Lucent Technologies
Bell Labs Innovations

CellPipe 55 Series

User Manual

October 2003

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- Product name, model, and serial number
- Software version
- Software and hardware options If supplied by your carrier, service profile identifiers (SPIDs) associated with your line
- Your local telephone company's switch type and operating mode, such as AT&T, 5ESS Custom or Northern Telecom National ISDN-1
- Whether you are routing or bridging with your Lucent product
- Type of computer you are using
- Description of the problem

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Preface

Thank you for placing your trust in this Lucent product.

With the *Lucent CellPipe 55*, you have chosen a powerful ADSL router that includes an integrated ADSL modem and a 4-port switch as standard features. This router lets you easily and conveniently provide individual computers or an entire local network with high-speed Internet access.

User's manual and *Lucent CellPipe 55* reference manual

The documentation of the device consists of two parts: the user's manual and the *Lucent CellPipe 55* reference manual.

You are now reading the user's manual. It contains all of the information that you need to set up your *Lucent CellPipe 55* quickly. It also contains the most important technical specifications for the device.

The *Lucent CellPipe 55* reference manual can be found on the CD as an Acrobat (PDF) document. It is designed as a supplement to the user's manual and goes into detail on topics that apply to a variety of *Lucent CellPipe 55* devices. These include:

- Configuration and management (*CELLtools*, *WEBconfig*, remote configuration)
- Advanced security settings
- Server services (DHCP, DNS, charge management)
- Routing and WAN functions

Model varieties

This user's manual applies to the following models of the *Lucent CellPipe 55* series:

- *Lucent CellPipe 55A-GX* (short '*CellPipe 55A-GX*')
- *Lucent CellPipe 55A-BX* (short '*CellPipe 55A-BX*')

Model restrictions

The sections of the documentation that refer only to a range of models are marked either in the corresponding text itself or with appropriate comments placed beside the text.

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This documentation was created by …

… several members of our staff from a variety of departments in order to ensure you the best possible support when using your Lucent product.

Our online services (www.lucent.com) are available to you around the clock should you have any queries regarding the topics discussed in this manual or require any further support. In the 'Support' section under 'Know-how' you will find many answers on "Frequently Asked Questions". The knowledge database (KnowledgeBase) offers an additional large pool of information. Current drivers, firmware, tools and manuals can be downloaded at any time.

In addition, Lucent Technologies Support is available. For telephone numbers and contact addresses of the Lucent Technologies Support, please see the enclosed leaflet or the Lucent Technologies website.

Information symbols	
	Very important information. Failure to observe this may result in damage.
	Important information that should be observed.
	Additional information that may be helpful but which is not required.

Special formatting in the body text	
Bold	Menu commands, buttons or input fields
`Code`	Input and output in command-line mode
<Value>	Placeholder for an actual value
Italics	Notes and product names

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Contents

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1 Introduction

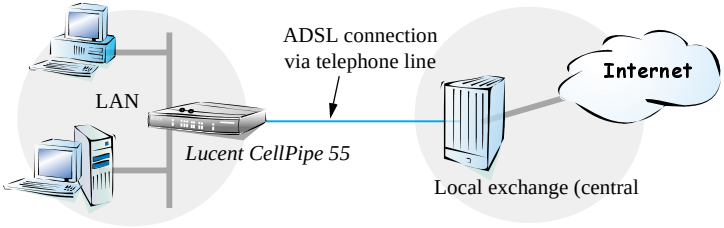
ADSL technology (**A**symmetric **D**igital **S**ubscriber **L**ine) permits high-speed Internet access via conventional telephone lines. ADSL features an outstanding price/performance ratio and is very popular among private users as well as small and mid-sized businesses. All of the devices of the *Lucent CellPipe 55* series are fully-featured routers that therefore also can be used for providing Internet access to a complete local network (LAN).

1.1 How does ADSL work?

Since the late 1980s, scientists have been working on the idea of using conventional telephone lines for video and multimedia applications.

High speed via standard telephone lines

Their approach was based on the use of telephone lines only for the distance between the subscriber and the next local exchange. From the switching center, the data is then transferred via high-speed connections to the desired destination or target network (i.e. the Internet). This minimization of the telephone line distance used permits considerably higher transfer rates than would be possible when relying solely on the telephone network.



All DSL technologies, of which ADSL is the most common, are based on this concept. Thanks to their high transfer speeds, DSL connections are well-suited for Internet access.

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Ideal for Internet surfers

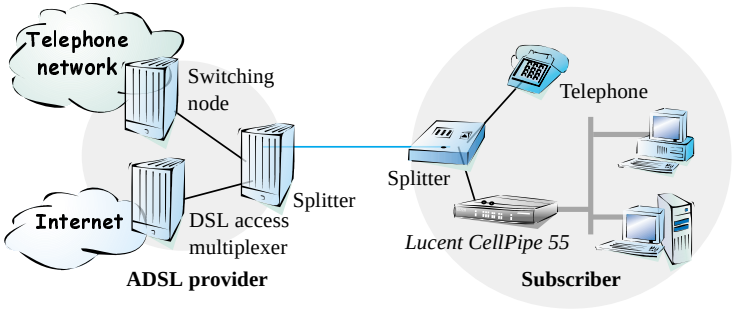
The ADSL version of DSL was designed for applications in which the user receives high volumes of data but only transmits relatively small volumes. A typical example for this would be access to the world wide web (www). Only a few commands (mouse clicks) are required to initiate the download of very large volumes of data such as graphics, texts, audio or video files. The user typically only sends very small amounts of data across the Internet connection.

With an ADSL connection, a user can download at up to 8 Mbps ("downstream") and upload at up to 800 Kbps ("upstream"). These maximum rates can be reduced as required by the ADSL provider. A typical access plan might specify, for example, 768 Kbps download and 128 Kbps upload speed.

All services via a single cable—thanks to the splitter

With ADSL, all traditional telephony applications (telephone, fax, answering machine, PBX) can still be used without restrictions. So-called splitters make this possible. Splitters are devices that separate the telephone line's "voice frequencies" from the "data frequencies" and ensure that the signals are forwarded to the appropriate networks. Voice signals are passed on to the existing telephone network, while data signals are forwarded to their destinations (i.e. Internet providers) via high-bandwidth network connections.

A splitter is also used at the subscriber end to permit ADSL modems/routers and conventional telephone equipment to be used at the same time.



ADSL-over-ISDN or ADSL-over-POTS?

ADSL can operate over modern ISDN telephone service as well as conventional analog service (POTS – **P**lain **O**ld **T**elephone **S**ervice).

There are, however, different technical specifications for the two telephone systems. For this reason, devices in the *Lucent CellPipe 55* series are offered in two different versions: A version for ADSL-over-POTS and a version for ADSL-over-ISDN.

You can determine which telephone system a device supports by looking at the model description on the bottom of the device. The label containing the device name also contains an additional code which stands for the telephone system the device supports:

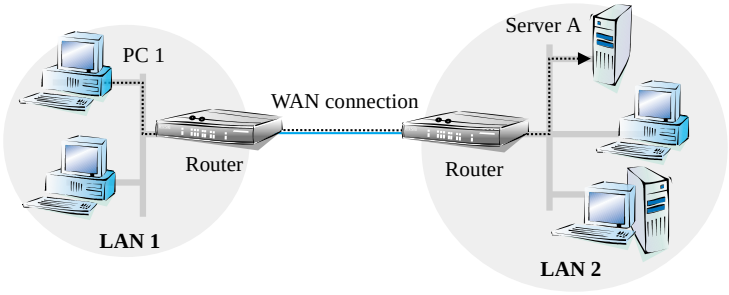
Code	Supported telephone system
'Annex A'	ADSL-over-POTS
'Annex B'	ADSL-over-ISDN

An 'Annex A' type *Lucent CellPipe 55* can only be used with ADSL-over-POTS service. Similarly, an 'Annex B' device can only be used with ADSL-over-ISDN service. Retrofitting a device to function with a different telephone system is not possible.

ADSL-over-ISDN connections also exist that do not operate in conjunction with ISDN, but which use a conventional analog telephone connection. A prominent example would be Deutsche Telekom's T-DSL service.

1.2 What does a router do?

Routers connect LANs at different locations and individual PCs to form a Wide Area Network (WAN). With the appropriate rights, any computer in this WAN can access the other computers and services of the complete WAN (as with 'PC 1' accessing 'Server A' in the remote LAN in the diagram).



Connecting a LAN to the Internet does not differ technically from the coupling of two LANs. The only difference is that not just a handful of computers, but the ultimate WAN can be found behind the Internet provider's router.

1.2.1 Bridgehead to the WAN

All routers have at least two connections: one for the LAN and at least one for WAN connections. In addition to LAN connectivity (10/100 Mbps Ethernet), the models in the *Lucent CellPipe 55* series each also offer an ADSL and an ISDN connector.

The router's task is to transfer data from the local network to the target network via a suitable WAN connection. Data is also transferred from the WAN to the desired recipients in the LAN.

1.2.2 Areas of deployment for routers

Routers are mainly used for the following three applications:

- **Internet access for a LAN (via ADSL or ISDN)**

  The Internet consists of countless large and small networks that are interconnected into the world's largest WAN via routers. The router links all the workstation computers on your local area network to the global Internet. Security functions such as IP masquerading protect your LAN against unauthorized access from outside.

  Internet access can be realized via ADSL or ISDN.

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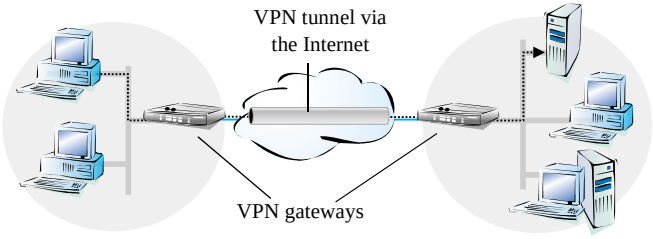
- **LAN to LAN coupling (via VPN or ISDN)**

  LAN to LAN coupling links individual LANs to form one large network, even if this means crossing continents. A typical example: A branch office is to be connected to the LAN of the headquarters. With an *Lucent CellPipe 55*, you can connect LANs in two ways:

  Lucent CellPipe 55 VPN Option required. Not possible with CellPipe 55A-GX.

  - **High-speed coupling via VPN**

    The fastest and most economical LAN to LAN links are possible with VPN (**V**irtual **P**rivate **N**etwork) technology, as VPN uses the Internet as the basis for its communications. The fast ADSL connection of the *Lucent CellPipe 55* comes into its own here. The precondition: a VPN gateway with access to the Internet is required on either side of the network interconnection. With *Lucent CellPipe 55 VPN Option*, you can upgrade your *Lucent CellPipe 55* to a complete VPN gateway.



  - **Conventional via ISDN**

    Without *Lucent CellPipe 55 VPN Option*, a LAN to LAN interconnection can only be realized via ISDN. In this case, the *Lucent CellPipe 55* with its intelligent line management and sophisticated filter mechanisms keeps connection costs low.

- **Remote access to the company network (only via ISDN)**

  The work of many office workers in modern organizations is less and less dependent on any definite location—the most important factor here is unimpaired access to shared and freely available information.

  Remote Access Service (RAS) is the magic word here. Employees working from home or field staff can dial into the company network via ISDN. When working with remote access, the *Lucent*

CellPipe 55 protects the company network: the callback function only grants access to known and registered users.

1.3 What can your *Lucent CellPipe 55* do?

The following table contains a direct comparison of the properties and functions of your devices with other models.

	CellPipe 55A-GX	*CellPipe 55A-BX*
Applications		
Internet access	✓	✓
LAN to LAN coupling via VPN (*Lucent CellPipe 55 VPN Option* required)	✓	✓
LAN to LAN coupling via ISDN	✓	✓
RAS server (via ISDN)	✓	✓
IP router	✓	✓
IPX router (via ISDN)	✓	✓
NetBIOS proxy	✓	✓
DHCP and DNS server (for LAN and WAN)	✓	✓
LANCAPI server	✓	✓
WAN connections		
ADSL over ISDN ('Annex B')	-	✓
ADSL over POTS ('Annex A')	✓	-
ISDN-S_0	✓	✓
Security features		
IP masquerading (NAT, PAT)	✓	✓
Firewall filter, MAC address filter	✓	✓
Configuration protection	✓	✓
Configuration		
Remote configuration via ISDN	✓	✓
Serial configuration port	✓	✓
FirmSafe	✓	✓
Optional software extensions		

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	CellPipe 55A-GX	*CellPipe 55A-BX*
Lucent CellPipe 55 VPN Option	✓	✓
ISDN leased-line option	✓	✓

The following sections contain brief descriptions of the most important functions and properties of the *Lucent CellPipe 55* routers.

Many of the explanations do not apply to the full series, but only to specific models. Please refer to the overview table above to determine which descriptions apply to your model.

1.3.1 Routing

The router checks all data in the LAN to determine whether they have to be sent to another network or computer. If data transfer is necessary, the router establishes the connection itself and closes the connection once the transfer is complete.

The integrated DHCP and DNS functions simplify configuration and ensure reliable network operation.

IPX router

In addition to IP, other protocols can also be routed via the ISDN interface. The IPX protocol permits the coupling of Novell networks as well as remote access to Novell networks.

NetBIOS proxy

Lucent routers offer a special feature for the interconnection of Microsoft peer-to-peer networks via ISDN. With the integrated routing of IP NetBIOS packets, the linking of Windows networks becomes child's play.

1.3.2 ADSL port

The *Lucent CellPipe 55* contains a highly flexible integrated ADSL modem. The two different versions, ADSL-over-POTS (Annex A) and ADSL-over-ISDN (Annex B) are supported by different versions of the devices (see page 10).

1.3.3 ISDN port

Connect the *Lucent CellPipe 55* to the S_0 port of an ISDN connection with a point-to-multipoint configuration (point-to-multipoint connection) or point-to-point configuration (point-to-point connection). The router automatically detects your port type and the D-channel protocol being used.

Channel bundling and compression

The routers support static and dynamic channel bundling via MLPPP and BACP. Stac data compression (hi/fn) can be used to achieve additional increases in the data transfer rate of up to 400%.

1.3.4 Security features

The *Lucent CellPipe 55* has powerful security functions to prevent unauthorized access.

IP masquerading, firewall and MAC address filter

IP masquerading hides all of the workstations of a LAN behind a single public IP address. The actual identities (IP addresses) remain concealed. Firewall filters permit specific IP addresses, protocols and ports to be blocked. With MAC address filters it is also possible to specifically monitor the access of workstations in the LAN to the IP routing function of the device.

Protection of the configuration

Login barring prevents any “brute force attacks” and denies access to the router after a configurable number of login attempts using an incorrect password. This measure effectively protects the configuration of the router against repeated attacks.

Protection of the ISDN port

To secure the integrated ISDN interface, the *Lucent CellPipe 55* uses password protection and caller identification (CLI) as well as the callback function to restrict connection establishment to previously specified ISDN subscriber numbers. Special PPP authentication mechanisms round out the security concept.

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1.3.5 4-port switch

The integrated switch permits up to four network devices to be connected. Not only terminal devices (so-called nodes, such as PCs or printers), but also lower-level switches and hubs can be connected. Both 10 and 100-Mbps Ethernet devices are supported.

The switch automatically recognizes the device type (node/hub) and speed of the connected devices—a manual configuration of the switch is not required. A variety of device types and speeds can be used in mixed mode. The connected network devices form a LAN and receive direct access to the router at the same time.

Please ensure that the cabling corresponds to the general rules applicable to Ethernet networks. This applies especially to the maximum permissible lengths of the segments and the unambiguous hierarchy of the cabling.

1.3.6 Office communications via the *LANCAPI* server

Faxing directly from within applications, voice mail with different announcements according to the time of day, banking without having to leave the office: These functions can be enabled on *Lucent CellPipe 55* routers featuring ISDN ports by using *LANCAPI*.

The *LANCAPI* is a special type of CAPI 2.0 interface that permits appropriate applications to access the router.

The main advantages of using *LANCAPI* are economic. *LANCAPI* is a special implementation of the CAPI 2.0 interface that provides all workstations in the LAN with access to office communications functions such as fax and eurofile transfer. thus eliminating the costs of equipping the workstations with ISDN adapters or modems.

A fax device is simulated at the workstation so that faxes can be sent. With the *LANCAPI*, the PC forwards the fax via the network to the router which establishes the connection to the recipient.

1.3.7 Simple and flexible configuration

Setting up and configuring the device to your specific needs is made quick and easy in the Windows operating systems by the included

configuration software. The following tools are available, depending on your operating system and personal preferences:

- ***CELLconfig* for Windows operating systems**
- ***WEBconfig* for any web browser**
- **Terminal mode for Telnet or other terminal programs**
- **SNMP interface**
- **TFTP server function**

Integrated setup wizards help you get the devices up and running under *CELLconfig* and *WEBconfig* as quickly as possible.

Remote configuration using PPP

One special configuration feature of the routers from Lucent which cannot and should not be setup locally is its ability to be configured remotely via PPP connections (e.g. the Windows Dial-up Network).

Firmware updates without risk with FirmSafe

The current firmware version is always available on the Lucent website. There is no risk involved with loading the new firmware: The Lucent FirmSafe function enables two firmware files to be managed on one device. If the new firmware version does not function as desired after the upload you can simply revert to the previous version.

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2 Installation

This chapter will assist you to quickly install hardware and software. First, check the package contents and system requirements. The device can be installed and configured quickly and easily if all prerequisites are fulfilled.

2.1 Package contents

Please check the package contents for completeness before starting the installation. In addition to the device itself, the package should contain the following accessories:

	CellPipe 55A-GX	*CellPipe 55A-BX*
Power adapter	✓	✓
LAN connector cable (green plugs)	✓	✓
ADSL connector cable (transparent plugs)	✓	✓
ISDN line connection cable (light blue plugs)	✓	✓
Connector cable for the serial configuration port	✓	✓
Lucent CellPipe CD	✓	✓
Printed documentation	✓	✓

If anything is missing, please contact your retailer or the address stated on the delivery slip of the unit.

2.2 System preconditions

Computers that connect to an *Lucent CellPipe 55* must meet the following minimum requirements:

- Operating system that supports TCP/IP, e.g. Windows XP, Windows Millennium Edition (Me), Windows 2000, Windows 98, Windows 95, Windows NT, Linux, BSD Unix, Apple Mac OS, OS/2, BeOS.
- Access to the LAN via the TCP/IP protocol.

The CELLtools and the functions of the LANCAPI also require a Windows operating system. A web browser is required for access to WEBconfig.

2.3 Introducing the *Lucent CellPipe 55*

This section introduces the device. We will give you an overview of all status displays, connections and switches.

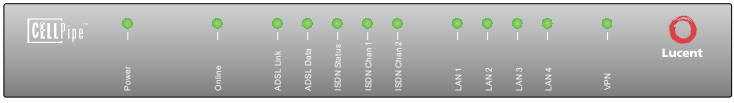
While the information in this section is useful for the installation of the device, it is not absolutely essential. You may therefore skip this section for the time being and go straight to the installation on page 24.

2.4 Status displays

The front and rear panels of the unit feature a series of LEDs that provide information on the status of the device.

2.4.1 Front side

The various *Lucent CellPipe 55* models have different numbers of indicators on the front panel depending on their functionality.



2.4.2 Top panel

The two LEDs on the top panel provide a convenient overview of the most important status information, also when the device is installed vertically.

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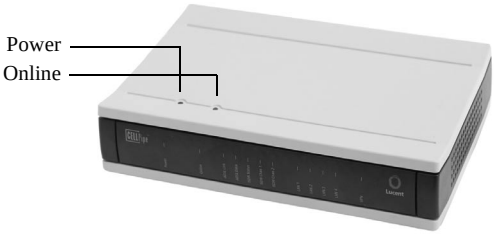


2.4.3 Meanings of the LEDs

Power

This LED indicates that the device is operational. After the device has been switched on, it will flash green for the duration of the self-test. After the self-test, either an error is output by a flashing red light code or the device starts and the LED remains lit green.

off		Device off
green	blinking	Self-test when powering up
green		Device ready for use
red/green	blinking alternately	Device insecure: configuration password not assigned
red	blinking	Time or connect-charge limit reached

The power LED flashes red/green in alternation until a configuration password has been specified. Without a configuration password, the configuration data (and thus the device as a whole) of the Lucent CellPipe 55 is insecure. Under normal circumstances, you would assign a configuration password during the basic configuration (instructions in the following chapter). For information on assigning a configuration password at a later time, please see Section 'Checking and modifying the basic settings' on page 64.

Online

The Online LED indicates the overall status of all WAN ports:

off		No active connection
green	flashing	Establishing first connection

green	inverse flashing	Establishing further connection
green		At least one connection established
red		Error establishing the previous connection

ADSL Link

Connection status of the ADSL link:

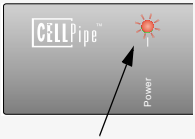
off		not connected
green	blinking	Initializing (establishing contact with the connection point)
green		Synchronization successful
red	flickering	Error (CRC error, framing error, etc.)
red		Synchronization failed

ADSL Data

Data traffic via the ADSL link:

off		No data traffic
green	flashing	Establishing first connection

Flashing Power LED but no connection?



Signal for a time limit or connect charge limit that has

There's no need to worry if the Power LED blinks red and you can no longer connect to the WAN. This simply indicates that a preset time or connect-charge limit has been reached. There are three methods available for unlocking:

- Reset connect charge protection.
- Increase the limit that has been reached.
- Completely deactivate the lock that has been triggered (set limit to '0').

If a time or connect charge limit has been reached, you will be notified in *CELLmonitor*. To reset the connect charge protection, select **Reset Charge and Time Limits** in the context menu (right mouse click). You can configure the connect charge settings in *CELLconfig* under **Management / Costs** (you will only be able to access this configuration if 'Complete configuration display' is selected under **View** / **Options…**).

You will find the connect charge protection reset in *WEBconfig* and all parameters

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green	inverse flashing	Establishing further connection
green		Connection(s) established
green	inverse flickering	Data traffic (send or receive)

ISDN Status

Status of ISDN S_0 connection:

off		Not connected or no S_0 voltage (no error message)
green	blinking	Initializing D channel (establishing contact with the connection point)
green		D channel ready for use
red	blinking	Error (CRC error, framing error, etc.)
red		Activation of D channel failed

If the ISDN status LED goes out automatically, this does not indicate an S_0 bus error. Many ISDN connections and PBXs disable the S_0 voltage after a certain time. The S_0 bus is automatically reactivated as required and the ISDN status LED will once again light up green.

ISDN Chan 1
ISDN Chan 2

Separate status display for both ISDN B channels:

off		No connection established
green	blinking	Dialing
green	flashing	Establishing first connection
green	inverse flashing	Establishing further connection
green		Connection established via B channel
green	inverse flickering	Data traffic (send or receive)

LAN 1
LAN 2
LAN 3
LAN 4

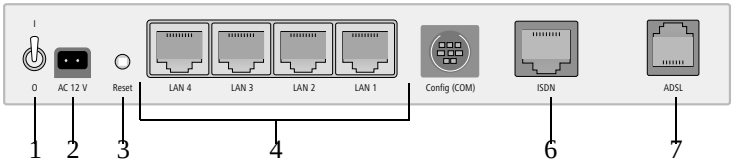
Status of the four LAN ports in the integrated switch:

off		No network device connected
green		Connection to network device operational, no data traffic
green	inverse flickering	Data traffic
red	blinking	Collision of packets

VPN Status of a VPN connection. Only active with *Lucent CellPipe 55 VPN Option* installed.

2.5 The back of the unit

The connections and switches of the router are located on the back panel :



1 Voltage switch

2 Connection for the included power adapter

3 Reset switch

4 Switch with four 10/100Base-Tx connections

5 Serial configuration port

6 ISDN/S_0 port

7 ADSL port

The Reset switch

The reset switch has two different functions depending on the length of time that it is pressed:

- **Restarting the device** (soft reset) – push the button for less than five seconds. The device will restart.
- **Resetting the configuration** (hard reset) – push the button for more than five seconds. All the device's LEDs will light up green and stay on. As soon as the reset switch is released, the device will restart with factory settings.

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2.6 Hardware installation

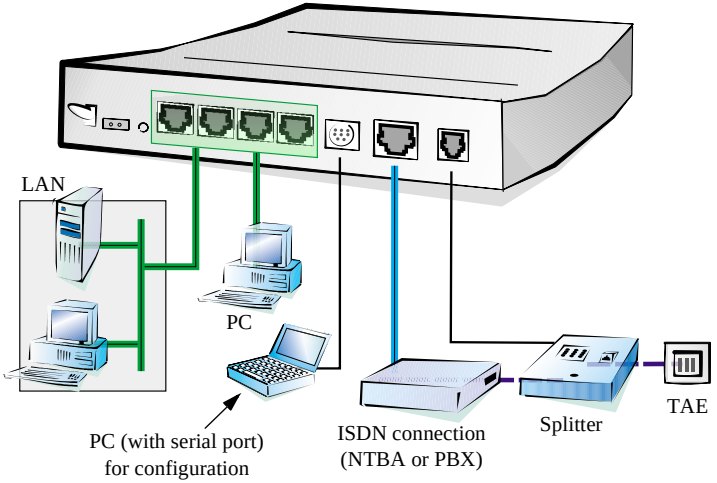
The installation of the *Lucent CellPipe 55* takes place in six steps:

a **LAN** – connect your *Lucent CellPipe 55* to the LAN or an individual PC. Plug one end of the supplied network cable (green plugs) into one of the LAN sockets of the device 4 and the other end into a free connector socket of your local network, a free socket of a hub, or the network card of an individual PC.

The LAN ports recognize not only the transfer rate (10/100 Mbps) but also the type (node/hub) of the connected network devices automatically (autosensing). Devices of different types and transfer rates may be connected parallel to one another.

You should never have more than one unconfigured Lucent CellPipe 55 in a network segment at any given time. All unconfigured Lucent CellPipe 55 devices use the same IP address (with the final digits '254'), which would result in an address conflict. To avoid problems, always configure multiple Lucent CellPipe 55 devices one at a time, immediately assigning each device a unique IP address (one that does not end with '254').

b **ADSL** – connect the ADSL port 7 to the ADSL modem socket of the splitter using the supplied ADSL connector cable (transparent plugs).



c **ISDN** – to connect the *Lucent CellPipe 55* to the ISDN, plug one end of the supplied ISDN connector cable (light blue plugs) in the ISDN/S_0 port 6 of the router and the other end into an ISDN/S_0 point-to-point or point-to-multipoint connection.

d **Configuration port** – you may optionally connect the router directly to the serial port (RS-232, V.24) of a PC. Use the cable supplied for this purpose. Connect the configuration port of the *Lucent CellPipe 55* 5 with a free serial port of the PC.

e **Connect to AC power and switch on** – connect socket 2 of the unit to an AC power supply using the included power adapter and switch the device on with switch 1.

Use the supplied power supply unit only! Using an unsuitable power supply unit may cause damage or injury.

f **Operational?** – After a short device self-test the Power LED will be permanently lit. Green LAN LEDs indicate the LAN sockets that have functioning connections.

2.7 Software installation

This section covers the installation of the included Lucent system software for Windows. This includes the *CELLtools*, the *LANCAPI* and a variety of Windows drivers.

You may skip this section if you use your Lucent CellPipe 55 exclusively with computers running operating systems other than Windows.

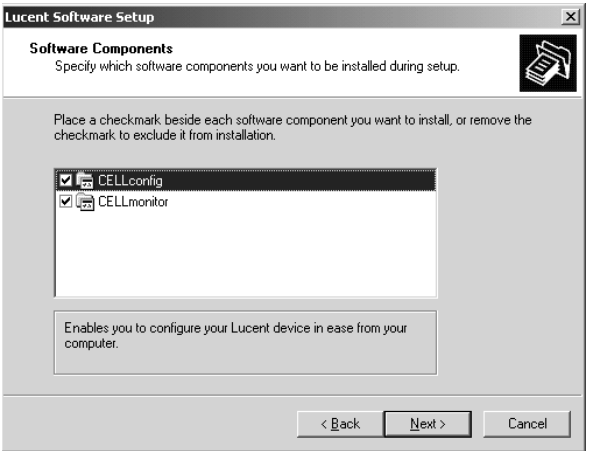
2.7.1 Starting Setup

Place the *Lucent CellPipe* CD in your CD drive. The setup program will start automatically.

If the setup program does not start automatically, run AUTORUN.EXE in the root folder of the Lucent CellPipe CD.

In Setup select **Install** Lucent **Software**. The following selection menus will appear on the screen:

EN



2.7.2 Which software should you install?

Not every application listed in the selection menu is required for the operation of your *Lucent CellPipe 55*.

- ***CELLconfig*** is the configuration program for all *Lucent CellPipe 55*. *WEBconfig* can be used alternatively or in addition via a web browser.
- ***CELLmonitor*** lets you monitor all *Lucent CellPipe 55* in the LAN.
- ***LANCAPI*** can be installed on as many Windows PCs in the LAN as required, permitting them to run any ISDN software. A PC with *LANCAPI* behaves as if it had its own ISDN card. In actual fact, the ISDN connection is realized centrally using the *Lucent CellPipe 55* with its ISDN interface.
- ***LANCAPI* Dial-Up Networking Support** lets you use the CAPI software interface on your Windows PC as a network adapter, for example for dial-up remote access to an *Lucent CellPipe 55*.
- The **CAPI Faxmodem** installs a fax modem driver on your Windows PC, permitting you to send faxes via the *LANCAPI*.

Select the appropriate software options and confirm your choice with **Next**. The software is automatically installed.

2.8 Preliminary remarks on the configuration

Once the hardware and software has been installed, you can configure your *Lucent CellPipe 55* to suit your requirements. The following chapters contain step-by-step instructions covering all of the major configuration options of your *Lucent CellPipe 55*. Specifically, they are:

- Basic configuration and initial security settings
- Setting up an Internet access
- Interconnection of two local networks
- Provision of dial-up access (RAS)
- Office communications with *LANCAPI*

CELLconfig or *WEBconfig*?

The configuration work is best performed with *CELLconfig* or *WEBconfig*.

If your configuration PC uses Windows, we recommend using *CELLconfig*. For all other operating systems, use your web browser to access *WEBconfig*, which is a standard component of your *Lucent CellPipe 55*.

Separate instructions for *CELLconfig* and *WEBconfig*

The following chapters contain step-by-step instructions covering all of the major functions of your *Lucent CellPipe 55*. Each chapter contains a section for configuration with *CELLconfig* and one for *WEBconfig*. You will thus always find a set of step-by-step instructions for the configuration tool of your choice.

2.9 In the next chapter…

… we will perform the basic configuration of your *Lucent CellPipe 55* and will protect the configuration against access with a password.

EN

3 Basic configuration

The basic configuration can be performed on a step-by-step basis using a convenient setup wizard to guide you through the setup process and prompt you for the required information.

First, this chapter will tell you which information is required for the basic configuration. Use this section to assemble the information you will need before you launch the wizard.

Next, enter the data in the setup wizard. Launching the wizard and the process itself are described step by step—with separate sections for *CELLconfig* and *WEBconfig*. Thanks to the information that you have collected in advance, the basic configuration is quick and effortless.

At the end of this chapter we will show you the settings that are needed for the LAN's workstations to ensure trouble-free access to the router ('TCP/IP settings to workstation PCs' on page 37).

3.1 Which information is necessary?

The basic configuration wizard will take care of the basic TCP/IP configuration of the router, protect the device with a configuration password, and will set up the ISDN connection if required. The following descriptions of the information required by the wizard are grouped in these three configuration sections:

- TCP/IP settings
- protection of the configuration
- information related to the ISDN connection
- information on ISDN connection
- configuring connect charge protection

3.1.1 TCP/IP settings

The TCP/IP configuration can be realized in two ways: either as a fully automatic configuration or manually. No user input is required for the fully automatic TCP/IP configuration. All parameters are set automatically by the setup wizard. During manual TCP/IP configuration, the wizard will prompt you for the usual TCP/IP parameters: IP address, netmask etc. (more on these topics later).

Fully automatic TCP/IP configuration is only possible in certain network environments. The setup wizard therefore analyzes the connected LAN to determine whether it supports fully automatic configuration.

New LAN—fully automatic configuration possible

If all connected network devices are still unconfigured, the setup wizard will suggest fully automatic TCP/IP configuration. This may be the case in the following situations:

- a single PC is connected to the router
- setup of a new network

Fully automatic TCP/IP configuration will not be available when integrating the *Lucent CellPipe 55* in an existing TCP/IP LAN. In this case, continue with the section 'Information required for manual TCP/IP configuration' on page 30.

The result of the fully automatic TCP/IP configuration: the router will be assigned the IP address '172.23.56.1' (netmask '255.255.255.0'). In addition, the integrated DHCP server will be enabled so that the *Lucent CellPipe 55* can automatically assign IP addresses to the devices in the LAN.

Configure manually nevertheless?

The fully automatic TCP/IP configuration is optional. You may also select manual configuration instead. Make your selection after the following considerations:

- Choose automatic configuration if you are **not** familiar with networks and IP addresses.
- Select manual TCP/IP configuration if you are familiar with networks and IP addresses, and one of the following conditions is applicable:
  - You have not yet used IP addresses in your network but would like to do so now. You would like to specify the IP address for your router, selecting it from the address range reserved for private use, e.g. '10.0.0.1' with the netmask '255.255.255.0'. At the same time you will set the address range that the DHCP server uses for the other devices in the network (provided that the DHCP server is switched on).

- You have previously used IP addresses for the computers in your LAN.

Information required for manual TCP/IP configuration

During manual TCP/IP configuration, the setup wizard will prompt you for the following information:

- **IP address and netmask for the *Lucent CellPipe 55***
  Assign a free IP address from the address range of your LAN to the *Lucent CellPipe 55* and specify the netmask.
- **Enable DHCP server?**
  Disable the DHCP server function in the *Lucent CellPipe 55* if you would like to have a different DHCP server assign the IP addresses in your LAN.

3.1.2 Configuration protection

The password for configuration access to the *Lucent CellPipe 55* protects the configuration against unauthorized access. The configuration of the router contains a considerable amount of sensitive information such as your Internet access information. We therefore strongly recommend protecting it with a password.

The setup wizard for the basic configuration automatically disables remote configuration access via ISDN, thus protecting your configuration against tampering. ISDN remote configuration access can be enabled at any time using the security wizard (see 'Enabling ISDN remote configuration' on page 64).

3.1.3 Settings for the ADSL connection

For the ADSL connection it may be necessary to enter the transfer protocol being used. The wizard will automatically enter the correct settings for major ADSL providers. You only need to enter the protocol used by your ADSL provider if the wizard does not list your provider.

The wizard also offers you a universal protocol 'Multimode' which works with all regular ADSL connections.

3.1.4 Settings for the ISDN connection

Set up the basic configuration of your ISDN connection if required. You will need the following data:

- One or more ISDN MSNs on which the router will accept calls. MSNs are ISDN subscriber numbers that are assigned to you by your telephone provider. They are normally entered without an area code. These numbers are only relevant for the router functions (LAN to LAN coupling, RAS), not for remote configuration and *LANCAPI*.
- A dialing prefix for access to the public telephone network. This is normally required only when using an ISDN PBX. '0' is the usual prefix. It is used for all outgoing calls.
- Finally, you should know whether your telephone provider transmits an ISDN connect-charge pulse. This signal can be used *Lucent CellPipe 55* for connect-charge budgets and the accounting function.

3.1.5 Connect charge protection

Connect charge protection blocks connections that go beyond a previously set amount, protecting you from unexpectedly high connection costs.

In *Lucent CellPipe 55*, there are three independent budgets: For ADSL access, you can set a maximum connection time in minutes. In addition to this time budget, there is also a budget for limiting ISDN connection charges.

In order for the limitations according to connect charge rates to function properly, it is necessary to enter the information for connect charge rates through ISDN.

Any budget can be deactivated by entering the value '0.'

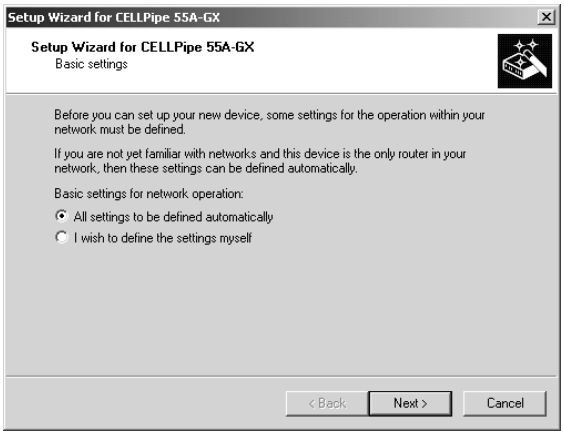
It is possible to completely turn off connect charge protection if desired.

3.2 Instructions for *CELLconfig*

a Start up *CELLconfig* by clicking **Start / Programs / Lucent / *CELLconfig***.

EN

CELLconfig automatically detects the new *Lucent CellPipe 55* in the TCP/IP network. Then the setup wizard starts that will help you make the basic settings of the device or will even do all the work for you (provided a suitable network environment exists).



*If the setup wizard does not start automatically, start a manual search for new devices on all ports (if the Lucent CellPipe 55 is connected via a serial port) or in the network (**Device** / **Find**).*

If you cannot access an unconfigured Lucent CellPipe 55, the problem may be due to the netmask of the LAN: with less than 254 possible hosts (netmask > '255.255.255.0'), please ensure that the IP address 'x.x.x.254' is located in your own subnet.

If you have chosen automatic TCP/IP configuration, please continue with Step d.

b If you would like to configure the TCP/IP settings manually, assign an available address from a suitable address range to the *Lucent CellPipe 55*. Confirm your choice with **Next**.

c Specify whether or not the router should act as a DHCP server. Make your selection and confirm with **Next**.

d In the following window, specify the password for configuration access. Note that the password is case-sensitive and ensure that it is sufficiently long (at least 6 characters).

In addition, you may specify whether the device may only be configured from the local network or whether remote configuration via the WAN (i.e. a remote network) is also permissible.

Please note that enabling this will also permit remote configuration via the Internet. You should always make sure that the configuration access is protected with a password.

e In the next window, select your ADSL provider from the list that is displayed. If you select 'My provider is not listed here,' you must enter the transfer protocol used by your ADSL provider manually. Usually, the universal protocol 'Multimode' will work. Confirm your choice with **Next**.

f Enter the ISDN subscriber numbers (as MSNs, i.e. without area code) on which the router will accept calls. Multiple numbers are separated by semicolons. If you do not specify any MSNs, the router will answer all incoming calls on the ISDN connection.

In addition, you can enter a trunk code for dialing into ISDN. Finally, you should specify whether or not the tariff information is to be transmitted at your ISDN connection. Confirm your choice with **Next**.

g Connect charge protection can limit the cost of ADSL and ISDN connections to a predetermined amount if desired. Confirm your choice with **Next**.

h Complete the configuration with **Finish**.

Section 'TCP/IP settings to workstation PCs' on page 37 will describe the settings required for the individual workstations in the LAN.

3.3 Instructions for *WEBconfig*

To configure the router with *WEBconfig* you must know how to address it in the LAN. An unconfigured *Lucent CellPipe 55* always reacts to a certain IP address, and in some network configurations even to a name.

EN

Does my *Lucent CellPipe 55* react to a name?

If you do not yet have a DHCP or DNS server on your LAN, the router reacts to any name (like 'Lucent' or 'Router') that you specify in the URL address field of a web browser.

If you don't know whether IP addresses have been used in your network up until now, display the IP address of your own PC (see the following section). If the 'IP Address' field contains the value '0.0.0.0', this indicates that an IP address has not yet been assigned to the network card.

What is the IP address of the *Lucent CellPipe 55*?

The IP address of an unconfigured *Lucent CellPipe 55* results from the IP address of your PC by replacing the last number of its IP address (after the third dot) with 254.

For example, if your PC is assigned the IP address 10.0.0.17, then you will find an unconfigured *Lucent CellPipe 55* under the address 10.0.0.254. The IP address of your PC can be displayed (depending on the operating system) with the following command line commands (entry under Windows at the command prompt):

Operating system	Command in the command line
Windows Me, Windows 98, Windows 95	winipcfg
Windows XP, Windows 2000, Windows NT 4.0	ipconfig
Linux, UNIX	ifconfig

Starting the wizards in WEBconfig

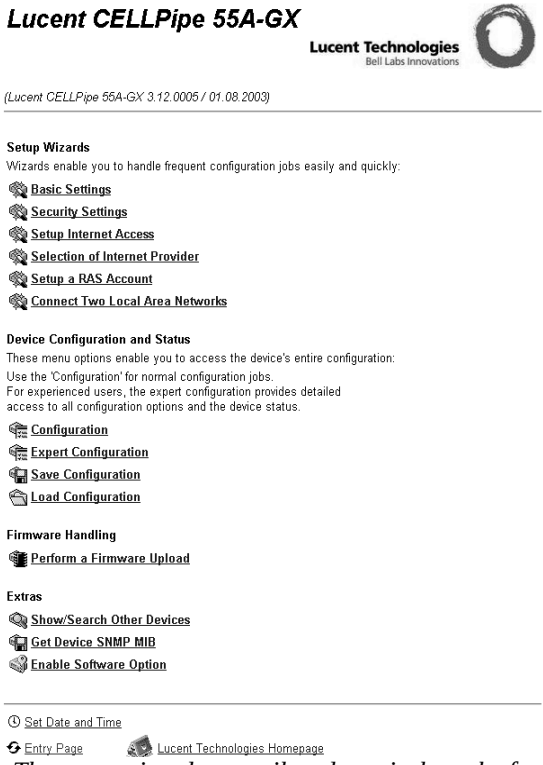
a Start your web browser (e.g. Internet Explorer, Netscape Navigator, Opera) and call the *Lucent CellPipe 55* there:

`http://<IP address of the Lucent CellPipe 55>` (or with any desired name)

If you cannot access an unconfigured Lucent CellPipe 55, the problem may be due to the netmask of the LAN: with less than 254 possible hosts (netmask > '255.255.255.0'), please ensure that the IP address 'x.x.x.254' is located in your own subnet.

The *WEBconfig* main menu will be displayed:

EN



The setup wizards are tailored precisely to the functionality of the specific Lucent CellPipe 55. As a result, your device may not offer all the wizards shown here.

If you have chosen automatic TCP/IP configuration, please continue with Step d.

b If you would like to configure the TCP/IP settings manually, assign an available address from a suitable address range to the *Lucent CellPipe 55*. Also set whether or not it is to operate as a DHCP server. Confirm your entry with **Apply**.

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c In the following 'Security settings' window, specify a password for configuration access. Note that the password is case-sensitive and ensure that it is sufficiently long (at least 6 characters).

You may specify whether the device may only be configured from the local network or whether remote configuration via the WAN (i.e. a remote network) is also permissible.

Please note that enabling this will also permit remote configuration via the Internet. You should always make sure that the configuration access is suitably protected, e.g. with a password.

Remote configuration via a direct ISDN connection is available independently of the WAN remote configuration: in this case, the configuration PC establishes a direct dial-up ISDN connection to the *Lucent CellPipe 55*, for example using Windows Dial-Up Networking. ISDN remote configuration can be enabled by specifying an MSN/terminal device selection digit for it. In this case, the *Lucent CellPipe 55* will accept calls on that MSN/ terminal device selection digit and can be remotely configured via the ISDN connection.

Confirm your selection with **Apply**.

d In the next window, select your ADSL provider from the list that is displayed. Confirm your choice with **Apply**.

If you select 'My provider is not listed here,' you must enter the transfer protocol used by your ADSL provider manually in the next window. Usually, the universal protocol 'Multimode' will work. Confirm your choice with **Apply**.

Entering the password in the web browser

When you are prompted for a password by your web browser when accessing the device in the future, enter it in the **Password** field. Please note that the password is case-sensitive. Leave the **User Name** field

Entering the configuration password

e Connect charge protection can limit the cost of ADSL and ISDN connections to a predetermined amount if desired. Confirm your choice with **Apply**.

If your devices does not feature an ISDN port, you may now close the setup wizard. Otherwise the wizard will prompt you to configure the ISDN port now. Make your choice and confirm it with **Apply**.

f Enter the ISDN subscriber numbers (as MSNs, i.e. without area code) on which the router will accept calls. Multiple numbers are separated by semicolons. If you do not specify any MSNs, the router will answer all incoming calls on the ISDN connection.

In addition, you can enter a trunk code for dialing into ISDN. Finally, you should specify whether or not the tariff information is to be transmitted at your ISDN connection. Confirm your entries with **Apply**.

g The basic setup wizard reports that all the necessary information has been provided. You can end the wizard with **Go on**.

3.4 TCP/IP settings to workstation PCs

The correct addressing of all devices within a LAN is extremely important for TCP/IP networks. In addition, all computers must know the IP addresses of two central points in the LAN:

- Default gateway – receives all packets that are not addressed to computers within the local network.
- DNS server – translates network names (www.**lucent.com**) or names of computers (**www**.lucent.com) to actual IP addresses.

The *Lucent CellPipe 55* can perform the functions of both a default gateway and a DNS server. In addition, as a DHCP server it can also automatically assign valid IP addresses to all of the computers in the LAN.

The correct TCP/IP configuration of the PCs in the LAN depends on the method used to assign IP addresses within the LAN:

- **IP address assignment via the *Lucent CellPipe 55* (default)**

  In this operating mode the *Lucent CellPipe 55* not only assigns IP addresses to the PCs in the LAN, it also uses DHCP to specify its

own IP address as that of the default gateway and DNS server. The PCs must therefore be configured so that they automatically obtain their own IP address and the IP addresses of the standard gateway and DNS server (via DHCP).

- **IP address assignment via a separate DHCP server**

  The workstation PCs must be configured so that they automatically obtain their own IP address and the IP addresses of the standard gateway and DNS server (via DHCP). The IP address of the *Lucent CellPipe 55* must be saved on the DHCP server so that the DHCP server transmits it to the PCs in the LAN as the standard gateway. In addition, the DHCP server should also specify the *Lucent CellPipe 55* as a DNS server.

- **Manual IP address assignment**

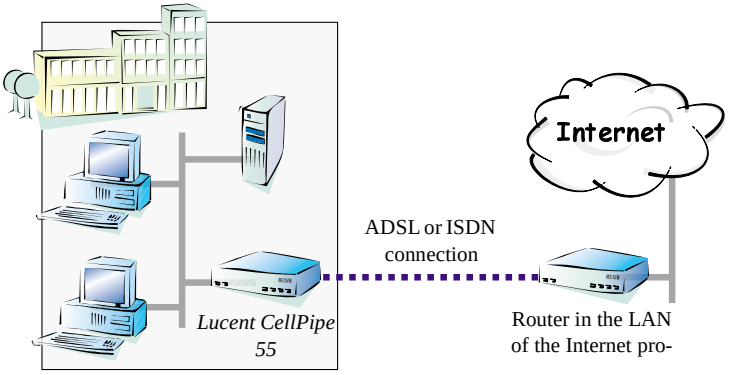
  If the IP addresses in the network are assigned statically, then for each PC the IP address of the *Lucent CellPipe 55* must be set in the TCP/IP configuration as the standard gateway and as a DNS server.

For further information and help on the TCP/IP settings of your Lucent CellPipe 55, please see the Lucent CellPipe 55 reference manual. For more information on the network configuration of the workstation computers, please refer to the documentation of your operating system.

EN

4 Setting up Internet access

All computers in the LAN can take advantage of the central Internet access of the *Lucent CellPipe 55*. The connection to the Internet provider can be established via any WAN connection, i.e. not only via ADSL, but also via the ISDN port (if present). Internet access via ISDN can be used as a backup connection for ADSL, for example.



Does the setup wizard know your Internet provider?

A convenient wizard is available to help you set up Internet access. The wizard knows the access information of major Internet providers and will offer you a list of providers to choose from. If you find your Internet service provider on this list, you normally will not have to enter any further transfer parameters to configure your Internet access. Only the authentication data that are supplied by your provider are required.

Additional information for unknown Internet providers

If the setup wizard does not know your Internet provider, it will prompt you for all of the required information step by step. Your provider will supply this information.

- **ADSL**
  - Protocol: PPP (PPPoA), PPPoE, Plain IP (IPoA) or Plain Ethernet
  - ATM parameter: VPI (Virtual Path Identifier) and VCI (Virtual Circuit Identifier), VC or LLC-based Multiplexing

  - Additionally for plain IP (IPoA) and Plain Ethernet: a dedicated public IP address with netmask (not to be confused with the private LAN IP address), default gateway and DNS server. These values can be received automatically from providers that support DHCP.
- **ISDN – dial-in number**

Additional connection options

You may also enable or disable further options in the wizard, depending on whether or not they are supported by your Internet provider:

- **Time-based billing or flat rate – select the accounting model used by your Internet provider.**
  - When using time-based billing, you can set the *Lucent CellPipe 55* to automatically close existing connections if no data has been transferred within a specified time (the so-called idle time).

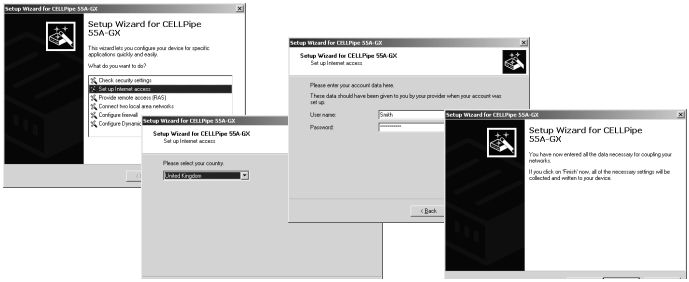
    In addition, you can activate a line monitor that identifies inactive remote stations faster and therefore can close the connection before the idle time has elapsed.
  - Active line monitoring can also be used with flat rate billing to continuously check the function of the remote station.

    You also have the option of keeping flat rate connections alive if required. Dropped connections are then automatically reestablished.
- **Dynamic channel bundling (ISDN only)** – if required, the second ISDN B channel will automatically be bundled to the connection. This doubles the available bandwidth; it may also double your connect charges as well, however. What's more, your ISDN connection will be busy in this case, with all other incoming and outgoing calls being rejected.
- **Data compression (ISDN only)** – this permits an additional increase in data throughput.

4.1 Instructions for *CELLconfig*

a Highlight the *Lucent CellPipe 55* in the selection window. From the menu bar, select **Tools / Setup Wizard**.

b Launch the 'Set up Internet access' wizard. Follow the wizard's instructions and enter the required information.



c From the menu, select the **Setup Internet access** wizard and click **Next**.

d In the following window select your country and your Internet provider if possible, and enter your access information.

e Depending on their availability, the wizard will display additional options for your Internet connection.

f The wizard will inform you as soon as the entered information is complete. Complete the configuration with **Finish**.

***CELLconfig*:**
Quick access to the setup wizards

Under *CELLconfig*, the fastest way to launch the setup wizards is via the button on the toolbar.

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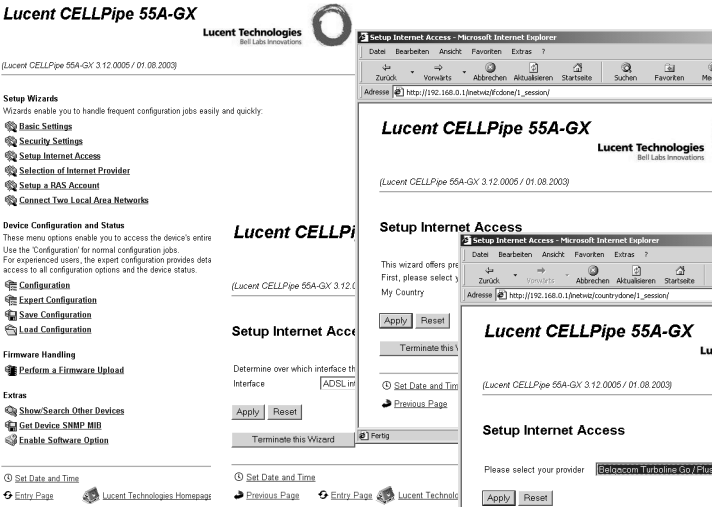
4.2 Instructions for *WEBconfig*

a In the main menu, select **Setup Internet access**.



b In the following window select your country and your Internet provider if possible, and enter your access information.

c Depending on their availability, the wizard will display additional options for your Internet connection.

d The wizard will inform you as soon as the entered information is complete. Complete the configuration with **Apply**.

EN

5 Linking two networks

With the network interconnection (also known as LAN to LAN coupling) of the *Lucent CellPipe 55*, two local networks are linked via ISDN. A setup wizard handles the configuration of the connection in the usual convenient manner.

Always configure both sides

Both routers involved in the network interconnection must be configured. Care must be taken to ensure that the configuration information provided matches.

The following instructions will assume that Lucent CellPipe 55 routers are being used on both sides. A network interconnection may also be realized with routers from other manufacturers. A mixed setup usually requires more extensive configuration measures for both devices, however. Please refer to the Lucent CellPipe 55 reference manual for more information in this regard.

Security aspects

You must, of course, protect your LAN against unauthorized access. A *Lucent CellPipe 55* therefore offers a whole range of security mechanisms that can provide an outstanding level of protection:

High-speed network links via DSL—VPN is the answer

To couple LANs using a fast DSL connection, you need the *Lucent CellPipe 55 VPN Option*. This software option enables your *Lucent CellPipe 55A-BX* router as a fully-fledged VPN gateway. Two *Lucent CellPipe 55* routers with *Lucent CellPipe 55 VPN Option* can be deployed to link LANs via the Internet.

The setup and configuration of VPN connections are covered in the *Lucent CellPipe 55 VPN Option* documentation.

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- Password-protected connections—simple and effective security.
- Verification of the ISDN subscriber number—for additional security.
- Callback function—for the highest security. Instruct the router to call incoming callers back under their own numbers.

The callback function cannot be configured using the wizard. It can only be set up in the expert configuration. For details, please see the Lucent CellPipe 55 reference manual.

5.1 What information is necessary?

The wizard will prompt you for the necessary information on a step-by-step basis. If possible, however, you should have it available before launching the wizard.

To explain the significance of the information requested by the wizard, we will be using a typical deployment as an example: setting up a link between a branch office and its headquarters. The routers involved are named 'HEAD_OFFICE' and 'BRANCH'.

Please refer to the following tables for the entries to be made for each of the routers. Arrows mark the dependencies between the entries.

5.1.1 General information

Name of local device and of remote station

Settings of the router in the …	Head Office		Branch
Name of the local device	*'HEAD_OFFICE'*	→	*'BRANCH'*
Name of the remote station	*'BRANCH'*	→	*'HEAD_OFFICE'*

If you haven't already named your *Lucent CellPipe 55*, the wizard will ask you for a new, **unique device name.** With this entry, you will rename your *Lucent*. Be sure to give the two devices different names.

Connection information

Settings of the router in the …	Head Office		Branch
Remote ISDN subscriber number	*(0789) 654321*	↔	*(0123) 123456*
Remote ISDN caller ID	*(0789) 654321*		*(0123) 123456*
Password for ISDN connection	*'Secret'*	↔	*'Secret'*

Enter the subscriber number of the remote station in the **ISDN subscriber number** field. The complete subscriber number including all necessary area and country codes is required.

The stated **ISDN caller ID** is used to identify and authenticate callers. When a *Lucent* receives a call, it compares the ISDN caller ID entered for the remote station with the actual caller ID transferred via the D channel. An ISDN caller ID generally consists of an area code and an MSN.

The **password for the ISDN connection** is an alternative to the use of the ISDN caller ID. It is always used to authenticate callers that do not send an ISDN caller ID. The exact same password must be entered on both sides. It is used for calls in both directions.

Data compression and Channel bundling

Settings of the router in the …	Head Office		Branch
Data compression	*on/off*	↔	*on/off*
Channel bundling	*on/off*	↔	*on/off*

Data compression increases the transfer speed of the connection at no additional cost. This is completely unlike the bundling of two ISDN channels with MLPPP (**M**ulti**L**ink **PPP**): The transfer rate will be doubled but there will also be additional telephone costs for two connections!

Selection of network protocols

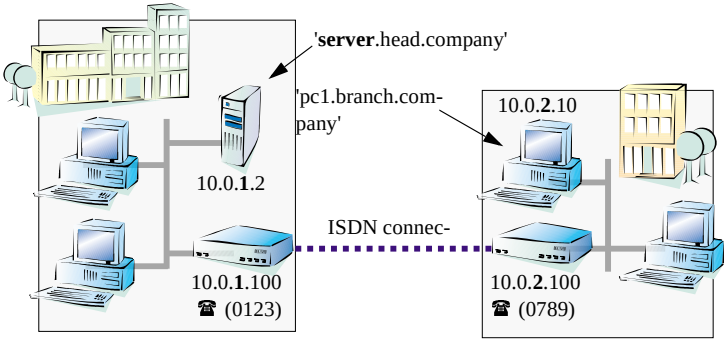
Select the desired network protocols:

EN

- TCP/IP – for example for Internet, intranet, Windows, Unix. NetBIOS can also be selected for Windows peer-to-peer networks.
- IPX – for Novell networks

5.1.2 Settings for the TCP/IP router

In TCP/IP networks, addressing has a special significance. Please note that two interconnected networks are logically separate from one another. Each must therefore have its own network number (in our example, '10.0.1.x' and '10.0.2.x'). These network numbers may not be identical.



LAN of the head office. IP: 10.0.**1.0**, netmask: 255.255.255.0

LAN of the branch office. IP: 10.0.**2.0**, netmask: 255.255.255.0 Domain:

Unlike when accessing the Internet, all of the IP addresses in the involved networks are visible on the remote side when coupling networks, not just those of the router. The computer with the IP address 10.0.2.10 in the branch office LAN sees the server 10.0.1.2 in the headquarters and can access it (assuming it has the appropriate rights), and vice versa.

DNS access to the remote LAN

Thanks to DNS, it is not only possible to access remote computers in a TCP/IP network via their IP address, but also by using freely defined names.

For example, the computer with the name 'pc1.branch.company' (IP 10.0.2.10) will not only be able to access the server of the head office

via its IP address, but also via its name, 'server.head.company'. The only precondition: the domain of the remote network in the wizard must be specified.

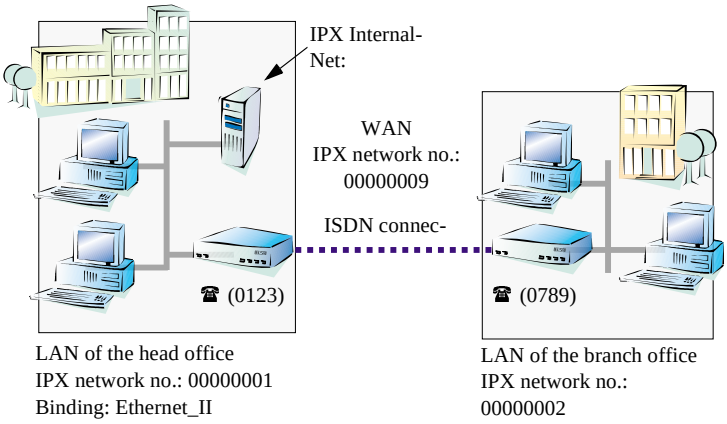
The domain can only be specified in the CELLconfig wizard. In WEBconfig, enter the appropriate information later in the expert configuration. For more information, see the Lucent CellPipe 55 reference manual.

5.1.3 Settings for the IPX router

Coupling two typical IPX networks to form a WAN requires three IPX network numbers:

- for the LAN of the head office
- for the LAN of the branch office
- for the higher-level WAN

The IPX network numbers in the head and branch offices are specified to the respective remote sides.



The three required network numbers are designated as “External Network Numbers” by the IPX conventions. Like IP network addresses, the apply to an entire LAN segment. On the other hand, internal IPX numbers are used to address specific Novell servers in the LAN. All three specified network numbers must be distinct from one another and from all used internal IPX network numbers.

In addition, it may be necessary to enter the frame type (“binding”).

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Specifying the IPX network number and binding used is not necessary if the remote network also contains a Novell server. It is only necessary to enter the network number for the WAN manually in this case.

5.1.4 Settings for NetBIOS routing

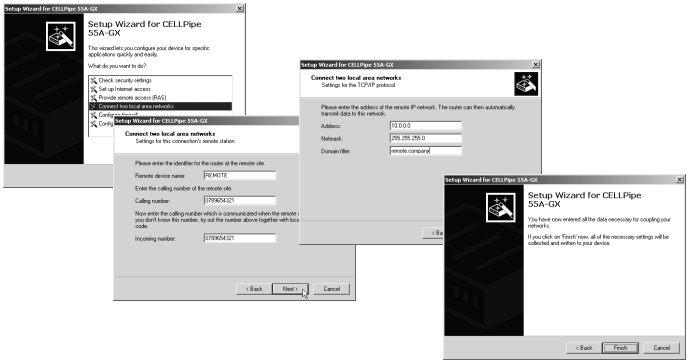
NetBIOS routing can be set up quickly: All that is required in addition to the information for the TCP/IP protocol used is the name of a Windows workgroup from in the router's own LAN.

Remote Windows workgroups do not appear in the Windows Network Neighborhood, but can only be contacted directly (e.g. via Find Computers).

5.2 Instructions for *CELLconfig*

Perform the configuration on both routers, one at a time.

a Launch the 'Connect two local area networks' wizard. Follow the wizard's instructions and enter the required information.



b The wizard will return a message to indicate that it has all the information it needs. Close the wizard with **Finish**.

c After finishing the configuration of both routers, you can test the network connection. Try to contact a computer in the remote LAN (e.g. with `ping`). The *Lucent CellPipe 55* should automatically set up a connection to the remote station and contact the required computer.

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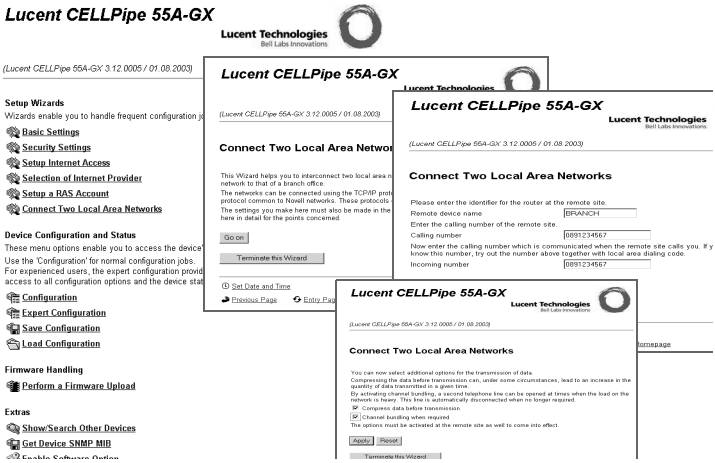
5.3 Instructions for *WEBconfig*

Perform the configuration on both routers, one at a time.

a From the main menu, launch the 'Connect two local area networks' wizard. Follow the wizard's instructions and enter the required information.



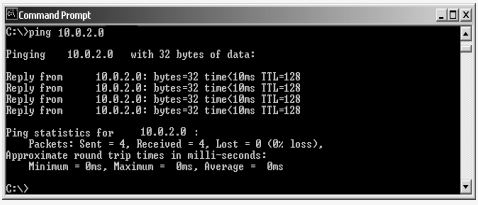
b The wizard will return a message to indicate that it has all the information it needs. Close the wizard with **Terminate**.

c After finishing the configuration of both routers, you can test the network connection. Try to contact a computer in the remote LAN (e.g. with `ping`). The *Lucent CellPipe 55* should automatically set

Ping – quick testing for TCP/IP connections

To test a TCP/IP connection, simply send a `ping` from your computer to a computer in the remote network. For more information on the 'ping' command, please see the documentation of your operating system.

IPX and NetBIOS connections can be tested by searching for a remote Novell server or a computer in the remote Windows workgroup from



up a connection to the remote station and contact the required computer.

6 Providing dial-up access

Your *Lucent CellPipe 55* supports dial-up connections to permit individual computers full access to your network. This service is also known as RAS (**R**emote Access **S**ervice).

The physical connection is realized via ISDN. An ISDN adapter or ISDN modem is therefore the only hardware requirement for the PC. PPP is used as the data transfer protocol. This ensures that all common devices and operating systems are supported.

A setup wizard handles the configuration of the dial-up connection in the usual convenient manner.

Security aspects

You must, of course, protect your LAN against unauthorized access. An *Lucent CellPipe 55* therefore offers a whole range of security mechanisms that can provide an outstanding level of protection:

- Password-protected connections – simple and effective security.
- Verification of the ISDN subscriber number – for increased security.
- Callback function – the highest security levels can be achieved by setting the router to call participants back at a number specified earlier.

The callback function cannot be configured using the wizard. It can only be set up in the expert configuration. For details, please see the Lucent CellPipe 55 reference manual.

6.1 Which information is required?

The wizard will set up dial-up access for only one user. Please run the wizard again for each additional user.

User name and password

Users authenticate themselves with this information when dialing in.

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Incoming number

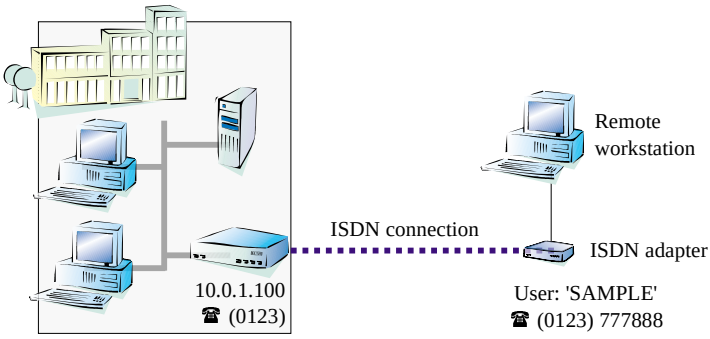
The *Lucent CellPipe 55* uses the optional ISDN caller ID as an additional user authentication. This security function should not be used when users dial in from differing locations.

Selection of network protocols

Select the desired network protocols:

- TCP/IP – for example for Internet, intranet, Windows, Unix. NetBIOS can also be selected for Windows peer-to-peer networks.
- IPX – for Novell networks

Important for TCP/IP: One IP address



LAN of the head office. IP: 10.0.1.0

Each active RAS user must be assigned an IP address when using the TCP/IP protocol. This IP address can be permanently assigned when setting up a user. However, it is simpler to let the *Lucent CellPipe 55* automatically assign free IP addresses to users when they dial in. In

The ISDN calling line identity (CLI)

The ISDN caller ID—also known as CLI (**C**alling **L**ine **I**dentity)—this is the telephone number of the caller which is transmitted to the participant receiving the call. As a rule, it consists of the country and area codes and an MSN.

The CLI is well-suited for authentication purposes for two reasons: it is very difficult to manipulate, and the number is transferred free of charge via the ISDN control channel (D channel).

this case you only need to specify the IP address range that the *Lucent CellPipe 55* should use for RAS users.

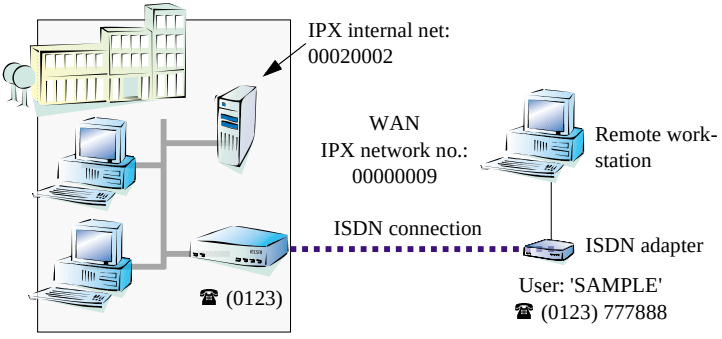
During both manual and automatic IP address assignment, please ensure that only free addresses from the address range of your local network are used. In our example, the IP address '10.0.1.101' will be assigned to the PC when connecting.

This IP address makes the computer a fully-fledged member of the LAN: with the appropriate rights, it can access all of the other devices in the LAN. The same applies in the other direction as well: computers in the LAN will also be able to access the remote machine.

Settings for IPX

Two IPX network numbers must be provided for remote access to an IPX network:

- the IPX network number of the head office
- an additional IPX network number for the higher-level WAN



LAN of the head office
IPX network no.: 00000001, Binding: Ethernet_II

The required network numbers are designated as “External Network Numbers”. Like IP network addresses, they apply to an entire LAN segment. On the other hand, internal IPX numbers are used to address specific Novell servers in the LAN. All three specified network numbers must be distinct from one another and from all used internal IPX network numbers.

In addition, it may be necessary to enter the frame type (“binding”).

Specifying the IPX network number and binding used is not necessary if the remote network also contains a Novell server. A network number for the WAN must also be entered manually in this case, however.

Settings for NetBIOS routing

All that is required to use NetBIOS is the name of a Windows workgroup from the router's own LAN.

*The connection is not established automatically. The RAS user must manually establish a connection to the Lucent CellPipe 55 via Dial-Up Networking first. When connected, they can search for and access computers in the remote network (via **Find / Computers**, not through the Network Neighborhood).*

6.2 Settings for the dial-in computer

A number of settings must be configured on the dial-in computer. These are briefly listed here, based on a Windows computer:

- Dial-Up Networking (or another PPP client) must be correctly configured
- Network protocol (TCP/IP, IPX) installed and bound to the dial-up adapter
- New connection in Dial-Up Networking with the call number of the router
- Terminal adapter or ISDN card set to PPPHDLC
- PPP selected as the Dial-Up server type, 'Enable software compression' and 'Require data encryption' unchecked
- Select desired network protocols (TCP/IP, IPX)
- Additional TCP/IP settings:
  - Assignment of IP address and name server address enabled
  - 'IP header compression' disabled

These settings will permit a PC to dial into a remote LAN via ISDN and access its resources in the usual manner.

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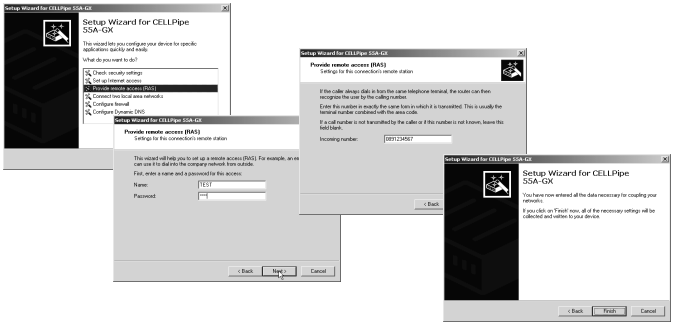
6.3 Instructions for *CELLconfig*

a Launch the 'Provide Dial-In access (RAS)' wizard. Follow the wizard's instructions and enter the required information.

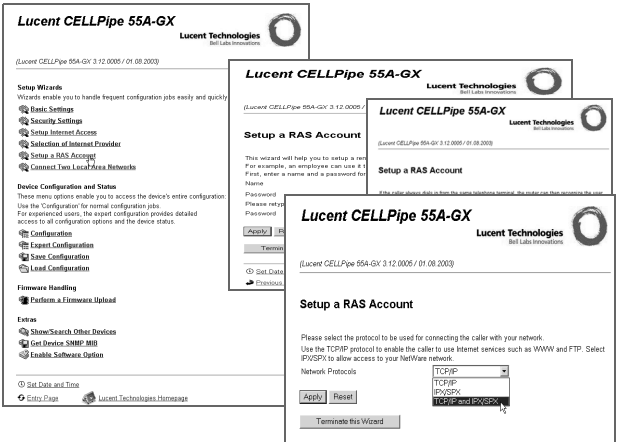


b The wizard will return a message to indicate that it has all the information it needs. Close the wizard with **Finish**.

c Configure Dial-Up Networking access on the dial-in PC as described. Next, test the connection (see box 'Ping – quick testing for TCP/IP connections' on page 49).

6.4 Instructions for *WEBconfig*

a From the main menu, launch the 'Setup a RAS account' wizard. Follow the wizard's instructions and enter the required information.



b Configure Dial-Up Networking access on the dial-in PC as described. Next, test the connection (see box 'Ping – quick testing for TCP/IP connections' on page 49).

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7 Office communications with the *LANCAPI*

LANCAPI from Lucent Technologies is a special version of the popular CAPI interface. CAPI (Common ISDN Application Programming Interface) establishes the connection between ISDN adapters and communications programs. For their part, these programs provide the computers with office communications functions such as a fax machine or answering machine.

In this chapter, we would like to introduce *LANCAPI* and its uses for office communications applications.

7.1 What are the advantages of *LANCAPI*?

The main advantages of using *LANCAPI* are economic. *LANCAPI* provides all Windows workstations integrated in the LAN with unlimited access to office communications functions such as fax machines, answering machines, online banking and eurofile transfer. All functions are supplied via the network without the necessity of additional hardware at each individual workstation. This eliminates the costs of equipping the workstations with ISDN adapters or modems. All you need to do is to install the office communications software on the individual workstations.

For example, faxes are sent by simulating a fax machine at the workstation. With *LANCAPI*, the PC forwards the fax via the network to the router which establishes the connection to the recipient.

All applications that you run via LANCAPI use direct ISDN connections which do not make use of the device's router functions. As a result, the firewall and charge monitoring functions do not work!

The client-server principle

The *LANCAPI* is made up of two components, a server (in the *Lucent CellPipe 55*) and a client (on the PCs). The *LANCAPI* client should only be installed on the computers of the local network that intend to use the functions of the *LANCAPI*.

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7.2 Configuring the *LANCAPI* server

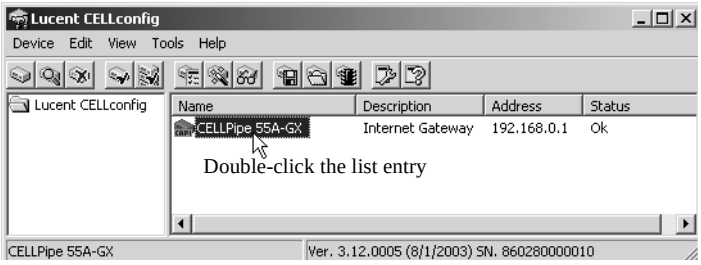
Two basic issues are important when configuring the *LANCAPI* server:

- What call numbers from the telephone network should *LANCAPI* respond to?
- Which of the computers in the local network should be able to access the telephone network via *LANCAPI*?

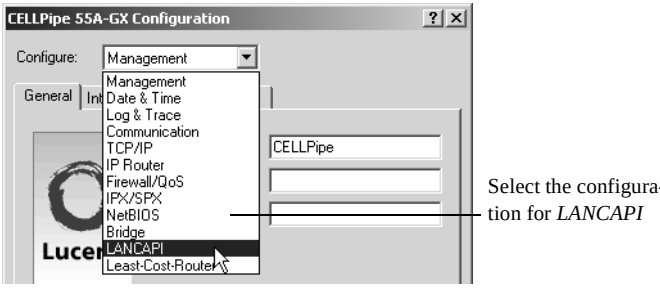
The configuration of the router is performed using the *CELLconfig* or *WEBconfig* configuration tables. The following two sections contain step-by-step instructions for each of these configuration programs.

7.2.1 Instructions for *CELLconfig*

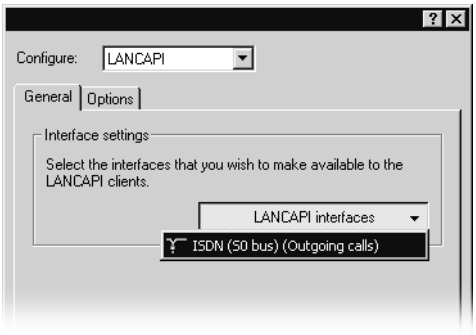
a Doubleclick the device name in the list to open the configuration of the router and enter your password when prompted to do so.



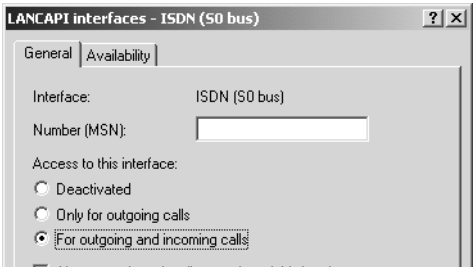
b Select the **LANCAPI** configuration section.



c Select the ISDN interface.



d Activate the *LANCAPI* server for the outgoing and incoming calls, or allow only outgoing calls.



If you would like the *LANCAPI* server to accept incoming calls, enter all of the MSNs on which the *LANCAPI* should answer calls in the 'Number (MSN/EAZ)' field. Use semicolons to separate multiple numbers. If you do not enter a subscriber number here, the *LANCAPI* will answer all incoming calls on the local ISDN connection.

7.2.2 Instructions for *WEBconfig*

a In the main menu, select **Expert Configuration**.

b In the following menus, select **Setup / LANCAPI Module / Interface-list**.

c In the **Interface-list**, select the only entry, **S0-1**.

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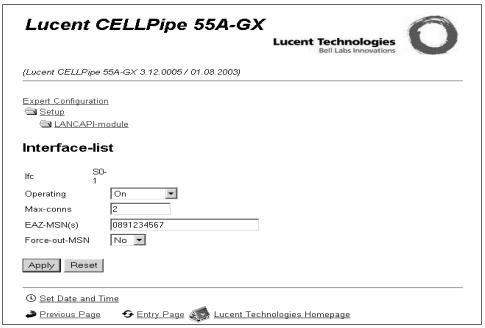
d Activate the *LANCAPI* server for the outgoing and incoming calls ('On'), or allow only outgoing calls ('Out').



If you would like the *LANCAPI* server to accept incoming calls, enter all of the MSNs on which the *LANCAPI* should answer calls in the 'Subscriber Numbers (MSN/EAZ)' field. Use semicolons to separate multiple numbers. If you do not enter a subscriber number here, the *LANCAPI* will answer all incoming calls on the local ISDN connection. Confirm your entries with **Apply**.

7.3 Installing the *LANCAPI* client

You must have administrator rights to install the LANCAPI client on a system running Windows XP or Windows 2000.

a Place the *Lucent CellPipe* CD in the CD-ROM drive of the client PC. If the setup program does not automatically start when you insert the CD, simply click 'autorun.exe' in the main directory of the *Lucent CellPipe* CD in the Windows Explorer.

b Select the **Install** Lucent **software** entry.

c Highlight the ***LANCAPI*** option. Click **Next** and follow the instructions for the installation routine. Finally, restart the computer if required.

The *LANCAPI* client will start automatically from now on. Its status is displayed by the new icon in the Windows system tray (next to the clock).

 = active	 = error	 = inactive

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7.4 Configuration of the *LANCAPI* client

The configuration of the *LANCAPI* client is used to determine which *LANCAPI* servers will be used and how these will be checked. All parameters can remain at their default settings if you are using only one *Lucent CellPipe 55* in your LAN as a *LANCAPI* server.

a Start the *LANCAPI* client in the 'ELSAlan' program group. Information regarding the drivers and the available service can be found on the 'General' tab.

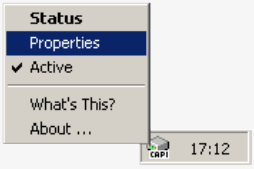
b In the *LANCAPI* client, change to the **Network** tab. First, select whether the PC should find its own *LANCAPI* server, or specify the use of a particular server.

- For the former, determine the interval at which the client should search for a server. It will continue searching until it has found the number of servers specified in the next field. Once the required number of servers has been found, it will stop searching.
- In the event that the client should not automatically search for servers, list the IP addresses of the servers to be used by the client. This can be useful if you are operating several *Lucent CellPipe 55* in your LAN as *LANCAPI* servers and you would like to specify a server for a group of PCs, for example.
- It is also possible to set the interval at which the client checks whether the found or listed servers are still active.

Quick access to the *LANCAPI* client

There are two ways to launch the *LANCAPI* client directly from the Windows taskbar: Double-clicking the icon will open the status window, from which you can reach the configuration via **Properties**.

A right-click will take you to the client even faster. Select **Properties** from the context menu.



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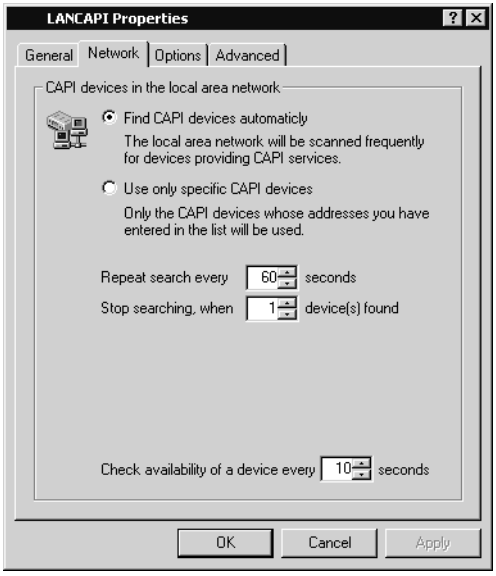

7.5 How to use the *LANCAPI*

Two options are available for the use of the *LANCAPI*:

- You may use software which interacts directly with a CAPI (in this case, the *LANCAPI*) port, such as *RVS-COM*. This type of software searches for the CAPI during its installation and uses it automatically.
- Other programs such as LapLink can establish a variety of connection types, for example, using Windows Dial-Up Networking. You may select the installed communications device that you would like to use when creating a new dial-up connection. For the *LANCAPI*, select the entry 'ISDN WAN Line 1'.

7.6 The *CAPI Faxmodem*

The *CAPI Faxmodem* provides a Windows fax driver (Fax Class 1) as an interface between the *LANCAPI* and applications, permitting the use of standard fax programs with an *Lucent CellPipe 55*.

Installation

The *CAPI Faxmodem* can be installed from the CD setup. Always install the *CAPI Faxmodem* together with the current version of *LANCAPI*. After restarting, the *CAPI Faxmodem* will be available to your system. Under Windows 98, it can be found under **Start** / **Settings / Control Panel / Modems**.

Faxing with the *CAPI Faxmodem*

Most major fax programs recognize the *CAPI Faxmodem* automatically during installation and identify it as a 'Class 1' fax modem. Fax transmissions can thus be realized at speeds of up to 14,400 bps. If your fax program offers you a choice (such as WinFax and Talkworks Pro), select the option 'CLASS 1 (Software Flow Control)' when setting up the modem.

Windows XP and Windows 2000 provide full fax functionality in conjunction with the *CAPI Faxmodem*. An additional fax program is not required.

The CAPI Faxmodem requires LANCAPI for the transmission of fax messages.

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8 Security settings

This section will explain the most important security settings.

8.1 Protection of the configuration

In the basic configuration, three measures were already implemented to protect the configuration of the device:

- Assignment of a password for the configuration
- Locking of configuration via the WAN (optional)
- Locking of ISDN remote configuration

Enabling ISDN remote configuration

ISDN remote configuration can be enabled by specifying an MSN for it. In this case, the *Lucent CellPipe 55* will accept calls on that MSN and can be remotely configured via the ISDN connection.

Parameters for automatic configuration locking

The *Lucent CellPipe 55* locks access to its configuration for a specified period of time after a certain number of failed log-in attempts. Both the number of failed attempts and the duration of the lock can be set as needed. By default, access is locked for a period of five minutes after the fifth failed log-in attempt.

Checking and modifying the basic settings

All parameters related to the protection of the configuration can easily be checked and modified:

- *CELLconfig* features the **Check security settings** wizard.
- *WEBconfig* provides the option of launching the **Basic Settings** wizard and changing the settings as required. The **Security Settings** wizard offers a range of additional options.

8.2 The security checklist

The following checklist contains a complete overview of all security settings for pros. Most of the points on this checklist are no cause for concern for simple configurations. The security settings implemented

during basic configuration or by the security wizard are generally adequate in such cases.

Detailed information on the security settings listed here can be found in the Lucent CellPipe 55 reference manual.

- **Have you assigned a password for the configuration?**

  The simplest option for the protection of the configuration is the establishment of a password. As long as a password hasn't been set, anyone can change the configuration of the device. The field for entering the password is contained in *CELLconfig* in the 'Management' configuration area on the 'Security' tab. It is particularly advisable to assign a password to the configuration if you want to allow remote configuration.

- **Have you permitted remote configuration?**

  If you do not require remote configuration, then deactivate it. If you require remote configuration, then be sure to assign a password protection for the configuration (see previous section). The field for deactivating the remote configuration is also contained in *CELLconfig* in the 'Management' configuration area on the 'Security' tab.

- **Have you provided the SNMP configuration with a password?**

  Also protect the SNMP configuration with a password. The field for protection of the SNMP configuration with a password is also contained in *CELLconfig* in the 'Management' configuration area on the 'Security' tab.

- **Have you allowed remote access?**

  If you do not require remote access, deactivate call acceptance by deactivating a call acceptance 'by number' and leaving the number list blank in *CELLconfig* in the 'Communication' configuration area on the 'Call accepting' tab.

- **Have you activated the callback options for remote access and is CLI activated?**

  When a call is placed over an ISDN line, the caller's number is normally sent over the D channel before a connection is even made (CLI). Access to your own network is granted if the call number appears in the number list, or the caller is called back if the callback option is activated (this callback via the D channel is not supported by the Windows Dial-Up Network). If the *Lucent*

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CellPipe 55 is set to provide security using the telephone number, any calls from remote stations with unknown numbers are denied access.

- **Have you activated IP masquerading?**

  IP masquerading is the hiding place for all local computers for connection to the Internet. Only the router module of the unit and its IP address are visible on the Internet. The IP address can be fixed or assigned dynamically by the provider. The computers in the LAN then use the router as a gateway so that they themselves cannot be detected. The router separates Internet and intranet, as if by a wall. The use of IP masquerading is set individually for each route in the routing table. The routing table can be found in the *CELLconfig* in the 'IP router' configuration section on the 'Routing' tab.

- **Have you closed critical ports with filters?**

  The firewall filters of the *Lucent CellPipe 55* devices offer filter functions for individual computers or entire networks. Source and target filters can be set for individual ports or for ranges of ports. In addition, individual protocols or any combinations of protocols (TCP/UDP/ICMP) can be filtered. It is particularly easy to set up the filters with *CELLconfig*. The 'Filtering' tab under 'IP router' can assist you to define the filter rules.

- **Have you excluded certain stations from access to the router?**

  Access to the internal functions of the devices through TCP/IP can be restricted using a special filter list. Internal functions in this case are configuration sessions via *CELLconfig*, *WEBconfig*, Telnet or TFTP. This table is empty by default and so access to the router can therefore be obtained by TCP/IP using Telnet or TFTP from computers with any IP address. The filter is activated when the first IP address with its associated network mask is entered and from that point on only those IP addresses contained in this initial entry will be permitted to use the internal functions. The circle of authorized users can be expanded by inputting further entries. The filter entries can describe both individual computers and whole networks. The access list can be found in *CELLconfig* in the 'TCP/IP' configuration section on the 'General' tab.

- **Is your saved *Lucent CellPipe 55* configuration stored in a safe place?**

  Protect the saved configurations against unauthorized access in a safe place. A saved configuration could otherwise be loaded in another device by an unauthorized person, enabling, for example, the use of your Internet connections at your expense.

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9 Troubleshooting

In this chapter, you will find suggestions and assistance for a few common difficulties.

9.1 No DSL connection is established

After startup, the router automatically attempts to connect to the ADSL provider. During this process, the ADSL link LED will blink green. If successful, the LED will switch over to steady green. If, however, the connection can't be established, the ADSL link LED will light up red. The reason for this is usually one of the following :

Correct device for your type of telephone service?

ADSL connections are possible based on two different types of telephone service: Either with traditional analog service ('ADSL-over-POTS'), or with ISDN ('ADSL-over-ISDN'). A special version of the *Lucent CellPipe 55* router is needed for each telephone system.

Verify that your *Lucent CellPipe 55* is actually designed for your ADSL connection type. You can find more information under 'ADSL-over-ISDN or ADSL-over-POTS?' on page 10.

Problems with cabling for ADSL?

Only the cable provided with your device should be used to connect to ADSL. This cable must be connected to the ADSL jack of the splitter (see also Seite 24).

Has the correct ADSL transfer protocol been selected?

The ADSL transfer protocol is set along with the basic settings. The basic setup wizard will enter the correct settings for numerous ADSL providers automatically. Only if your ADSL provider is not listed, you will have to enter the protocol that is used manually. Usually, the universal protocol 'Multimode' will work in this case. In any case, the protocol that your ADSL provider supplies you with will definitely work.

You can monitor and correct the protocol settings under:

Configuration tool	Run command
CELLconfig	Management / Interfaces / Interface settings / ADSL Interface
WEBconfig	Expert Configuration / Setup / Interfaces / ADSL Interface

9.2 DSL data transfer is slow

The data transfer rate of an Internet or ADSL connection is dependent upon numerous factors, most of which are outside of one's own sphere of influence. Important factors aside from the bandwidth of one's own Internet connection are the Internet connection and current load of the desired target. Numerous other factors involving the Internet itself can also influence the transfer rate.

Increasing the TCP/IP window size under Windows

If the actual transfer rate of an ADSL connection is significantly below the fastest rate listed by the provider, there are only a few possible causes (apart from the above-mentioned external factors) which may involve one's own equipment.

One common problem occurs when large amounts of data are sent and received simultaneously with a Windows PC using an asynchronous connection. This can cause a severe decrease in download speed. The cause of this problem is what is known as the TCP/IP receive window size of the Windows operating system that is set to a value too small for asynchronous connections.

Instructions on how to increase the Windows size can be found in the KnowledgeBase of the support section of the Lucent website (www.lucent.com).

9.3 Unwanted connections under Windows XP

Windows XP computers on a LAN attempt to compare their clocks with a timeserver on the Internet at startup. This is why when a Windows XP in the LAN is started, a connection to the Internet is established by the *Lucent CellPipe 55*.

To resolve this issue, you can turn off the automatic time synchronization under **Right mouseclick on the time of day / Properties / Internet time**.

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10 Technical data

10.1 Performance data and specifications

Modes	Multiproto-col router	IP, IPX and NetBIOS/IP router , HTTP and HTTPS server, DNS client, DNS server, DNS relay, DHCP client, DHCP relay and DHCP server including autodetection, NTP client, SNTP server, Dynamic DNS client
Connections	ADSL WAN (RJ-11)	'Annex A' devices : ADSL over POTS as per ITU G.992.1 Annex A, ANSI T1.413, ITU G.992.2 (G.Lite), G.994.1 (G.hs); 'Annex B' devices : ADSL over ISDN as per ITU G.992.1 Annex B, as well as proprietary ADSL over ISDN (Texas Instruments, ADI, Alcatel), ETSI TS 101 388, optional connection of external SDSL modem (PPPoE) or external Plain Ethernet router (DSL over LAN)
	ISDN WAN (RJ-45)	ISDN S_0 bus, point-to-point and point-to-multipoint configuration, I.430, (autosensing), optional leased-line support; D-channel 1TR6, DSS1 (Euro-ISDN); B-channel PPP (asynchronous/synchronous), X.75, HDLC, MLPPP for channel bundling, CAPI 2.0 via *LANCAPI*, Stac data compression
	Ethernet LAN (4 x RJ-45)	4 x Ethernet IEEE 802.3 (switch), 10/100Base-T-autosensing, node/hub auto detection, port-separation switchable (private mode)
Protocols	LAN	IP: ARP, Proxy ARP, IP, ICMP, UDP, TCP, TFTP, RIP 1, RIP 2, DHCP, DNS, SNMP, HTTP, HTTPS, BOOTP, NTP/SNTP, NetBIOS, LANCAPI, RADIUS
		IPX: RIP, SAP, IPX and SPX watchdogs, NetBIOS watchdogs
	WAN	PPPoE, PPPoA, PPTP, IPoA and Plain Ethernet
Transfer rates (maximum)	LAN	100 Mbps, full duplex operation
	WAN	Downstream 8 Mbps, upstream 800 kbps
ATM	Transport	Up to 8 ATM AAL-5 PVCs
	OAM	ATM-F4 and F5-Loop-Back

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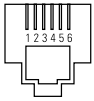
Security	Access	PAP, CHAP and MS-CHAP as PPP authentication mechanisms, password-protected configuration access for each interface, access control list (IP, MAC and protocol filter) for configuration access and *LANCAPI*, ISDN caller ID list
	Firewall functions, NAT/PAT	Stateful Inspection Firewall with Intrusion Detection and Denial-of-Service Protection. IP address and port translation via a single IP address; dynamic and static IP address assignment; IP packet filter with port ranges; masquerading of TCP, UDP, ICMP, FTP, PPTP, IPSec (VPN pass-through) and NetMeeting; DNS forwarding; inverse masquerading for IP services from the intranet such as web servers; support for 2 local networks (DMZ); DNS hit lists as well as wildcard filters (URL blocking)
Operation	Static or dynamic IP address assignment via PPP; PPP auto-reconnect and auto-disconnect; BACP (bandwidth-on-demand); FirmSafe with 2 firmware versions for absolutely secure software upgrades	
Statistics	Counters	Extensive ADSL, ATM, Ethernet, IP and DNS statistics; SYSLOG error counter, connection and online time as well as transfer volume per station, accounting information exportable via *CELLmonitor* and SYSLOG
Diagnosis	LEDs for LAN, WAN and devices status; extensive trace system	
Management	Outband	Command line interface, serial V.24/V.28 port (8-pin mini-DIN)
	Inband	*CELLconfig* including setup wizards for Internet access, security and LAN to LAN coupling; *CELLmonitor* status display; remote assistance via ISDN; Telnet, browser-based (HTTP/ HTTPS) and TFTP configuration as well as firmware upload; SNMP management via SNMP V2, WAN or LAN access configurable separately; simultaneous remote configuration and management of multiple devices with *CELLconfig*, supervisor alerts via SNMP traps and SYSLOG
	Tools	*CELLconfig* (Windows configuration program) *CELLmonitor* (Windows status display) *WEBconfig* (integrated web server)

Hardware	Power adapter	12 VA, external AC adapter (230 V)
	Environment	Temperature range 5–40°C; humidity 0–80 %; non-condensing
	Housing	210 x 140 x 45 mm (W x H x D), rugged plastic case, connectors on the rear side, stackable, provision for wall mounting
	Approvals	EU (CE certification: EN 55022, EN 55024, EN 60950)
Package contents	Hardware	Power adapter, serial configuration cable, 1 Ethernet cable, ADSL connection cable for splitter
	Software	*CELLconfig*, *CELLmonitor*, firmware, CAPI Faxmodem,
	Documentation	Quick Install, PDF manuals, languages: English and German
Service	Warranty	2 years
	Support	Via hotline and Internet

10.2 Contact assignment

10.2.1 ADSL interface

6-pin RJ11 socket

Connector	Pin	IAE
	1	–
	2	–
	3	A
	4	B
	5	–
	6	–

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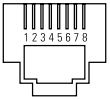
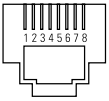
10.2.2 ISDN S0 interface

8-pin RJ45 socket as per ISO 8877, EN 60603-7

Connector	Pin	Line	IAE
	1	–	–
	2	–	–
	3	T+	2a
	4	R+	1a
	5	R-	1b
	6	T-	2b
	7	–	–
	8	–	–

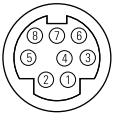
10.2.3 Ethernet interfaces 10/100Base-T

8-pin RJ45 sockets as per ISO 8877, EN 60603-7

Connector	Pin	Line
	1	T+
	2	T-
	3	R+
	4	–
	5	–
	6	R-
	7	–
	8	–

10.2.4 Configuration interface (outband)

8-pin mini-DIN socket

Connector	Pin	Line
	1	CTS
	2	RTS
	3	RxD
	4	RI
	5	TxD
	6	DSR
	7	DCD
	8	DTR
	U	GND

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