for omgivelserne (fare for at snuble).
- Undlad at tilslutte eller trække datatransmissionsledninger ud af apparatet, når det er tordenvejr, og undlad at berøre dem.

Bestemmelsesmæssig anvendelse, brug

- **X4000** er beregnet til anvendelse i kontormiljø. Som multiprotokolrouter etablerer **X4000** WAN-forbindelser afhængigt af systemkonfigurationen. For at forebygge uønskede afgiftsbetalinger bør du ubetinget overvåge produktet.
- **X4000** opfylder de gældende sikkerhedsbestemmelser for informationsteknisk udstyr til kontorer.
- Bestemmelsesmæssig anvendelse af systemet iht. IEC_950/EN_60950, er kun sikret, når metalkabinettet er monteret komplet (køling, brandsikkerhed, radiostøjdæmpning).
- Omgivelsestemperaturen må ikke overstige 50 °C. Undgå direkte sollys.
- Sørg for, at genstande (f.eks. klips) eller væske ikke trænger ind i apparatet (elektrisk stød, kortslutning). Sørg for tilstrækkelig køling.
- **X4000** indeholder ingen komponenter, som må udskiftes af brugeren, eller kontakter/jumpere, som brugeren skal indstille.

- Afbryd straks strømforsyningen og kontakt serviceafdelingen i nødstilfælde (f.eks. beskadiget kabinet eller betjeningselement, indtrængning af væske eller fremmede genstande).

Rengøring og reparation

- Apparatet må kun åbnes af et BinTec-autoriseret serviceværksted. Træk altid netstikket ud, før apparatet åbnes. Uautoriseret åbning og ukorrekt udførte reparationer kan medføre betydelige farer for brugeren (f.eks. elektrisk stød). Lad kun et autoriseret BinTEC-serviceværksted udføre reparationer på apparatet. Din forhandler kan oplyse dig serviceværkstedets adresse. I alle andre tilfælde bortfalder enhver garanti.
- Apparatet må under ingen omstændigheder rengøres med væske. Indtrængende vand kan udsætte brugeren for alvorlige farer (f.eks. elektrisk stød) og forårsage alvorlige skader på apparatet.
- Benyt aldrig skuremidler, alkaliske rengøringsmidler, skrappe eller skurende hjælpemidler.

100Base-T Twisted pair connection, Fast Ethernet. Network connection for 100-Mbps networks.

10Base-T Twisted pair connection. Network connection for 10-Mbps networks with ➤➤ **RJ45** connector.

1TR6 D-channel protocol used in the German ISDN. Today the more common protocol is the ➤➤ **DSS1**.

Access list A rule that defines a set of packets that should or should not be transmitted by the router.

Accounting Recording of connection data, e.g. date, time, connection duration, charging information and number of data packets transferred.

ADSL Asymmetric ➤➤ **Digital Subscriber Line**

The data rate is up to 640 kbps ➤➤ **upstream** and 1.5 - 9 Mbps ➤➤ **downstream** over ranges of up to 5.5 km.

The main ADSL applications are: Internet access, video-on-demand (digital and compressed) and high-speed data communication over ➤➤ **POTS**.

ARP Address Resolution Protocol

ARP belongs to the ➤➤ **TCP/IP protocol family**. ARP resolves IP addresses into their corresponding ➤➤ **MAC addresses**.

Asynchronous transmission A method of data transmission in which the time intervals between transmitted characters can vary in length. This allows computers and peripheral devices to intercommunicate without being synchronized by clock signals. The beginning and end of the transmitted characters must be marked by start and stop bits – in contrast to ➤➤ **synchronous transmission**.

B-channel Control and signaling channel of the ➤➤ **ISDN Basic Rate Interface** or the ➤➤ **Primary Rate Interface** for transmission of traffic (voice, data). An ISDN Basic Rate Interface consists of two B-channels and one ➤➤ **D-channel**. A B-channel has a data transmission rate of 64 kbps.

The data transmission rate of an ISDN Basic Rate Interface with **X4000** can be increased to up to 128 kbps using ➤➤ **channel bundling**.

BOD Bandwidth on Demand

Bandwidth on Demand is an extended method of ➤➤ **channel bundling**, in which it is also possible to connect ➤➤ **dialup connections** to ➤➤ **leased lines** or to configure dialup connections as a backup facility for leased lines.

BootP Bootstrap protocol

Based on the ➤➤ **UDP** or ➤➤ **IP protocol**. Automatically assigns an ➤➤ **IP address**. DIME Tools contain a BootP server that you can start on your PC to assign the as yet unconfigured router an IP address.

Bridge Network components for connecting homogeneous networks. As opposed to a ➤➤ **router**, bridges operate at layer 2 (data link layer) of the ➤➤ **OSI model**, are independent of higher-level protocols and transmit data packets using ➤➤ **MAC addresses**. Data transmission is transparent, which means the information contained in the data packages is not interpreted.

Bridges are used to physically decouple networks and to reduce network data traffic. This is done by using filter functions that allow data packets to pass to certain network segments only.

Some BinTec routers can be operated in Bridging Mode.

Broadcast Broadcasts (data packages) are sent to all stations in a network in order to exchange information. Generally, there is a certain address (broadcast address) in the network that allows all stations to interpret a message as a broadcast.

Bus A data transmission medium for use by all the devices connected to a network. Data is forwarded over the entire bus and received by all devices on the bus.

Called Party Number Number of the terminal called.

Calling Party Number Number of the calling terminal.

CAPI Common ISDN Application Programming Interface

A software interface standardized in 1989 that allows application programs to access ISDN hardware from the PC. Most ISDN-specific software solutions (communications programs such as RVS-COM Lite) work with the CAPI interface. Such communications applications enable you, for example, to send and receive faxes or transfer data over the ISDN from your PC. See also ➤➤ **Remote CAPI**.

CCITT Consultative Committee for International Telegraphy and Telephony

A predecessor organization of the ➤➤ **ITU** that passed recommendations for the development of communications standards for public telephony and data networks and data transmission interfaces.

Channel bundling Channel bundling

One of **X4000**'s features. Channel bundling is a method of increasing the data throughput. The data throughput is doubled by switching in a second ➤➤ **B-channel** for data transmission. Channel bundling can be either dynamic (= on demand) or static (= always).

CHAP Challenge Handshake Authentication Protocol

A security mechanism during the establishment of a connection with a ➤➤ **WAN partner** using ➤➤ **PPP**. This protocol is used for checking the WAN partner name and the password defined for the WAN partner. If the partner name and password at both ends are not the same, a connection is not set up. The user name and password are encoded in CHAP before they are sent to the partner – as opposed to ➤➤ **PAP**.

CLID Calling Line Identification

A security mechanism during the establishment of a connection with a ➤➤ **WAN partner**. A caller is identified by means of his ISDN extension number before the connection is established. If the extension number is not the same as the extension number you have defined for a WAN partner, a connection is not established.

Client A client uses the services provided by a ➤➤ **server**. Clients are usually workstations.

Data compression A process for reducing the amount of data transmitted. This enables higher throughput to be achieved in the same transmission time. Examples of this technique include ➤➤ **STAC**, ➤➤ **VJHC** and ➤➤ **MPPC**.

Datagram A self-contained ➤➤ **data packet** that is forwarded in the network with minimum protocol overhead and without an acknowledgement mechanism.

Data packet A data packet is used for information transfer. Each data packet contains a prescribed number of characters (information and control characters).

DCE Data Circuit-Terminating Equipment

Data Circuit-Terminating Equipment (see ➤➤ **V.24**)

D-channel Control and signalling channel of the ➤➤ **ISDN Basic Rate Interface** or the ➤➤ **Primary Rate Interface**. The D-channel has a data transmission rate of 16 kbps. In addition to the D-channel, each ISDN BRI has two ➤➤ **B-channels**.

DCN Data communications network

Dialup connection A connection is set up when required by dialing an extension number, in contrast to a ➤➤ **leased line**.

Direct dialing range See ➤➤ **extension numbers range**

DHCP Dynamic Host Configuration Protocol

A Microsoft protocol that provides a mechanism for dynamic assignment of ➤➤ **IP addresses**. A DHCP server allocates each ➤➤ **client** in a network an IP address from a defined address pool compiled by the system administrator. Prerequisite: ➤➤ **TCP/IP** must be configured at the clients so that they can request their IP address from the server. **X4000** can be used as a DHCP server.

DIME Desktop Internetworking Management Environment

DIME Tools is a collection of tools for the configuration and monitoring of routers over Windows applications. They are included with all BinTec routers free of charge.

DNS Domain Name System

Each device in a ➤➤ **TCP/IP network** is usually located by its ➤➤ **IP address**. Because ➤➤ **host names** are often used in networks to reach different devices, it is necessary for the associated IP address to be known. This task can be performed by a Domain Name Server (DNS), which resolves the host names into IP addresses. Alternatively, name resolution can also take place over the HOSTS file, which is available on all PCs.

Domain A domain refers to a group of devices in a network, whose host names share a common suffix, the domain name. Thus, in the ➤➤ **Internet**, a part of a naming hierarchy (e.g. bintec.de).

Downstream Data transmission rate from the ➤➤ **Internet Service Provider** to the client.

DSL/xDSL Digital Subscriber Line

Data transmission technique that enables high transmission rates to be achieved on normal telephone lines.
The data rate is dependent on the distance to be covered and the quality of the line and therefore varies.

xDSL is used as a bookmark for the different DSL variants, such as ➤➤ **ADSL**, ➤➤ **RADSL**, ➤➤ **VDSL**, ➤➤ **HDSL**, ➤➤ **SDSL**, ➤➤ **U-ADSL**, etc., which are part of the family of DSL techniques.

DSS1 Digital Subscriber Signalling System.

A common D-channel protocol used in the Euro ISDN.

DTE Data Terminal Equipment

Data Terminal Equipment (see ➤➤ **V.24**)

DTMF Dual Tone Multi Frequency (tone dialing system)

Dialing method for telephony systems. In this method, pressing a key on the telephone keypad generates two simultaneous tones, which are correspondingly evaluated by the PABX or exchange.

E1/T1 E1: European variant of the 2.048 Mbps ➤➤ **ISDN** ➤➤ **Primary Rate Interface**, which is also called the E1 system.

T1: American variant of the ISDN Primary Rate Interface with 23 basic channels and one D-channel (1.544 Mbps).

EAZ Terminal Selection Digit

Is only used in the ➤➤ **1TR6** system and designates the last digit of an extension number. It is used for dialing various terminals connected to the ISDN Basic Rate Interface (e.g. fax). This occurs by attaching one digit between 0 and 9 to the actual ISDN telephone number. In Euro ISDN (DSS1), the complete extension number, ➤➤ **MSN**, is transferred instead of the EAZ.

Encapsulation Encapsulation of ➤➤ **data packets** in a certain protocol for transmitting the packets over a network that the original protocol does not directly support (e.g. NetBIOS over TCP/IP).

Encryption Refers to the encoding of data, e.g. ➤➤ **MPPE**.

Ethernet A local network that connects all devices in the network (PC, printers, etc.) via a twisted pair or coaxial cable.

Extension An extension is an internal number for a terminal or subsystem. In ➤➤ **point-to-point ISDN accesses**, the extension is usually a number from the ➤➤ **extension numbers range** assigned by the telephone provider. In point-to-multipoint connections, it can be the MSN or a part of the MSN.

Extension numbers range (direct dialing range)

A **point-to-point ISDN access** includes a ➤➤ **PABX number** and an extension numbers range. The PABX number is used to reach the PABX. The extension numbers range is a group of numbers used for selecting terminals within the ➤➤ **PABX**.

Filters A rule that defines a set of packets that should or should not be transmitted by the router.

Firewall Designates the whole range of mechanisms to protect the local network against external access. **X4000** provides protection mechanisms such as ➤➤ **NAT**, ➤➤ **CLID**, ➤➤ **PAP/CHAP**, access lists, etc.

FTP File Transfer Protocol

A TCP/IP protocol used to transfer files between different hosts.

Gateway Entrance and exit, transition point

Component in the local network that offers access to other networks, also offers transitions between different networks, e.g. ➤➤ **LAN** and ➤➤ **WAN**.

HDSL High Data Rate ➤➤ **DSL**

The ➤➤ **upstream** and ➤➤ **downstream** data rates are: ➤➤ **T1** 1.554 Mbps and ➤➤ **E1** 2.048 Mbps over ranges up to 4 km.

The main HDSL applications are: High-speed data communication over leased lines.

HDSL2 High Data Rate ➤➤ **DSL**, version 2

The ➤➤ **upstream** and ➤➤ **downstream** data rate is 1.554 Mbps over ranges up to 4 km.

The main HDSL applications are: High-speed data communication over leased lines.

Host name A name used in ➤➤ **IP networks** as a replacement for the corresponding ➤➤ **IP address**. A host name consists of an ASCII string that uniquely identifies the host computer.

Hub Network component used to connect several network components together to form a local network (star-shaped).

Internet The Internet consists of a range of regional, local and university networks. The ➤➤ **IP protocol** is used for data transmission in the Internet.

IP Internet Protocol

One of the ➤➤ **TCP/IP** suite of protocols used for the connection of Wide Area Networks (➤➤ **WANs**).

IP address The first part of the address by which a device is identified in an IP network, e.g. 192.168.1.254. See also ➤➤ **netmask**.

IPX/SPX Internet Packet Exchange/Sequenced Packet Exchange

Protocol suite from Novell for the transmission of data in a network. The two parts of this protocol suite are IPX (layer 3 of the OSI model) and SPX (layer 4 of the OSI model).

ISDN Integrated Services Digital Network

The ISDN is a digital network for the transmission of voice and data. There are two possible subscriber connections for ISDN, the ➤➤ **ISDN Basic Rate Interface** and the ➤➤ **Primary Rate Interface**. ISDN is an international standard. For ISDN protocols, however, there is a range of variations.

ISDN Basic Rate Interface An ISDN subscriber interface. The Basic Rate Interface consists of two ➤➤ **B-channels** and a ➤➤ **D-channel**. Compare ➤➤ **Primary Rate Interface**.

The interface to the subscriber is provided by an ➤➤ **S_0 bus**.

ISDN BRI ISDN Basic Rate Interface

➤➤ **ISDN Basic Rate Interface**, also ➤➤ **S_0 interface**.

ISDN Login One of **X4000**'s features. **X4000** can be configured and administrated remotely using ISDN Login. ISDN Login operates on routers in the ex works state as soon they are connected to an ISDN connection and therefore reachable via an extension number.

ISDN PRI ISDN Primary Rate Interface

ISDN ➤➤ **Primary Rate Interface**, also ➤➤ **S_{2M} interface**.

ISO International Standardization Organization

An international organization for the development of world-wide standards, e.g. ➤➤ **OSI model**.

ISP Internet Service Provider

Allows companies or private individuals access to the Internet.

ITU International Telecommunication Union

International organization that co-ordinates the construction and operation of telecommunications networks and services.

LAN Local Area Network

A network covering a small geographic area and controlled by its owner. Usually within the confines of a building or corporate center.

Leased line Leased line

Fixed connection to a subscriber. In contrast to a ➤➤ **dialup connection**, neither an extension number nor connection setup or clearing is necessary.

MAC address Every device in the network is defined by a fixed hardware address (MAC address). The network card of a device defines this internationally unique address.

MIB Management Information Base

The MIB is a database that describes all the manageable devices and functions connected to a network. All MIBs (including the BinTec MIB) contain objects specific to the manufacturer. ➤➤ **SNMP** is based on MIB.

MMI Man-Machine Interface

Is a convenient user guide with LC display and input keys for the user to navigate the basic functions of **X4000**.

Modem Modulator/Demodulator

An electronic device used to convert digital signals to analog tone signals and vice versa, so that data can be transmitted in an analog medium.

MPPC Microsoft Point-to-Point Compression

➤➤ **data compression** procedure for

MPPE Microsoft Point-to-Point Encryption

Data encryption process.

MSN Multiple Subscriber Number

Multiple number for an ISDN BRI in Euro ISDN. The MSN is the extension number that permits a terminal to be addressed specifically on the ➤➤ **S_0 bus** in Euro ISDN. An MSN has up to eight digits, e.g. 49 911 7654321, where 7654321 corresponds to the MSN.

Usually three such MSNs are assigned to each ISDN BRI (point-to-multipoint connection) in Germany.

Multiprotocol router A ➤➤ **router** that can route several protocols, e.g. ➤➤ **IP**, ➤➤ **IPX**, etc.

NAT Network Address Translation

Used as a security mechanism in **X4000**. Using NAT conceals your complete network to the outside world. The IP addresses of all devices in your own network remain confidential, only one IP address is made known for connections to the outside.

NetBIOS Network Basic Input Output System

A programming interface that activates network operations on a PC. It is a set of commands for transmitting and receiving data to and from other Windows PCs on the network.

Netmask The second part of an address in an IP network, used for identification of a device, e.g. 255.255.255.0. See also ➤➤ **IP address**.

Network address A network address designates the address of a complete local network.

NT Network Termination

An NT adapter is the network termination unit of an ➤➤ **ISDN** connection. In Germany, this is obtained from Deutsche Telekom AG. It is used to connect a private network (➤➤ **S_0 bus**) to the public ISDN network. It is equivalent to the terminal socket used for connecting an analog telephone.

NTBA Network Termination for Basic Access.

An NTBA adapter is the network termination unit of an ➤➤ **ISDN** Basic Rate Interface. In Germany, this is obtained from Deutsche Telekom AG. It is used to connect a private network (➤➤ **S_0 bus**) to the public ISDN network. It is equivalent to the terminal socket used for connecting an analog telephone.

OSI model OSI = Open Systems Interconnection

➤➤ **ISO** reference model for networks. Defines interface standards between computer manufacturers for software and hardware requirements.

OSPF Open Shortest Path First

Routing protocol used in networks to exchange information (routing tables) between ➤➤ **routers**.

PABX Private Automatic Branch Exchange

An ISDN PABX is used to set up an internal telephone infrastructure. Both analog terminals (e.g. fax, modem) and digital terminals can be connected to a PABX. The internal network provides free telephoning and connection switching. The individual terminals are given different extension numbers.

PABX Private Automatic Branch Exchange

An ISDN ➤➤ **PABX** is a telephone exchange with ➤➤ **S_0 interface** and ➤➤ **1TR6** or other manufacturer-specific ➤➤ **D-channel protocols** on the subscriber side.

Exchanges allow internal connections between the PABX extensions without the need to connect to the telephone service provider. Not all BinTec routers contain an exchange.

PABX number A point-to-point ISDN access includes a PABX number and an ➤➤ **extension numbers range**. The PABX number is used to reach the PABX. A certain terminal of the ➤➤ **PABX** is then dialed via one of the numbers of the extension numbers range.

PAP Password Authentication Protocol

Authentication process for connecting over ➤➤ **PPP**. Functions like ➤➤ **CHAP**, except that the user name and password are not encoded before being transmitted to the partner.

Ping Packet Internet Groper

Command that can be used to determine the range to remote network components. Ping is also used for test purposes to determine if the remote device can actually be reached at all.

Point-to-multipoint Feature of a connection that is permanently connected between three or more data stations or set up via switching systems.

Point-to-multipoint connection ➤➤ **Point-to-multipoint**)

Several different terminals can be connected to a point-to-multipoint connection. The individual terminals are addressed via certain extension numbers (➤➤ **MSN**s).

Point-to-point Feature of a connection between two data stations only. The connection can be permanently switched or set up via switching systems.

Point-to-point ISDN access A point-to-point ISDN access is used for the connection of a ➤➤ **PABX**. The PABX can forward calls to a number of terminals. A point-to-point access includes a ➤➤ **PABX number**, via which the PABX is reached from outside and a group of numbers (➤➤ **extension numbers range**), with which the terminals connected to the PABX can be dialed.

Port Input/output

The port number is used to decide to which service (telnet, WWW) an incoming data packet should be sent.

POTS Plain Old Telephone System

The traditional analog telephone network.

PPP Point-to-Point Protocol

A protocol suite for authentication of the connection parameters of a ➤➤ **point-to-point connection**. PPP is used to connect local networks over the ➤➤ **WAN**. Multiprotocol packets are encapsulated (➤➤ **encapsulation**) in a standard format before transmission. Establishing a connection involves a number of other components and subprotocols, such as the authentication mechanisms ➤➤ **PAP/CHAP**.

PPP authentication Security mechanism. A method of authentication using passwords in ➤➤ **PPP**.

PPPoE Point to Point Protocol over Ethernet

The PPP-over-Ethernet (PPPoE) protocol permits Internet access over Ethernet via an ➤➤ **xDSL** modem or xDSL router.

Primary Rate Interface (PRI) An ISDN subscriber interface. The PRI consists of a D-channel and 30 B-channels (in Europe). (In America: 23 B-channels and a D-channel.) Compare ➤➤ **ISDN Basic Rate Interface**.

Protocol Protocols are used to define the manner and means of information exchange between two systems. Protocols control and rule the course of data communication at various levels (decoding, addressing, network routing, control procedures, etc.).

Proxy ARP ARP = Address Resolution Protocol

Process used to determine the associated ➤➤ **MAC address** for a host whose ➤➤ **IP address** is known.

RADSL Rate-Adaptive ➤➤ **Digital Subscriber Line**

The data rate is up to 640 kbps ➤➤ **upstream** and 1.5 - 9 Mbps ➤➤ **downstream** over ranges of up to 18.5 km.

The main RADSL applications are: Internet access, video-on-demand (digital and compressed) and high-speed data communication over ➤➤ **POTS**.

Real Time Clock (RTC) Hardware clock with buffer battery

Remote Remote, as opposed to local.

If a far station is not located in your own local network (LAN), but in another LAN, this is referred to as remote.

This LAN must be connected to the local LAN over a WAN connection (over **X4000**).

Remote access Opposite to local access, see ➤➤ **Remote**.

Remote CAPI BinTec's own interface for ➤➤ **CAPI**.

The Remote CAPI interface enables all subscribers of a network to use CAPI services, but over **X4000** to a single ISDN connection. All subscribers must have the corresponding application software installed to support the CAPI interface. This standard interface is, however, used by most communications applications.

X4000 is supplied as standard with suitable software (RVS-COM Lite).

BinTec's CAPI interface is implemented as a dual-mode CAPI. CAPI 1.1 and 2.0 applications can access ISDN resources parallel to one another. This means new CAPI 2.0 applications can be used on the network or on the same PC parallel to old applications based on CAPI 1.1.

RIP Routing Information Protocol

Routing protocol used in networks to exchange information (routing tables) between ➤➤ **routers**.

RJ45 Plug or socket for maximum eight wires. Connection for digital terminals.

Router A device that connects different networks at layer 3 of the ➤➤ **OSI model** and routes information from one network to the other.

Routers are able to recognize blocks of information and evaluate addresses (as opposed to a ➤➤ **bridge**, which operates with a transparent protocol). The best paths (routes) from one point to another are chosen by using routing tables. In order to keep the routing tables up to date, routers exchange information between themselves via routing protocols (e.g. ➤➤ **OSPF**, ➤➤ **RIP**).

Modern routers such as **X4000** are ➤➤ **multiprotocol routers** and thus capable of routing several protocols (e.g. IP and IPX).

S_0 bus All ISDN sockets and the ➤➤ **NTBA** of an ISDN point-to-multipoint connection. All S_0 buses consist of a four-wire cable. The lines transmit digital ISDN signals. The S_0 bus is terminated with a terminating resistor after the last ISDN socket. The S_0 bus starts at the NTBA and can be up to 150 m long. Any ISDN devices can be operated on this bus. However, only two devices can use the S_0 bus at any one time, as only two ➤➤ **B-channels** are available.

S_0 interface See ➤➤ **ISDN Basic Rate Interface**

S_{2M} interface See ➤➤ **ISDN Primary Rate Interface**

SDSL Single line ➤➤ **Digital Subscriber Line**

The ➤➤ **upstream** and ➤➤ **downstream** data rate is up to 768 kbps over ranges up to 3.5 km.

The main SDSL applications are: ➤➤ **E1/T1** and ➤➤ **POTS**.

Server A server offers services used by ➤➤ **clients**. Often refers to a certain computer in the LAN, e.g. DHCP server.

In client-server architecture, a server is the software part that executes functions for its clients, e.g. ➤➤ **TFTP server**. In such a case, the server is not necessarily a computer server.

Setup Tool Menu-driven tool for the configuration of **X4000**. The Setup Tool can be used as soon as the router has been accessed (serial, ➤➤ **ISDN Login**, ➤➤ **LAN**).

Short hold Is the defined amount of time, after which a connection is cleared if no more data is transmitted. Short hold can be set to static (fixed amount of time) or dynamic (according to charging unit).

SNMP Simple Network Management Protocol

A protocol in the ➤➤ **TCP/IP protocol suite** that is used to transport management information about network components. Every SNMP management system contains an ➤➤ **MIB**. SNMP can be used to configure, control and administrate various network components from one system. Such an SNMP tool is included in your router: the Configuration Manager. As SNMP is a standard protocol, you can use any other SNMP managers, e.g. HP OpenView.

SNMP shell Input level for SNMP commands.

SOHO Small Offices and Home Offices

Small offices and home offices.

Spoofing Technique for reducing data traffic (and thus saving costs), especially in WANs.

The router answers as proxy for remote PCs to cyclically transmitted data packets with a monitoring function (e.g. sign of life messages).

STAC Data compression procedure.

Subnet A network scheme that divides individual logical networks into smaller physical units to simplify routing.

Switch LAN switches are network components with a similar function to ➤➤ **bridges** or even ➤➤ **routers**. They switch data packets between the input and output port. In contrast to bridges, switches have several input and output ports. This increases the bandwidth in the network. Switches can also be used for conversion between networks with different speeds (e.g. 100-Mbps and 10-Mbps networks).

Synchronous Transmission process in which the transmitter and receiver operate with exactly the same clock signals – in contrast to ➤➤ **asynchronous**. Spaces are bridged by a stop code.

TCP Transmission Control Protocol

One of the ➤➤ **TCP/IP** suite of protocols used for the connection of Wide Area Networks (➤➤ **WANs**).

TCP/IP Transmission Control Protocol/Internet Protocol

A protocol suite for the connection of Wide Area Networks (➤➤ **WANs**). The two parts of this protocol suite are ➤➤ **IP** (layer 3 of the OSI model) and ➤➤ **TCP** (layer 4 of the OSI model).

TE Terminal Equipment

Terminal equipment for subscriber access, e.g. telephone, fax or PC.

TEI Terminal Endpoint Identifier

The TEI in ➤➤ **ISDN** is an address field in layer 2 that is used for identifying a certain terminal.

Telematics Telematics is a combination of telecommunication and computer technology and describes data communication between systems and devices.

Telnet Protocol from the ➤➤ **TCP/IP protocol suite**. Telnet enables communication with a remote device in the network.

TFTP Trivial File Transfer Protocol

Protocol for data transmission.

TFTP server software is a part of ➤➤ **DIME Tools**. It is used for the transfer of configuration files and software to and from the router.

U-ADSL Universal ➤➤ **Asymmetric Digital Subscriber Line**

The data rate is 128 kbps ➤➤ **upstream** and 1 - 9 Mbps ➤➤ **downstream** over ranges of up to 5.5 km.

The main U-ADSL applications are: ➤➤ **POTS** Internet access.

UDP User Datagram Protocol

A transport protocol similar to ➤➤ **TCP**. UDP offers no control or acknowledgment mechanisms, but is faster than TCP. UDP is connectionless in contrast to TCP.

Upstream Data transmission rate from the client to the ➤➤ **Internet Service Provider**.

URL Universal/Uniform Resource Locator

Address of a file on the Internet

V.11 ITU-T recommendation for balanced dual-current interface lines (up to 10 Mbps).

V.24 CCITT and ITU-T recommendation that defines the interface between a PC or terminal as Data Terminal Equipment (➤➤ **DTE**) and a modem as Data Circuit-terminating Equipment (➤➤ **DCE**).

V.28 TU-T recommendation for unbalanced dual-current interface lines

V.35 ITU-T recommendation for data transmission at 48 kbps in the range from 60-108 kHz.

V.36 Modem for ➤➤ **V.35**.

V.90 ITU standard for 56 kbps analog modems. In contrast to older V.34 modems, data is sent in digital form to the client when the V.90 standard is used and does not need to be first converted from digital to analog on one side of the modem (provider), as was the case with V.34 and earlier modems. This makes higher transmission rates possible. A maximum speed of 56 kbps can be achieved only under optimum conditions.

VDSL Very high bit rate ➤➤ **Digital Subscriber Line** (also called VADSL or BDSL).

The data rate is 1.5 to 2.3 Mbps ➤➤ **upstream** and 13 to 52 Mbps ➤➤ **downstream** over ranges of 300 m to 14 km.

The main VDSL applications are: as for ➤➤ **ADSL**, but at higher transmission rates and with synchronization over short ranges.

VJHC Van Jacobson Header Compression

➤➤ **data compression** procedure for IP header compression.

VPN Virtual Private Network

The use of existing structures such as the ➤➤ **Internet** structure for connecting private networks (e.g. SOHO exchange). The data can be encrypted between the two endpoints of the VPN to meet increased security requirements.

WAN Wide Area Network

Wide Area Network connections, e.g. over ISDN, X.25.

WAN interface WAN interface

WAN interfaces connect the local network to the (➤➤ **WAN**). This is usually done by means of analog or digital telephone lines (➤➤ **switched** or ➤➤ **leased lines**).

WAN partner Remote station that is reached over a ➤➤ **WAN**, e.g. ISDN.

X.21 The X.21 recommendation defines the physical interface between two network components in packet-switched data networks (e.g. Datex-P).

X.21bis The X.21bis recommendation defines the ➤➤ **DTE**/➤➤ **DCE** interface to V-series synchronous modems.

X.25 An internationally agreed standard protocol that defines the interface between network components and a packet-switched data network.

X.31 For integration of X.25-compatible DTEs in ISDN.

Manual questionnaire, fax back to +49 911 / 9673 1498

How do you rate your own skills?

O network specialist O average knowledge of networks O little knowledge of networks

How do you rate the scope of the manual?

O not enough O just right O too much

Is something important missed out in the manual?

O no O yes, the following ……...

Does the manual contain unnecessary information?

O no O yes, the following ……...

How do you rate the clarity of the manual?

O very good O good O average O bad O very bad

How do you rate the comprehensibility (examples, explanations, graphics)?

O very good O good O average O bad O very bad

Did you have any problems during installation and configuration that you couldn't solve with the manual?

O no O yes, the following ……...

Which configuration tools do you use?

O Configuration Wizard O Setup Tool O Configuration Manager O SNMP commands O others: ……..

Comments:

.....
.....
.....
.....
.....