

Nokia M5122

ADSL Bridge

T66250

ADMINISTRATOR MANUAL



NOKIA

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Glossary

Chapter 1

Introduction to Nokia M5122

Nokia M5122 is an ADSL bridge which enables high-speed Internet access and LAN interconnection. It increases the capacity of the already installed telephone lines used for telephone services. M5122 enables high-speed connections for homes and small offices.



Figure 1-1 Nokia M5122

Nokia M5122 allows multiple PCs equipped with a 10Base-T Ethernet interface to be connected to a remote network via a Digital Subscriber Line Access Multiplexer (DSLAM) and an ATM access network. It acts as a bridge between the Ethernet LAN and ADSL/ATM network interfaces. An in-built 4-port hub allows easy home and small office network installation.

The ADSL transmission is based on a DMT line code and it provides speeds up to 8 Mbit/s downstream (from the network) and 800 kbit/s

upstream (to the network). M5122 can adjust its speed to the line conditions in steps of 32 kbit/s maximising the data throughput over the given distance. M5122 is compatible with the following ADSL standards: ITU-T G.992.1 (ITU-T ADSL) and ITU-T G.992.2 (ITU-T ADSL Lite). M5122 is compatible with Nokia Digital Subscriber Line Access Multiplexer.

M5122 provides optimised access to high-speed data services. It can be used to connect telecommuters to the corporate network or netsurfers to the Internet Service Provider's (ISP) network, for example.

M5122 has a command line interface (CLI) for configuration and performance monitoring purposes. It can be accessed through a serial connector on the M5122 back panel or using telnet. The most commonly used parameters can also be configured with a web browser.

An external POTS filter enables the simultaneous use of the conventional telephone service and the ADSL data services.

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Chapter 2

Applications and features

This chapter introduces the most common applications, features and management methods of M5122.

2.1 Applications

M5122 is a self-learning MAC layer Ethernet bridge which can be used in all networking applications. The two most typical applications for M5122 are:

- High-speed Internet access
- LAN interconnection

2.1.1 High-speed Internet access

M5122 can be used to connect the user's PC to the Internet services easily. In high-speed Internet access application the M5122 bridges the outgoing and incoming IP packets from/to customer premises through the ADSL connection and ATM core network to a remote access node (RAN) which finally routes the packets to an Internet service provider (ISP) and to the Internet.

The benefit of bridging in this application example is the transparency to different applications which the end user may require as well as the easy installation of the M5122 because as a simple bridge it requires no configuration.

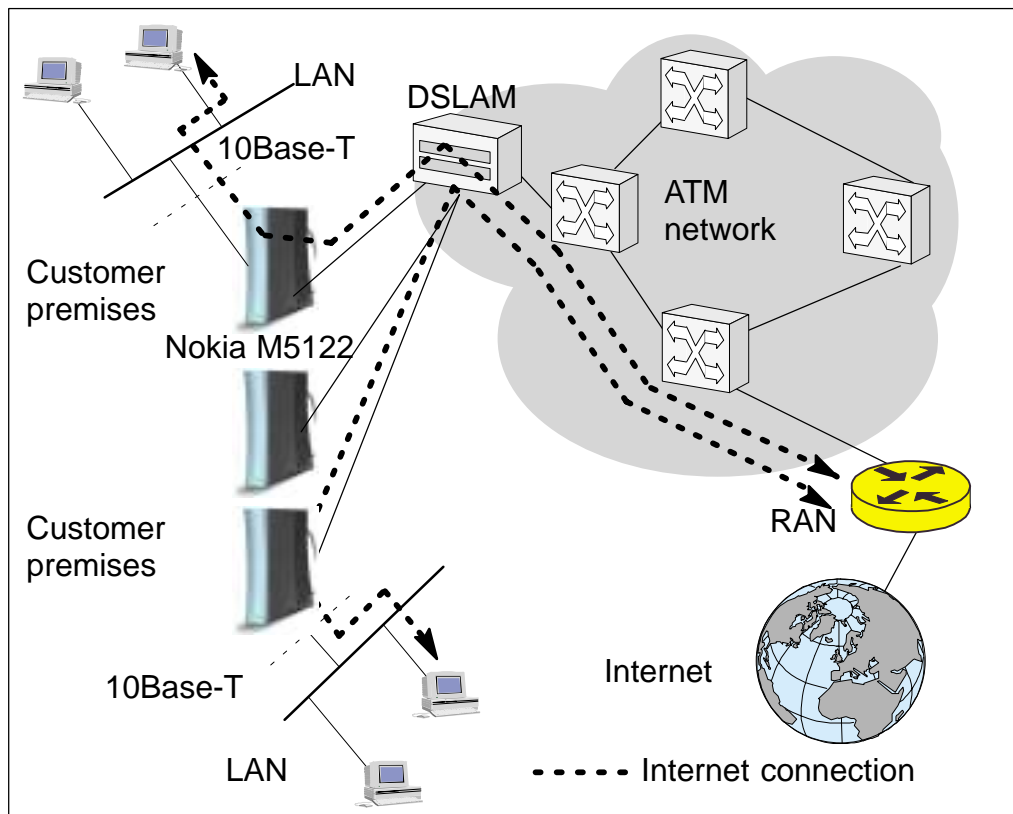


Figure 2-1 High-speed Internet access

2.1.2 LAN interconnection

LAN interconnection between a corporate headquarters and its remote office is a typical application for M5122. In the LAN interconnection application M5122 relays all non-local Ethernet traffic between the corporate headquarters and remote sites through the ATM core network.

The benefit of bridging in this application example is the transparency for all network protocols in a multiprotocol data communications corporate network.

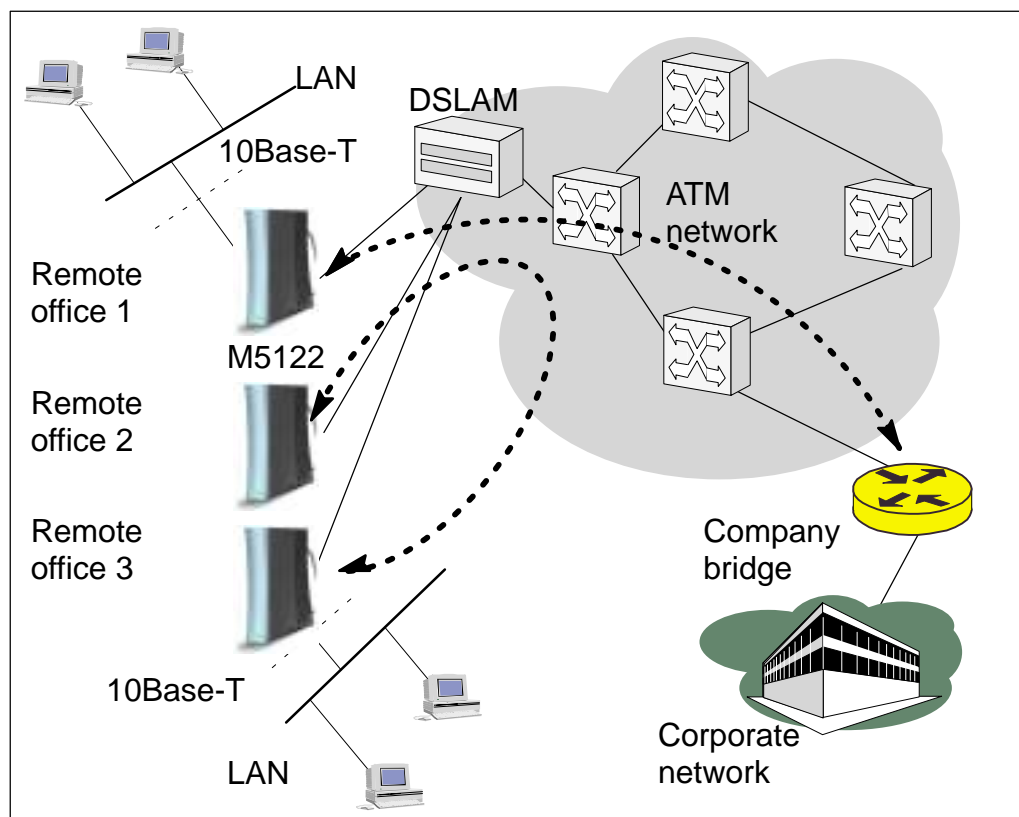


Figure 2-2 LAN interconnection

2.2 Functionality

2.2.1 Bridging

M5122 operates as a self-learning bridge supporting up to 1024 MAC addresses. Bridging is done between the Ethernet 10Base-T interfaces and the ATM/ADSL interface.

2.2.2 ATM and ADSL

M5122 supports eight ATM/ADSL virtual channel connections (VCC). The factory default setting is one VCC with virtual path identifier (VPI) 0 and virtual channel identifier (VCI) 100. The ATM channel supports UBR (Unspecified bit rate) traffic shaping. The maximum transmit rate on the VCC is equal to the ADSL upstream capability.

The ADSL transmission is based on the DMT line code. M5122 provides a DMT line rate up to 8 Mbit/s downstream and up to 800 kbit/s upstream. The DMT transceiver is rate adaptive and capable of providing faster rates over short distances or slower rates over long distances. The transceiver adapts itself to the line conditions and rate adaptation is done in steps of 32 kbit/s. The network operator can set the data rates as a part of the network management functionality provided by Nokia DSLAM.

M5122 supports ATM over ADSL transmission ITU-T G.992.1 and ADSL Lite ITU-T G.992.2. The ADSL mode can be changed through the command line interface.

2.2.3 Dynamic Host Configuration Protocol

Note

Use DHCP with PPTP tunneling only.

M5122 can act as a Dynamic Host Configuration Protocol (DHCP) server for the PCs on the end-user home network. In this mode, M5122 can assign up to 253+253 consecutive addresses from two separate address ranges (that is, 253 consecutive addresses per address range) to the PCs on the home network. Two separate address ranges can be used if more than 253 addresses are required on the local subnet, if two non-contiguous address ranges are needed or if an additional router with DHCP relay is used on the local network. M5122 can also act as a DHCP relay agent and relay the DHCP requests to an external DHCP server.

2.2.4 Point-to-Point Tunneling Protocol (PPTP)

When PPTP local tunneling is used, a local network client initialises a PPTP-tunneled PPP connection (VPN) to Nokia M5122. The modem

terminates the tunnel and all data from that terminated local PPTP tunnel will be forwarded to an assigned ATM VCC by using PPP over AAL5 encapsulation. Thus, each local PPTP tunnel requires an equivalent ATM VCC assigned to it restricting the total number of local PPTP hosts to 8.

Local tunneling is used when there is a need to have one or more computers connected independently to different networks. For example, in remote work application, the rest of the family may be using the common ISP services and one or two family members need to gain access to their corporate networks. With local tunneling, these remote workers may be connected to a different network than the rest of the users.

Local tunneling is activated using the PPTP client running, for example, in Windows. The destination IP address must be M5122 LAN/VBRIDGE IP address depending on the configuration. PPP packets within PPTP are mapped to the configured VCC. M5122 has three different ways to choose the ATM VCC that will be used for tunneling:

- Automatic, chooses the first free VCC
- Chooses the VCC number using C:number, where number is from 1 to 8. C:number is typed after the M5122 IP address in PC's PPTP client Connect To window (see Figure 2-3).
- Chooses the VCC number using N:name, where name is the VCCx description (see Chapter 5: Management section CLI commands). N:name is entered after the M5122 IP address.

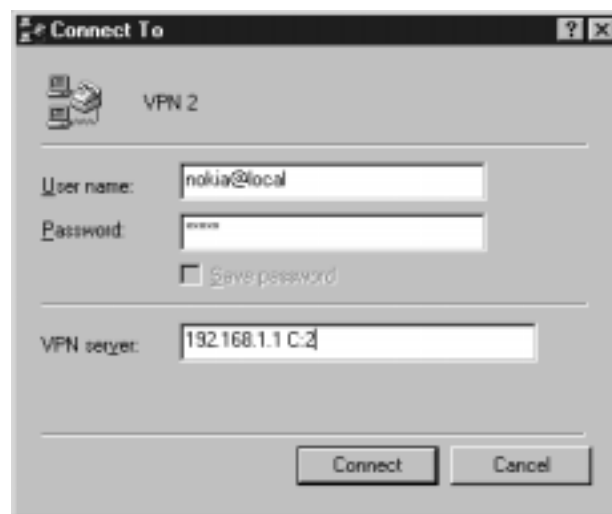


Figure 2-3 Choosing the VCC2 for tunneling example

2.2.5 Payload encapsulations

The Ethernet frames are encapsulated in the ATM link by using RFC 2684 LLC/SNAP encapsulation.

2.2.6 Weighted Fair Queueing (Class of Service)

As a Class of Service (CoS) function, M5122 supports Weighted Fair Queueing (WFQ) for each ATM VCC. The CoS function ensures that different IP traffic streams are treated fairly in the upstream (towards the Internet) direction. This may be necessary, in some cases, because the upstream capacity of the ADSL line is somewhat limited compared to the Ethernet bandwidth on the office or home LAN. The WFQ CoS function classifies IP traffic streams based on IP address, protocol and port fields. It is capable of identifying the IP stream from all supported payload encapsulation formats.

2.3 Management

By default, M5122 is a bridge and requires no configuration if used in its default configuration. If you want to change the configuration or monitor M5122 performance you can do it through the command line interface (CLI) or with an ordinary web browser. The CLI allows complete configuration of the unit whereas the web browser management allows the configuration of the most frequently used configuration parameters and monitoring.

The CLI can be accessed locally through an RS-232 command line interface connector on the M5122 back panel, with telnet protocol through payload interfaces (10Base-T or ADSL/ATM) or through a separate dedicated ADSL/ATM management channel. The web browser management can be accessed through the payload interfaces (10Base-T or ADSL/ATM).

To enable management connection through the payload interfaces (10Base-T or ADSL/ATM) you must configure an IP address for the internal virtual bridge gateway interface (Vbridge interface) of M5122. Similarly you have to give an IP address to the separate ADSL/ATM management channel for you to be able to manage M5122 through it.

You can use CLI for monitoring purposes as well as for configuring management parameters and ATM channel parameters.

Chapter 3

Interfaces and indicator lights

M5122 has four 10Base-T Ethernet interfaces (4-port hub), an ADSL interface, and a command line interface. The interfaces are shown in Figure 3-1.

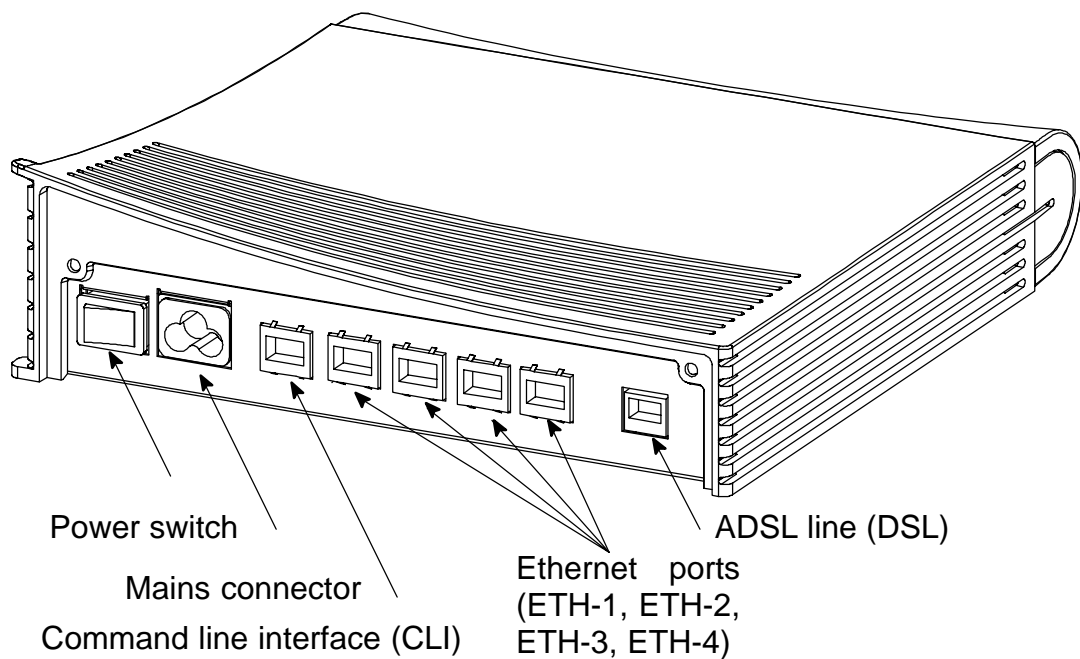


Figure 3-1 M5122 back panel

3.1 Ethernet interfaces

M5122 has an in-built 4-port hub which allows easy home and small office network installation. The Ethernet interfaces (ETH-1, ETH-2,

ETH-3, and ETH-4) are located on the back panel. The Ethernet interface is a standard 10 Mbit/s half-duplex 10Base-T interface. The mechanical connector is an 8-pin RJ-45. The pin-out numbering is shown in Table 3-1. The cable is straight if you connect your PC to the ETH port of M5122. Use a cross cable if you connect M5122 to a hub.

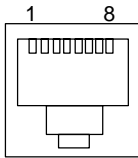


Figure 3-2 ETH connector

PIN	Signal	Direction M5122- Ethernet	MDI signal
1	Rx+	<-	Receive data +
2	Rx-	<-	Receive data -
3	Tx+	->	Transmit data +
6	Tx-	->	Transmit data -

Table 3-1 Ethernet interface pin-out numbering

3.2 ADSL interface

The ADSL interface (DSL) is compatible with ITU-T G.992.1 specification. The mechanical connector is a 6-pin RJ-11. The pin-out numbering is shown in Table 3-2.

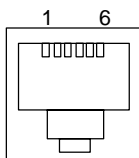


Figure 3-3 DSL connector

PIN	Signal
3	DSL1
4	DSL2

Table 3-2 ADSL interface pin-out numbering

3.3 Command line interface

The command line interface (CLI) is RS-232 interface with an RJ-45 mechanical connector. The pin-out numbering is shown in Table 3-3.

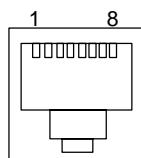


Figure 3-4 CLI connector

PIN	Signal	Direction M5122-ter- minal	MDI signal
1	107 DSR (const. ON)	→	Data set ready
2	108 DTR	←	Data terminal ready
3	109 DCD (const. ON)	→	Data channel re- ceived line signal de- tector
4	102 SG		Signal ground
5	103 TxD	←	Transmitted data
6	104 RxD	→	Received data
7	105 RTS (not in use)	←	Request to send
8	106 CTS (const. ON)	→	Clear to send

Table 3-3 Command line interface pin-out numbering

3.4 Indicator lights

M5122 has eight indicator lights on the front panel: PWR, STA, COL, ETH-1, ETH-2, ETH-3, ETH-4, and DSL. STA indicator is red. Other indicators are green.

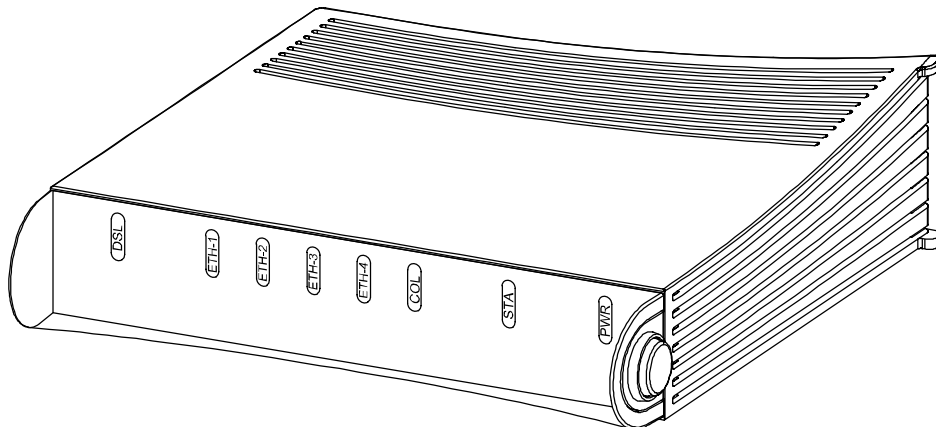


Figure 3-5 M5122 front panel indicators

DSL GREEN

Off ADSL link is down.

Blinks ADSL connection is being established.

On ADSL link is up.

ETH- GREEN

Off Ethernet is down.

On Ethernet is functional.

Blinks Receives traffic from Ethernet.

COL GREEN

Blinks Collisions on the Ethernet. Note, that it is normal that some collisions occur on the Ethernet.

STA RED

Off OK
On Hardware malfunction during startup.

PWR GREEN

Off Power off.
On Power on.

Chapter 4

Installing Nokia M5122

This chapter presents a step-by-step installation procedure of M5122. Before starting the installation check that M5122 is physically undamaged. The package contains the following items:

- M5122 modem
- ADSL line cable (6-pin)
- 10Base-T straight Ethernet cable (8-pin)
- power cord
- User Manual

Caution

If you have stored M5122 in temperature lower than +5 °C and bring the unit in the normal room temperature, moisture may condense into the unit. Keep the unit in the room temperature for one hour before taking it into use.

4.1 M5122 default settings

The default settings are shown in bold type in Table 4-1. See Chapter 5 for more information on Config mode levels.

By default, M5122 is an device which bridges traffic between its Ethernet and ATM (VCC1) interfaces.

Config mode level	Parameter	Setting
system	hostname	M5122
eth	bridging	on
vcc1	pvc	0 (vpi) 100 (vci) eth-llc (encaps)
	bridging	on

Table 4-1 M5122 default settings

4.2 Step-by-step installation procedure

In this section, we present two installation procedures: *ADSL data services* and *Telephone and ADSL data services*. To use both telephone and ADSL services, you will need a POTS splitter. This manual gives installation example for a Nokia splitter T66270.

In these examples, we assume that you have installed your Ethernet card properly and that your service provider has provided you with instructions how to set your PC's networking options.

ADSL data services

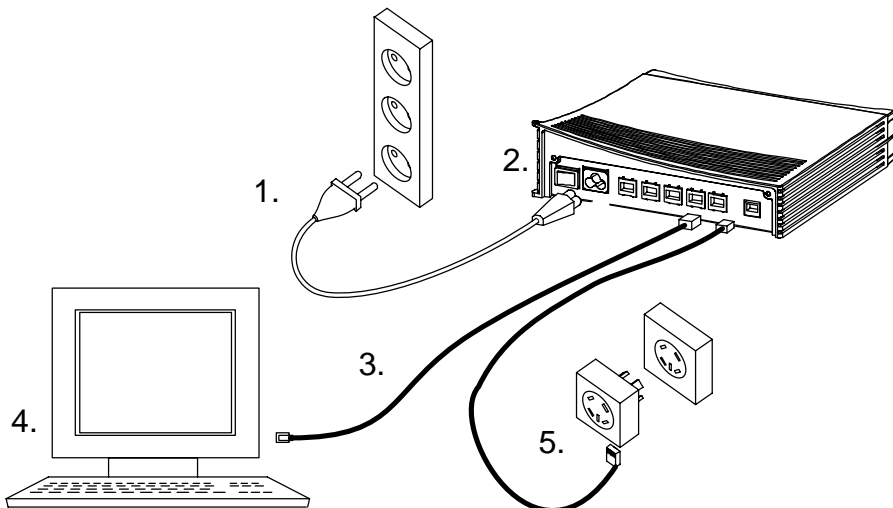


Figure 4-1 M5122 with cables connected (ADSL services only)

1. Plug the mains power cord to a mains outlet. M5122 can be connected to an earthed socket outlet only.

2. Switch on M5122. The PWR indicator lights up. After a while, the red STA indicator blinks and then remains unlit. M5122 is now functional.
3. Connect the Ethernet cable between your PC's 10Base-T connector and the Ethernet connector on the M5122 back panel (ETH-1, ETH-2, ETH-3, or ETH-4).
4. Switch on your PC. The indicator corresponding the Ethernet port you connected your PC to becomes green when your PC has started. This indicator blinks when there is traffic in the corresponding Ethernet port.
5. Connect the ADSL line cable between the DSL connector on the M5122 back panel and the wall socket. After a while, the DSL indicator starts blinking. This indicates that the ADSL line is being established. When the DSL indicator remains lit, the line is functional.
6. During normal operation PWR and DSL indicators are lit and the Ethernet indicators of the active Ethernet ports blink or remain lit depending whether there is traffic or not. COL indicator may blink occasionally during normal operation.

Telephone and ADSL data services with T66270 splitter

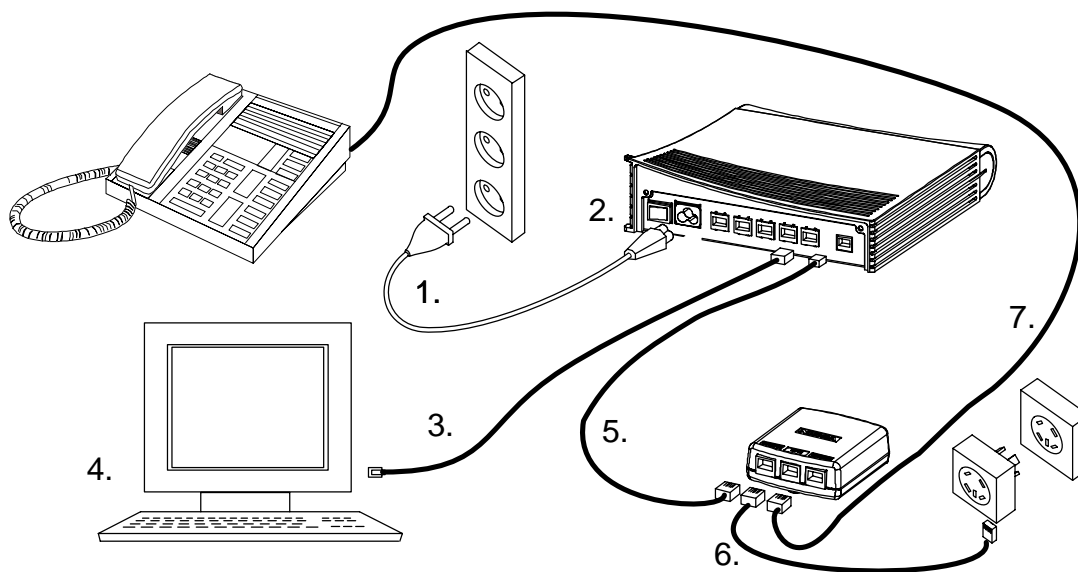


Figure 4-2 M5122 with cables and splitter (T66270) connected (Telephone and ADSL services)

1. Plug the mains power cord to a mains outlet. M5122 can be connected to an earthed socket outlet only.
2. Switch on M5122. The PWR indicator lights up. After a while, the red STA indicator blinks and then remains unlit. M5122 is now functional.
3. Connect the Ethernet cable between your PC's 10Base-T connector and the Ethernet connector on the M5122 back panel (ETH-1, ETH-2, ETH-3, or ETH-4).
4. Switch on your PC. The indicator corresponding the Ethernet port you connected your PC to becomes green when your PC has started. This indicator blinks when there is traffic in the corresponding Ethernet port.
5. Connect the ADSL line cable between the DSL connector on the M5122 back panel and the splitter's MODEM connector.
6. Connect the splitter cable between the splitter's LINE connector and the wall socket. After a while, the DSL indicator starts blinking. This indicates that the ADSL line is being established. When the DSL indicator remains lit, the line is functional.
7. Connect the telephone to the splitter's PHONE connector.

8. During normal operation PWR and DSL indicators are lit and the Ethernet indicators of the active Ethernet ports blink or remain lit depending whether there is traffic or not. COL indicator may blink occasionally during normal operation.

Now your M5122 has been connected and you can configure your PC's networking options and check that the service works according to your service provider's instructions.

4.3 Troubleshooting

This section gives some tips for troubleshooting.

Power (PWR) indicator is unlit.

Make sure that power cord has been connected to a mains outlet and M5122 has been switched on.

Red status (STA) indicator is lit

Switch power off and then on again. If the STA indicator remains lit, the unit may be faulty.

ADSL (DSL) indicator is unlit

Make sure that the ADSL line cable has been properly connected between the DSL connector and the wall socket.

Ethernet (ETH-) indicator is unlit

Make sure that the Ethernet cable has been properly connected between your PC's Ethernet interface and the M5122 ETH connector. Make sure that your PC is ON.

You cannot access the Internet

1. Make sure that your M5122 is ON.
2. Check that the DSL indicator is lit.
3. Check that Ethernet indicator (ETH-1, ETH-2, ETH-3, or ETH-4) corresponding to the Ethernet interface you are connected to is ON.
4. Make sure that your PC's networking functions have been configured according to your service provider's instructions.

4.4 Installing M5122 on the wall

M5122 can also be wall mounted. Figure 4-3 shows the installation procedure.

1. Drill two holes (6 mm in diameter) on the wall. The distance between the holes must be 155 mm. Insert the plugs to the holes and fix the screws.
2. Mount the modem on the wall as shown in Figure 4-3.

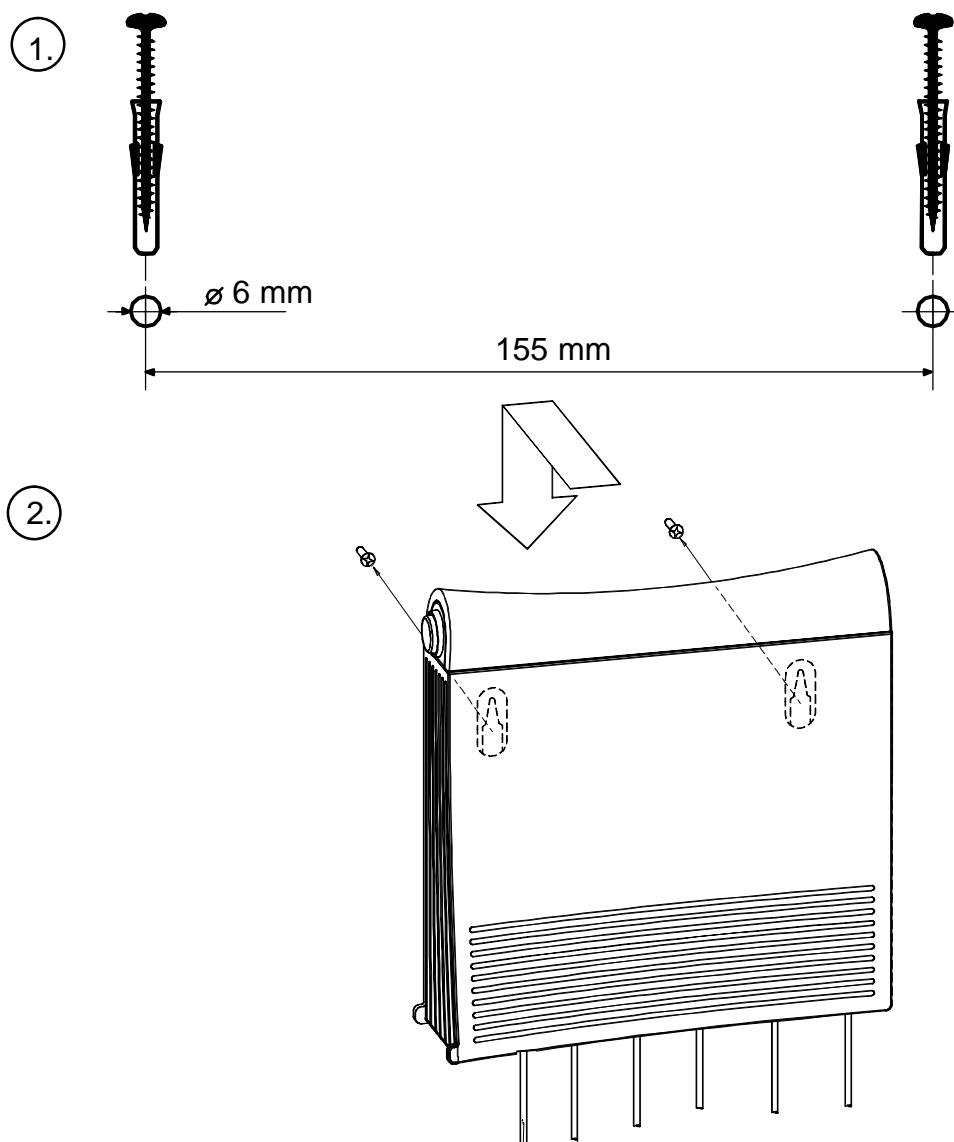


Figure 4-3 Wall installation

Chapter 5

Management

M5122 can be managed with a web browser or through a command line interface (CLI). This chapter introduces both management methods. You can configure the most commonly used parameters with a web browser. The CLI can be used for all configuration purposes. We will also give some typical configuration examples in this chapter.

5.1 Browser management

The web configuration pages of M5122 can be accessed through the Ethernet and through the ADSL/ATM channels of M5122. In order to access the web management feature, the IP functionality must be activated and an IP address must be given to the corresponding interface.

You can use your PC's web browser software to access the web configuration pages in M5122. To access the web pages you must know the IP address of your M5122 or, alternatively, the "name" that your M5122 recognises.

Note

Before using your web browser for configuration, you must know the IP address or the name assigned to your M5122.

There are three ways to find out whether to use a name or an IP address:

- Your service provider has given you an IP address for M5122.
- Your M5122 uses Dynamic Host Configuration Protocol (DHCP) and Domain Name Server. In this case the name is *M5122*.

- Your M5122 uses DHCP. In this case run winipcfg.exe (Windows 95) or ipconfig.exe (Windows 98, 2000 and NT). The IP address of M5122 is the Default Gateway address shown by the ipconfig program.

5.1.1 Opening a connection

To open a connection to the Nokia M5122:

1. Start your web browser.
2. Enter the name ('M5122') or IP address of your Nokia M5122 in the browser's Open Location field and press Enter. If you use the IP address, it has to be assigned to a local port or gateway interface (Vbridge).
3. Type in the username/password as requested. If no username/password is required, just click OK to proceed. The Nokia M5122 Main Page appears.

5.1.2 Main Page

Main Page is shown first when you use a web browser to connect to M5122. The currently shown page is shown highlighted on the list on the left. Clicking an item on the list (Service Providers, Local Network, Statistics, Restart, and Save Config) takes you to the corresponding page.

Note

When you make modifications to the configuration, remember to save the configuration if you want your changes to be active after a restart.



Figure 5-1 Main page

The Main Page shows you the statuses of the DSL line and Ethernet interfaces. Software and hardware versions and the serial number of M5122 are shown in the bottom of the page.

5.1.3 Service providers page

You can view network connection information (ATM channel number, VPI and VCI values, and encapsulation) by selecting the connection from the pulldown list. Figure 5-2 shows the page with eth-llc encapsulation enabled and Figure 5-3 with PPTP tunneling enabled. Connection name (Figure 5-3) is used for identifying connections. The name can be changed and it can be 31 characters long.



Figure 5-2 Service Providers page with eth-llc encapsulation

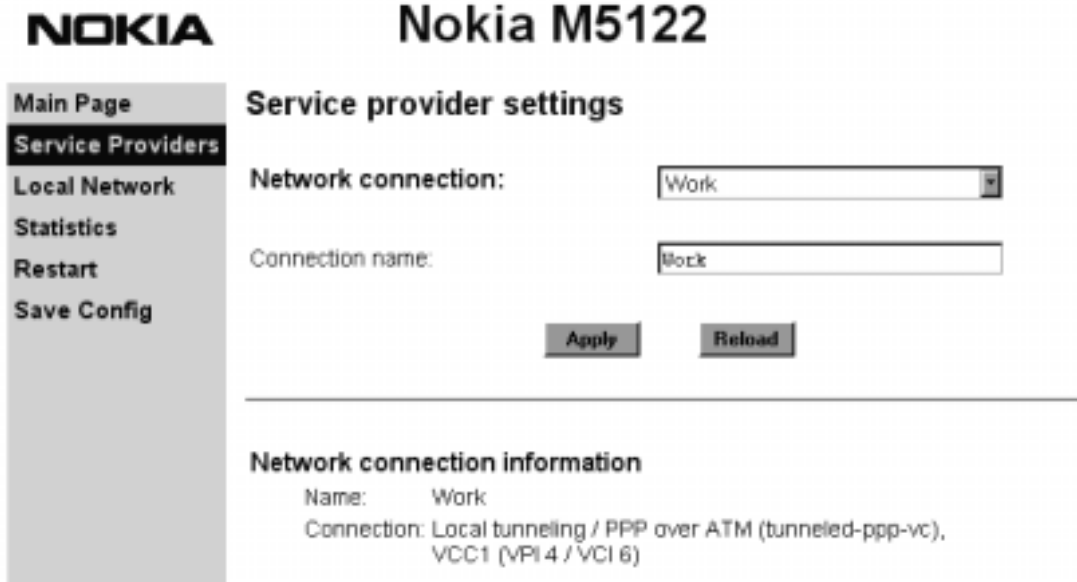


Figure 5-3 Service Providers page with PPTP tunneling enabled

5.1.4 Local network pages

The *Local Network* page has three sub pages: *Local ports*, *DHCP*, and *Routing*.

Local ports page

On the *Local Network Local Ports* sub page you can assign an IP address to the Gateway port (Vbridge).

Note

When you click Apply, the IP address is changed immediately. If the IP address of the interface you are using changes the connection will be lost. You have to reconfigure the IP address of the accessing host. For example, in Windows programs winipcfg.exe or ipconfig.exe must be used first to release the old address and then to renew to request new address.

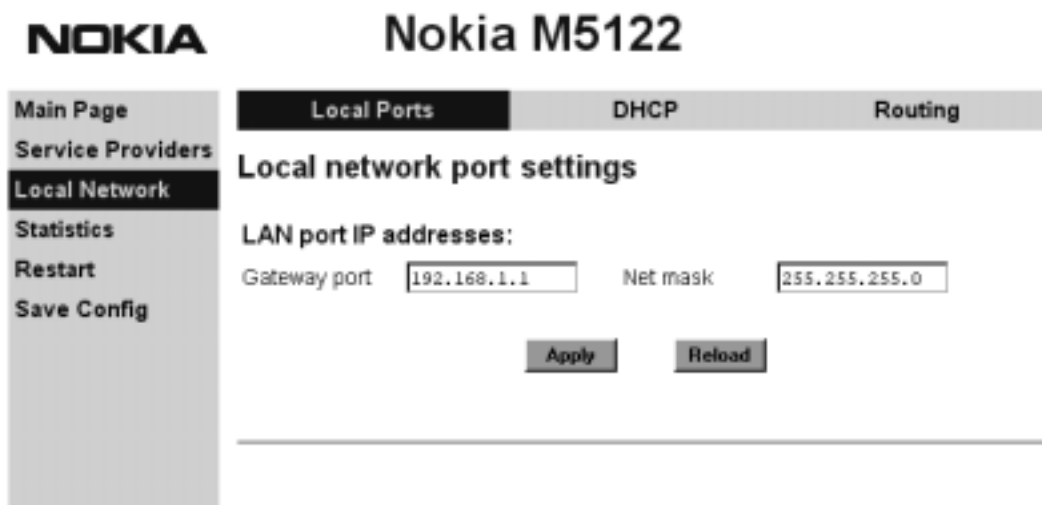


Figure 5-4 Local Network Local Ports page

DHCP page

Note

Use DHCP with PPTP tunneling only.

On the *Local Network DHCP* subpage you can enable/disable Dynamic Host Control Protocol and set the Address ranges from which the addresses are distributed to the DHCP clients on your network. You can also set the Domain Name Server addresses here.

Start address is the first address in the address range. The *Range size* defines how many addresses the range contains. *Subnet mask* is the subnet mask of the addresses in the range. *Primary* and *Secondary DNSs* set the domain name servers for the corresponding address range. *Lease time* defines how often the DHCP client must renew its lease. *Domain name* defines the domain name for the range.

The DHCP server can be enabled towards LAN and Vbridge (gateway interface) ports. When the DHCP server is enabled, up to two scopes (address ranges) are automatically generated and bound to Vbridge interface. Two separate address ranges can be used if more than 253 addresses are required on the local subnet, if two non-contiguous ranges are needed, or if an additional router with DHCP relay is used on the local network. In Figure 5-5, scope (a) has been bound to Vbridge interface. When the address ranges are not defined, M5122 uses the default values for all DHCP parameters. The default values are:

- Start address is the interface IP address
- Subnet mask 255.255.255.0
- Range size of up to 253 addresses starting from the interface IP address.
- DNS address is the interface IP address
- Lease time is 60 minutes
- Domain name is null string

If at least one address range has been defined, then IP address, DNS, domain name and lease time, if defined, override the default values.

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Nokia M5122

Local Ports
DHCP
Routing

Main Page

Service Providers

Local Network

Statistics

Restart

Save Config

Local network DHCP settings

Local DHCP server

Address range 1

Start address	<input type="text"/>	Subnet mask	<input type="text"/>
		Range size	<input type="text"/>
Primary DNS	<input type="text"/>	Secondary DNS	<input type="text"/>
Lease time (minutes)	<input type="text"/>	Domain name	<input type="text"/>

Address range 2

Start address	<input type="text"/>	Subnet mask	<input type="text"/>
		Range size	<input type="text"/>
Primary DNS	<input type="text"/>	Secondary DNS	<input type="text"/>
Lease time (minutes)	<input type="text"/>	Domain name	<input type="text"/>

Apply
Reload

DHCP server status

## scope [a]	pool-address	pool-last	pool-mask
	192.168.1.1	192.168.1.254	255.255.255.0
	net-binding	primary-dns	secondary-dns
	VERIDGE	192.168.1.1	n/a
	lease-time	gateway	domain-name
	00/01:00:00	192.168.1.1	n/a

Figure 5-5 Local Network DHCP page

Routing page

On the *Local Network Routing* sub page you can set static routes and enable/disable dynamic routing protocols (Routing Information Protocol versions 1 and 2).

To enable dynamic routing select the Routing protocol version from the pull-down list and click the Apply button. RIP versions 1 and 2 are supported. *Both v1 and v2* option enables the receiving of both RIPv1 and RIPv2 packets.

To add a static route, type in the *Destination network* IP address, the *Subnet mask* of the destination network, and the *Gateway* and the *Interface* through which the destination network can be reached. Then click the *Add new* button.

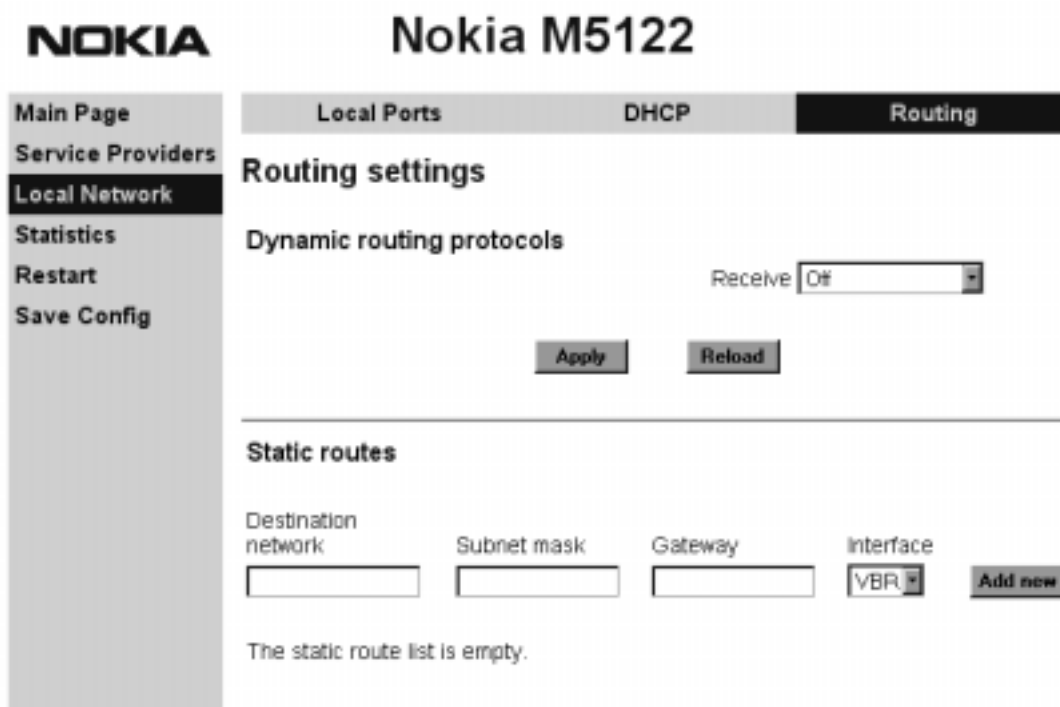


Figure 5-6 Local Network Routing page

5.1.5 Statistics page

The Statistics page lets you view a selection of M5122 statistics. to view statistics of a particular function, click the corresponding button and the statistics view is opened on a separate window.

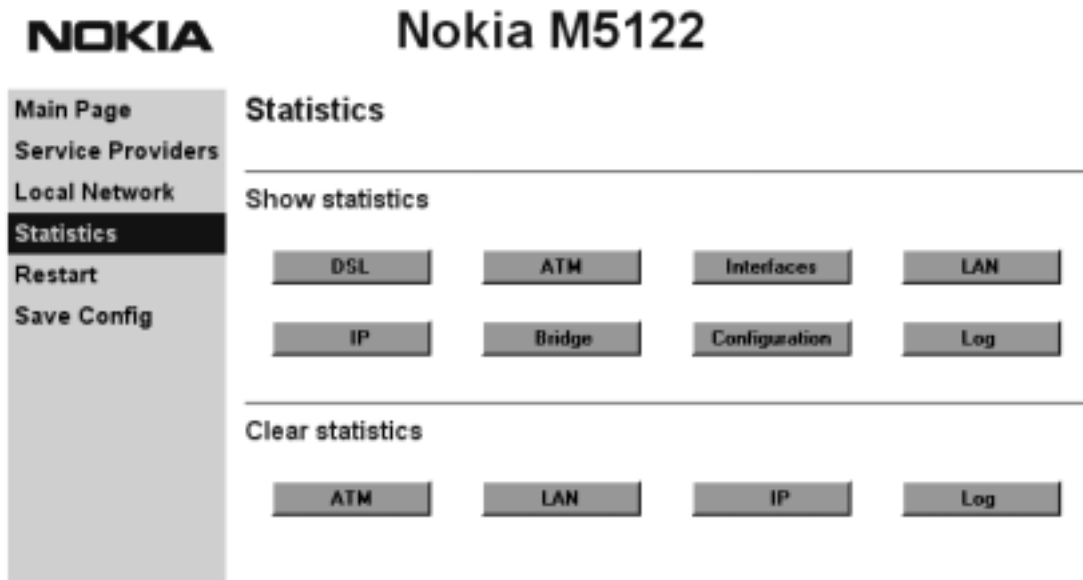


Figure 5-7 Statistics page

5.1.6 Restart page

On the Restart page, you can reset subsystems and restart M5122.



Figure 5-8 Restart page

5.1.7 Save configuration page

When you change the configuration, all configuration changes are activated immediately without restart/reload. However, the configuration will not be saved into the nonvolatile memory. If M5122 is restarted or powered down without saving the configuration, the old configuration will be restored. Clicking the Save configuration button saves the configuration into the nonvolatile memory and the old configuration cannot be restored through the web interface.



Figure 5-9 Save configuration page

5.2 Command line interface (CLI) management

The local command line interface is accessed through the local management console on the back panel. The local management console interface is an asynchronous V.24/V.28 character-based interface with the following configuration:

Setting	Value
Speed	9600
Parity	None
Data bits	8
Stop bits	1
Duplex	Full
Flow control	None

Table 5-1 Local management console configuration

You need a serial adapter (Product code E66254) and the 10Base-T Ethernet cable to connect you PC's serial port to the local management console interface (CLI).

The command line interface can also be accessed through the Ethernet port of M5122 or through the ATM channels of M5122 on top of the telnet protocol. In order to use the CLI through the Ethernet interface or the ATM channel, the IP function must be switched on and IP address must be given to the M5122 gateway interface (Vbridge).

M5122 can also be managed remotely through a separate ATM virtual channel. This channel is only used for management purposes. In order to use this dedicated management channel, it has to be activated first and given an IP address configuration. The management traffic to this interface is not routed to any other interfaces of M5122.

Note

If you want to manage M5122 through both the payload channels (Ethernet and ATM/ADSL) and the dedicated management channel, the IP addresses of Vbridge and the dedicated management channel must be from different subnets.

5.2.1 Command line interface

The command line interface has been divided into two modes: *main* and *configuration*. The main mode lets you monitor the status and performance of M5122 and debug M5122. The debugging commands are used to solve difficult problem situations and are meant for expert users only. The debugging commands are not handled in this manual.

The configuration mode lets you change M5122 configuration. The CLI is case sensitive. All commands must be given in lower case characters. Only file names and strings can contain upper case characters.

In the configuration mode, functions can be activated by typing the corresponding command, for example `bridging`. The function can be deactivated by simply typing `no bridging`. If you type in a value which is incorrect (for example, letters instead of numbers), the CLI prompts you to enter the value correctly and displays help. You can always get help on the command or display by typing `help` or `?` at the command prompt.

You can recall your previous commands by pressing the “up-arrow” key on your keyboard.

The configuration mode has been divided into levels. You can navigate through the configuration mode by typing the name of the level. By typing `top` you will return to the previous level. You can view the current settings of the level by typing `show`. `quit` returns you to the main mode.

The configuration mode levels are:

- system
- password
- eth
- vcc1, vcc2, vcc3, vcc4, vcc5, vcc6, vcc7, vcc8
- Vbridge
- mngtvcc
- common.

The example below shows how to access the different configuration levels:

```
M5122>
M5122>conf
M5122(conf)#system
M5122(conf-system)#password
M5122(conf-password)#eth
M5122(conf-eth)#vcc1
M5122(conf-vcc1)#vcc2
M5122(conf-vcc2)#vcc3
M5122(conf-vcc3)#vcc4
M5122(conf-vcc4)#vcc5
M5122(conf-vcc5)#vcc6
M5122(conf-vcc6)#vcc7
M5122(conf-vcc7)#vcc8
M5122(conf-vcc8)#Vbridge
M5122(conf-Vbridge)#mngtvcc
M5122(conf-mngtvcc)#common
M5122(conf-common)#quit
M5122(conf)#quit
M5122>
```

5.2.2 Typical configuration tasks

This section provides some typical configuration tasks. These configuration examples can be done through the command line interface.

Note

After you have made changes to the configuration, you must save the configuration if you want it to be active also after restarting M5122.

Setting up local management through CLI

You can use the command line interface locally through the CLI connector on the M5122 back panel. To configure M5122 locally:

1. Connect the 10Base-T Ethernet cable with the serial adapter E66254 between your PC's (or terminal's) serial connector and the M5122's CLI connector, see Figure 5-10.

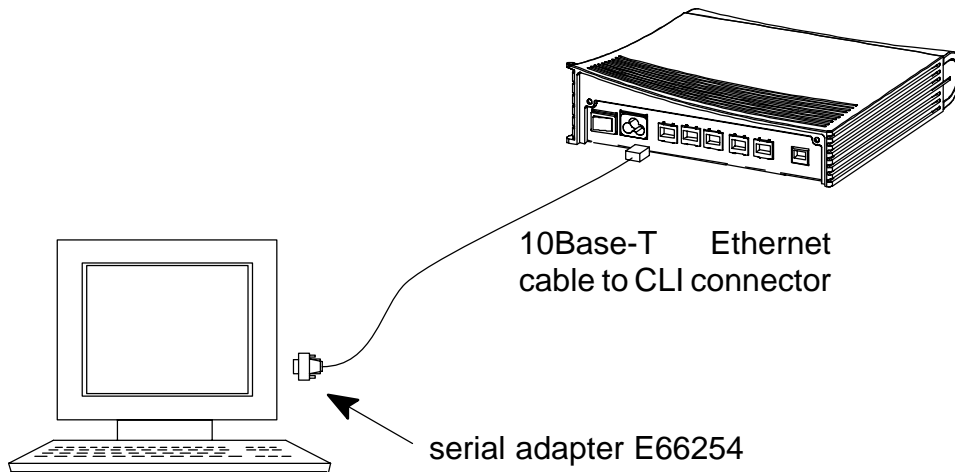


Figure 5-10 Local management cabling

2. Use the settings in Table 5-2 to configure your terminal connection.

Setting	Value
Speed	9600
Parity	None
Data bits	8
Stop bits	1
Duplex	Full
Flow control	None

Table 5-2 Terminal settings

3. Start terminal software on your PC. Press ENTER on the terminal screen and the CLI prompt will appear.

4. Login ID is only used for identifying the users. It will be shown on the screen when you issue the `show status session` command. You can bypass Login ID by pressing `ENTER`. If a password has been assigned to your M5122, give the password to the password prompt. If the password is not used, bypass the password prompt by pressing `ENTER`.

Configuring DHCP and DNS

Note

Use DHCP with PPTP tunneling only.

The DHCP server can be enabled towards Vbridge interface. When the DHCP server is enabled, up to two address ranges (scopes) will be automatically generated and bound to Vbridge interface. Two address ranges can be used if more than 253 addresses are required on the local subnet, if two non-contiguous ranges are needed or if an additional router with DHCP relay is used on the local network.

The address range defines pool of IP addresses and parameters like default gateway, DNS addresses and domain name. The generated default address range allows up to 253 IP addresses (C class). Automatically generated address ranges use Vbridge IP address as gateway and DNS server addresses. If one address range is defined, then automatic binding will be disabled. If optional address range parameters like gateway or DNS addresses are not defined, Vbridge IP addresses are used as in automatic binding.

Typically, when DHCP is used, the advertised DNS addresses point to Vbridge interface. In such cases, the DNS proxy forwards the DNS request to statically configured DNS servers or to DNS servers learned dynamically via PPP/PCP.

The following commands are used to configure DHCP and DNS settings:

```
M5122 (conf-common) #dhcp?
usage: dhcp mode
       dhcp address
       dhcp gateway
       dhcp dns
       dhcp lease-time
       dhcp domain-name
```



```
M5122(conf-common)#dhcp mode server ; this enables
DHCP server
```

Normally, there is no need to configure the DNS addresses. If the service provider does not support automatic DNS address allocation, the DNS servers can be configured as shown by the following example:

```
M5122(conf-common)# dns address primary 1.2.3.4
M5122(conf-common)# dns address secondary 1.2.3.5
M5122(conf-common)#
```

Configuring static and dynamic routing

Routing entries in the routing table are needed in order to forward the IP packets to the correct interface. M5122 can have both static and dynamic routes configured. Static routes are configured manually and dynamic routes are learned automatically using RIP v1 and RIP v2 protocols. The following examples show how to configure static routes to M5122.

Default gateway for an interface that learns the next hop automatically:

```
M5122(conf-common)# ip route 0.0.0.0 0.0.0.0 0.0.0.0
vcc1
```

Default gateway for an interface that requires static next hop:

```
M5122(conf-common)# ip route 0.0.0.0 0.0.0.0 1.2.3.1
vcc1
```

Static route for an interface that learns the next hop automatically:

```
M5122(conf-common)# ip route 131.132.133.0
255.255.255.0 0.0.0.0 vcc1
```

Static route for an interface that requires a static next hop:

```
M5122(conf-common)# ip route 131.132.133.0
255.255.255.0 1.3.5.1 vcc1
```

M5122 can have only one default gateway. The interfaces that can learn gateway/peer address dynamically can use value 0.0.0.0 instead of the next hop address.

File system and downloading new firmware using TFTP

M5122 has a flash file system. Some files in the file system have special meanings. These files are:

- image.exe; primary application file.

- image.bak; secondary application file used if image.exe has been corrupted or is missing. It will be then renamed as image.exe automatically.
- startup.cfg; primary configuration file used during startup.
- dhcp.leases; contains DHCP lease table information.

M5122 has the following commands that can be used for file handling:

- copy
- rename
- delete
- dir

If you use image.exe as a destination filename with the copy command and the image.exe already exists, the existing image.exe will be automatically renamed as image.bak. This guarantees that the application file exists if M5122 loses power during SW download.

You can update the operating software of M5122 by downloading the new software from a TFTP server. To download and activate new M5122 operating software:

1. Use CLI to issue
`install tftp://<ip-address>/Gx1x2200.R00` command, where <ip-address> is the IP address of the TFTP server containing the new software and Gx1x2200.R00 is the name of the file to be downloaded. The command `copy tftp://<ip-address>/Gx1x2200.R00 image.exe` can be used alternatively. Note, that Gx1x2200.R00 is merely an example of the file name.
2. After you will see `transfer status SUCCESSFUL` message, restart M5122 to activate the new software.

Downloading configuration or application from monitor

Monitor is a small application that is executed before the actual software image is started. Typically the Monitor automatically loads the application file image.exe. You can activate the Monitor by pressing “m” followed by “o” in the very beginning of the system startup:

```
local MAC=00:40:43:02:36:72; Using M111/850 eth conf
Type 'm' (fast) followed by 'o' (in 10 sec) to
activate Monitor
Nokia Networks (C) 1999
Nokia Boot
```

```
B-R0.0.0. built on Apr 4 2000 11:27:55  
MON>
```

The following commands are available for file handling in the Monitor:

- rename
- delete
- dir

Monitor has two methods of retrieving files:

- TFTP
- XMODEM

You can retrieve files from a TFTP server using the commands in the following example:

```
MON>ipa 192.168.1.1  
    ip=192.168.1.1  
ipserver=0.0.0.0  
    ipgw=0.0.0.0  
serverfile=  
MON>ips 192.168.1.100  
    ip=192.168.1.1  
ipserver=192.168.1.100  
    ipgw=0.0.0.0  
serverfile=  
MON>file startup.cfg  
    ip=192.168.1.1  
ipserver=192.168.1.100  
    ipgw=0.0.0.0  
serverfile=startup.cfg  
MON>eget  
tftp loader  
    ip=192.168.1.1  
ipserver=192.168.1.100  
    ipgw=0.0.0.0  
serverfile=startup.cfg  
loading file...  
file size=556  
MON>wri startup.cfg  
Writing successful  
MON>
```

A file can also be transmitted from an XMODEM1K running in a PC, for example, as in the following example:

```
MON>xget
Start Xmodem1k sending...
MON>wri image.exe
Writing successful
MON>
```

5.2.3 Main mode commands

Command	Show diagnostic log
Description	Displays diagnostic log.
Syntax	show log
Arguments	None.
Example	
M5122> show log	
00/00:00:05 HI(1) ATM chann/vcc1/admin.stat up	
M5122>	

Command	Show DSL line status	
Description	Displays DSL line status	
Syntax	show dsl [all]	
Arguments	Optional all argument shows all DSL line information.	
Example		
M5122> show dsl all		
hardware-type	ALCATEL/DMT	
hardware-rev	99111601/POTS/CP	
firmware-rev	00003642	
activity-status	OPER/FULL	
	near-end	far-end
vendor-id	ffff	n/a
ansi-compliance	7	n/a
adsl-init-version	31	n/a
maximum-bitrate	5696kbits	448kbits
actual-bitrate	4608kbits	416kbits
noise-margin	3.5dB	0.0dB
output-power	12.0dBm	20dBm
attenuation	48.5dB	0.0dB
corr-fast-fec	0	0
corr-intl-fec	47	0
fail-fast-crc	0	0
fail-intl-crc	0	0
fail-fast-hec	0	0
fail-intl-hec	0	658
flaged-alarms	NONE	NONE
M5122>		

Command	Show Ethernet interface status
Description	Displays Ethernet interface status
Syntax	show eth [all]
Arguments	show eth command shows Ethernet interface state and status. all argument shows also interrupts.
Example <pre>M5122> show eth ##eth(up) type IEEE 802.3/DIX pkt oct dis err stat-tx-payload 10964 672919 0 0 stat-rx-payload 10968 657690 0 0 M5122></pre>	

Command	Show ATM status
Description	Displays ATM status.
Syntax	show atm [all]
Arguments	show atm command shows active ATM channels and traffic statistics. all shows all ATM information.
Example <pre>M5122> show atm ##vcc1(up) vpi vci type encap 0 10 DATA_PVC ETH-LLC pkt oct dis err stat-tx-payload 223641 2568289 0 0 stat-rx-payload 18030 1440816 0 0 M5122></pre>	

Command	Show bridge interface status
Description	Displays interfaces which have bridging enabled.
Syntax	show bridge if
Arguments	None
Example	
M5122> show bridge if	
VBRI (up) phys-address	
00:99:12:16:10:53	
ETH (up) phys-address	
00:00:00:00:00:00	
VCC1 (up) phys-address	
00:00:00:00:00:00	
M5122>	

Command	Show bridging statistics
Description	Displays bridging statistics.
Syntax	show bridge stat
Arguments	None
Example	
M5122> show bridge stat	
in-packet 8518 out-packet 8494	
discard 24	
M5122>	

Command	Show bridging table
Description	Displays bridging table.
Syntax	show bridge table
Arguments	None
Example	
M5122> show bridge table	
if phys-address age type	
VBRI 00:99:12:16:10:53 n/a forever	
VCC1 00:60:08:94:da:a7 0 dynamic	
ETH 00:60:08:94:af:d7 0 dynamic	
nr-of-entries 3	
M5122>	

Command	Show IP interfaces
Description	Displays IP interfaces. In M5122, the only possible IP interfaces are its own internal interface (Vbridge) and the dedicated management VCC interface.
Syntax	show ip if
Arguments	None
Example <pre>M5122> show ip if Vbridge (up) net-address net-mask mtu phys-address 192.168.3.1 255.255.255.0 1500 00:40:43:02:36:81 as ETHERNET/RIP DISABLED MNGTVCC (up) net-address net-mask mtu phys-address 192.168.1.1 255.255.255.0 1500 00:40:43:02:36:80 M5122></pre>	

Command	Show Address Resolution Protocol table
Description	Displays ARP table.
Syntax	show ip arp
Arguments	None.
Example <pre>M5122>show ip arp Vbridge net-address phys-address age 10.98.20.140 00:00:0e:7c:15:d4 00.07 M5122></pre>	

Command	Show IP routing table
Description	Displays IP routing table.
Syntax	show ip route
Arguments	None
Example <pre>M5122>show ip route Vbridge route-dest route-mask netxthop tag 192.168.1.0 255.255.255.0 10.98.20.1 STAT 10.98.20.255 255.255.255.255 255.255.255.255 BCAST 10.98.20.150 255.255.255.255 10.98.20.150 IFACE 10.98.20.0 255.255.255.0 10.98.20.150 LOCAL M5122></pre>	

Command	Show IP, ICMP, UDP, TCP, and RIP statistics
Description	Displays statistics related to the IP traffic. The information displayed by this command is related to the IP traffic to/from the management IP interfaces (Vbridge and dedicated management VCC).
Syntax	show ip [stat icmp udp tcp rip]
Arguments	<p>stat argument shows the IP statistics.</p> <p>icmp argument shows the Internet Control Message Protocol statistics.</p> <p>udp argument shows the User Datagram Protocol statistics.</p> <p>tcp argument shows the Transmission Control Protocol statistics.</p> <p>rip shows the Routing Information Protocol statistics.</p>
Example <pre>M5122> show ip stat forwarding NO FORWARD out-discards 0 default-ttl 255 out-no-routes 0 in-receives 2355 reasm-timeout 5 in-hdr-errors 0 reasm-reqds 0 in-addr-errors 1 reasm-OKs 0 forw-datagrams 0 reasm-fails 0 in-unknown-protos 0 frag-OKs 0 in-discards 2354 frag-fails 0 in-delivers 2354 frag-creates 0 out-requests 0 routing-discards0 M5122></pre>	

Command	Show debugging status
Description	Displays which debugging functions are on.
Syntax	show debug
Arguments	None.
Example <pre>M5122> show debug log OFF dsl OFF atm-aal0 OFF atm-aal5 OFF eth OFF ip-arp OFF ip-ppp OFF ip-host OFF ip-forward OFF ip-icmp OFF M5122></pre>	

Command	Show M5122 information
Description	Displays M5122 hardware and software information.
Syntax	show status [session performance]
Arguments	Optional arguments <code>session</code> and <code>performance</code> . <code>session</code> shows information of the active configuration sessions. If <code>login-id</code> is used, it is shown on the screen. <code>performance</code> shows error counters.
Example <pre>M5122> show status product-id T66250.01 0 serial-num 61001413382 cpu-type XPC850SR / B flash-type 2 M sdram-type 8 M phys-address-lan 00:40:43:02:48:c6 phys-address-wan 00:40:43:02:48:c7 short-desc M5122 long-desc NOKIA M5122 ADSL Bridge boot-version B-R0.0.7 appl-version A-R log-severity HIGH start-uptime 00/21:24:26 M5122></pre>	

Command	Show default configuration
Description	Displays the default configuration of M5122. M5122 uses this configuration if the startup.cfg file is missing.
Syntax	show config default
Arguments	None
Example	
<pre>M5122> show config default system hostname M5122 eth bridging vcc1 pvc 0 100 eth-llc bridging vcc2 vcc3 vcc4 vcc5 vcc6 vcc7 vcc8 Vbridge mngtvcc common M5122></pre>	

Command	Show startup configuration
Description	Displays the startup configuration of your M5122. This is the configuration saved in the startup.cfg file. Startup.cfg file is activated when M5122 is switched on. If the startup.cfg file is missing, the default configuration is used.
Syntax	show config startup
Arguments	None
<p>Example</p> <pre>M5122> show config startup system hostname M5122 eth bridging vcc1 pvc 0 100 eth-llc bridging vcc2 vcc3 vcc4 vcc5 vcc6 vcc7 vcc8 Vbridge mngtvcc common M5122></pre>	

Command	Show running configuration
Description	Displays currently active configuration. If you have made changes in the configuration and you want them to be active after restart, save the current configuration to startup.cfg file using <code>save config</code> command.
Syntax	<code>show config running</code>
Arguments	None
Example	
<pre>M5122> show config running system hostname M5122 eth bridging vcc1 pvc 0 100 eth-llc bridging vcc2 vcc3 vcc4 vcc5 vcc6 vcc7 vcc8 Vbridge ip address 192.168.172.21 255.255.255.0 mngtvcc common M5122></pre>	

Command	Show configuration file
Description	Displays a local configuration file
Syntax	show config file <filename>
Arguments	filename is the name of the local configuration file. The extension of the configuration files is always .cfg.
Example <pre>M5122> show config file startup.cfg system hostname M5122 eth bridging vcc1 pvc 0 100 eth-1lc bridging vcc2 vcc3 vcc4 vcc5 vcc6 vcc7 vcc8 Vbridge ip address 192.168.172.21 255.255.255.0 mngtvcc common M5122></pre>	

Command	Ping
Description	Send an ICMP echo request to an IP address to test the IP function.
Syntax	ping <ip-address>
Arguments	ip-address is the IP address of the ping destination in dotted decimal format.
Example <pre>M5122> ping 198.168.172.23 Reply from 198.168.172.23: bytes 32 time<10ms TTL=128 M5122></pre>	

Command	ATMping
Description	Sends five OAM F5 loopback cells to the specified VPI/VCI destination with a 5 second total timeout interval. You can use ATMping to test the ATM connection.
Syntax	atmping <vpi> <vci> <range>
Arguments	vpi is the Virtual Path Identifier and vci is the Virtual Channel Identifier of the ATM channel you want to test. vpi values are integers (0...255). vci values are integers (0...65535) range values are segment and end-to-end depending whether you want to test the first segment of the ATM connection or the end-to-end connection.
Example	<pre>M5122> atm ping 0 100 end-to-end M5122> reply asserted roundtrip time = 4.20 ms M5122></pre>

The debug commands are used to solve difficult problem situations. The debugging can be switched off with the following command. Other debugging commands are not handled in this manual.

Command	Switch off debug
Description	Switches all debug operations off. To quit debugging, write no debug all on the screen regardless of what is being printed on the screen.
Syntax	[no] debug all
Arguments	no switches debugging off.
Example	<pre>M5122> no debug all M5122></pre>

Command	Show contents of file directory
Description	Displays the contents of M5122 file directory.
Syntax	dir
Arguments	None
Example M5122> dir <pre> filename size appl-version startup.cfg 195 image.exe 375007 Gx1x2200.R00 nr-of-files 2 avail-media 1454306 bytes M5122></pre>	

Command	Copy file
Description	Copies files within M5122 or over a TFTP (Trivial File Transfer Protocol) connection. With this command you can, for example, download configuration files.
Syntax	<pre> copy <src-filename><dst-filename> copy <src-filename> tftp:<ip-address>/<../dst-file-name> copy tftp:<ip-address>/<../src-filename> <dst-file-name></pre>
Arguments	src-filename is the name of the file you want to copy. dst-filename is its destination filename. ip-address is the IP address of the TFTP server.
Example M5122>copy tftp:/191.111.111.1/file.cfg file.cfg M5122>	

Command	Rename file
Description	Renames a file. For example, with this command you can rename a configuration file to startup.cfg. Startup.cfg file is used when M5122 is restarted. You can also rename image.bak file to image.exe if you want to use the old firmware.
Syntax	rename <old-filename> <new-filename>
Arguments	old-filename is the name of the file you want to rename. new-filename is the new filename.
Example Example 1: M5122> rename newconf.cfg startup.cfg M5122> Example 2: M5122> rename image.bak image.exe M5122>	

Command	Delete file
Description	Deletes a file
Syntax	delete <del-filename>
Arguments	del-filename is the name of the file you want to delete.
Example M5122> delete old.cfg M5122>	

Command	Download new firmware
Description	Downloads a new firmware from a TFTP server. Remember to restart M5122 after downloading to activate the new firmware.
Syntax	install tftp:<ip-address>/<.../src-filename>
Arguments	ip-address is the IP address of the TFTP server. src-filename is the name of the file which contains the new firmware.
Example M5122> install tftp:/10.98.20.6/appl-A0.4.2 blocks received transfer status SUCCESSFUL M5122> restart ...	

Command	Save log to a file
Description	Saves log snapshot with a default file name (log.txt).
Syntax	save log
Arguments	None
Example M5122>save log M5122>	

Command	Save configuration to file
Description	Saves the configuration to a file.
Syntax	save config [<cfg-filename>]
Arguments	Optional cfg-filename argument is the name of the file in which you want to save the configuration. If you omit the argument, configuration is saved to startup.cfg file.
Example M5122>save config config.cfg M5122>	

Command	Load configuration file to memory
Description	Activates the configuration in a configuration file.
Syntax	load <cfg-filename>
Arguments	<code>cfg-filename</code> is the name of the configuration file you want to load to the memory. Note, that you must save the configuration (<code>save config</code>) if you want the configuration to be active after you restart your M5122.
Example	<pre>M5122> load config.cfg M5122></pre>

Command	Logout
Description	Logs out from the command line interface. If a password has been assigned to your M5122, remember to log out after the configuration session.
Syntax	logout
Arguments	None
Example	<pre>M5122>logout</pre>

Command	Clear counters
Description	Clears the statistics counters.
Syntax	clear [log atm eth bridge ip]
Arguments	<code>log</code> argument rewinds the diagnostic log to the beginning of the log file. <code>atm</code> argument clears the ATM statistics counters. <code>eth</code> argument clears the Ethernet statistics counters. <code>bridge</code> argument clears the bridging counters. <code>ip</code> argument clears the IP statistics counters.
Example	<pre>M5122> clear log M5122></pre>

Command	Reset subsystem
Description	Resets subsystems.
Syntax	reset [log dsl ppp arp bridge]
Arguments	<p>log resets the diagnostic log subsystem.</p> <p>dsl resets the DSL subsystem. The DSL connection will be re-established.</p> <p>ppp resets the PPP subsystem. The PPP connection will be re-established.</p> <p>arp clears the ARP table.</p> <p>bridge clears the bridge table.</p>
Example M5122> reset dsl M5122>	

Command	Restart M5122
Description	Restarts M5122.
Syntax	restart
Arguments	None
Example M5122> restart in progress...	

Command	Switch to configuration mode
Description	Switches to the configuration mode. The configuration mode lets you change the configuration of M5122.
Syntax	configure
Arguments	None
Example M5122>configure M5122(conf)#	

5.2.4 Configuration mode commands

Command	Show running configuration
Description	Shows the currently active configuration.
Syntax	show
Arguments	None.
Example	
<pre>M5122(conf)#show system hostname M5122 eth bridging vcc1 pvc 0 100 eth-llc bridging vcc2 vcc3 vcc4 vcc5 vcc6 vcc7 vcc8 Vbridge mngtvcc common M5122(conf)#</pre>	

System level commands

Command	Assign hostname
Description	Assigns a hostname to M5122. This hostname is shown in CLI prompt.
Syntax	hostname <name-string>
Arguments	<i>name-string</i> is an ASCII string of maximum of 32 characters.
Example	
<pre>M5122(conf-system)#hostname Nokia Nokia(conf-system)#</pre>	

Command	Set configuration session timeout
Description	Sets a timeout for a management session.
Syntax	timeout <value>
Arguments	value is a time from 1 to 255 minutes.
Example M5122(conf-system)#timeout 10 M5122(conf-system)#	

Password level command

Command	Assign new password
Description	Switches password on/off and sets a new password for different user levels. Note, that you must assign admin password before you can assign other passwords. When removing passwords, admin password must be removed last.
Syntax	[no] <user bridge-user ptp-user admin> <passwd-string>
Arguments	no switches off user password. user argument sets the user privilege level password. User password gives no access to the configuration mode. Also, firmware download is not allowed on the user privilege level. bridge-user sets the bridge-user privilege level password. Bridge user can set static routes and enable Vbridge IP address. ptp-user sets the PPTP-user privilege level password. PPTP user can change VCCx description, DHCP, DNS and Vbridge configurations. admin sets the administrator privilege level password. Administrator can change all configuration parameters. Only the administrator is allowed to use file handling commands (copy, rename, etc.). passwd-string is the new password.
Example M5122> admin nokia M5122	

Ethernet level command

Command	Switch on/off bridging
Description	Switches on/off bridging on the Ethernet interfaces.
Syntax	[no] bridging
Arguments	no switches bridging off.
Example	<pre>M5122(conf-eth)#bridging M5122(conf-eth)#</pre>

VCC (ATM channel) commands

Note, that you can configure up to 8 separate ATM channels.

Command	Assign name to ATM channel
Description	Assigns a name to the specific ATM channel connection. The name is shown on M5122 Service Provider web page as Connection name.
Syntax	[no] desc <desc-string>
Arguments	no deletes the name. desc-string is an ASCII string of 31 characters.
Example	<pre>M5122(conf-vccx)#desc Work M5122(conf-vccx)#</pre>

Command	Activate ATM channel
Description	Activates an ATM channel and sets the encapsulation for that channel.
Syntax	[no] pvc <vpi> <vci> <encap>
Arguments	no deactivates the ATM channel. vpi is the Virtual Path Identifier of the ATM channel. Possible values are 0...255. vci is the Virtual Channel Identifier of the ATM channel. Possible values are 0...65535. encap is the encapsulation of the ATM channel. Encapsulations are eth-llc and tunneled-ppp-vc.
Example	M5122(conf-vccx)#pvc 0 100 eth-llc M5122(conf-vccx)#

Command	Switch on/off bridging
Description	Switches bridging on/off on the specified ATM channel.
Syntax	[no] bridging
Arguments	no switches off bridging.
Example	M5122(conf-vccx)#bridging M5122(conf-vccx)#

Vbridge (gateway interface) commands

Command	Switch on/off IP function
Description	Switches on/off IP function. To enable management connection through the payload interfaces (10Base-T or ADSL/ATM) you need to configure an IP address for the internal virtual bridge interface (Vbridge interface) of M5122. If IP function is disabled, M5122 will not handle IP packets whose destination is M5122 itself.
Syntax	[no] ip address <ip-address> <ip-mask>
Arguments	no switches off IP function. ip-address is the IP address of the Vbridge in dotted decimal notation. ip-mask is the subnet mask in dotted decimal notation.
Example	<pre>M5122(conf-Vbridge)#ip address 192.168.3.1 255.255.255.0 M5122(conf-Vbridge)#</pre>

Command	Switch on/off RIP send function in Vbridge
Description	Switches on/off RIP send function. When enabled, M5122 sends Routing Information Protocol messages to other routers.
Syntax	[no] ip rip-send <version>
Arguments	no switches RIP receive function off. v1 version selects RIP version 1. v2 version selects RIP version 2. compatible-v1 version selects the sending of RIPv2 packets using broadcast.
Example	<pre>M5122(conf-Vbridge)#ip rip-send v2 M5122(conf-Vbridge)#</pre>

Command	Switch on/off RIP receive function in Vbridge
Description	Switches on/off RIP receive function. When enabled, M5122 receives Routing Information Protocol messages from other routers.
Syntax	[no] ip rip-receive <version>
Arguments	no switches RIP receive function off. v1 version selects RIP version 1. v2 version selects RIP version 2. both-v1v2 version selects both RIP version 1 and version 2.
Example M5122(conf-Vbridge)#ip rip-receive v2 M5122(conf-Vbridge)#	

Command	Disable/enable management through the Vbridge
Description	Disables/enables the management of M5122 through the payload channels.
Syntax	[no] ip admin-disabled
Arguments	no enables management through the ATM channel.
Example M5122(conf-Vbridge)#ip admin-disabled M5122(conf-Vbridge)#	

Dedicated management channel commands

Command	Activate dedicated management channel
Description	Activates a dedicated management channel and sets the encapsulation for that channel.
Syntax	[no] pvc <vpi> <vci> <encap>
Arguments	no deactivates the ATM channel. vpi is the Virtual Path Identifier of the ATM channel. Possible values are 0...255. vci is the Virtual Channel Identifier of the ATM channel. Possible values are 0...65535. encap is the encapsulation of the ATM channel. Encapsulations are eth-llc, ppp-vc and ip-llc.
Example	<pre>M5122(conf-mngetvcc)#pvc 0 100 eth-llc M5122(conf-mngetvcc)#</pre>

Command	Switch on/off IP function
Description	Switches on/off IP function on the dedicated management channel interface. You must activate IP function and assign an IP address to the dedicated management channel interface to manage M5122 through this channel.
Syntax	[no] ip address <ip-address> <ip-mask>
Arguments	no switches off IP function. ip-address is the IP address of the dedicated management channel interface in dotted decimal notation. ip-mask is the subnet mask in dotted decimal notation.
Example	<pre>M5122(conf-mngetvcc)#ip address 192.168.1.1 255.255.255.0 M5122(conf-mngetvcc)#</pre>

Command	Switch on/off RIP receive function
Description	Switches on/off RIP receive function.
Syntax	[no] ip rip-receive <version>
Arguments	no switches RIP receive function off. v1 version selects RIP version 1. v2 version selects RIP version 2. both-v1v2 version selects both RIP version 1 and version 2.
Example	M5122(conf-mngtvcc)#ip rip-receive v1 M5122(conf-mngtvcc)#

Common commands

Command	Add/delete IP route
Description	Adds/deletes an IP route for the management traffic.
Syntax	[no] ip route <dest-net> <net-mask> <gateway> <if>
Arguments	no deletes an IP route. dest-net is the IP address of the destination in the dotted decimal notation. net-mask is the subnet mask of the destination in dotted decimal notation. gateway is the default gateway for the route. if is the interface through which the destination can be reached, Vbridge or mngtvcc.
Example	M5122(conf-common)#ip route 131.112.11.1 255.255.255.0 131.2.111.2 mngtvcc M5122(conf-common)#

Command	Define and activate host access list
Description	You can define up to four IP addresses from which M5122 can be accessed using telnet or http. If you define one or more addresses, M5122 can be accessed from the specified addresses only.
Syntax	[no] ip host-acl <access-net> <net-mask>
Arguments	no switches host access list off. ip-address is the allowed host address and ip-mask is its subnet mask.
Example	<pre>M5122(conf-common)#ip host-acl 192.168.1.17 255.255.255.0 M5122(conf-common)#</pre>

Command	Switch on/off dynamic host configuration protocol
Description	Switches on/off dynamic host configuration protocol.
Syntax	[no] dhcp mode <service>
Arguments	no switches off DHCP. service parameter value is server when you want to use M5122 as a DHCP server and relay when you want to relay DHCP request to an external server.
Example	<pre>M5122(conf-common)#dhcp mode server M5122(conf-common)#</pre>

Command	Set DHCP address range
Description	You can define to DHCP address ranges with this command. The default pool is the IP address of the interface with a subnet mask 255.255.255.0. If you don't define an address range, a range will be defined automatically for Vbridge interface.
Syntax	[no] dhcp address <scope> <pool-base> <pool-mask> <pool-size>
Arguments	no switches of address pool. scope defines the pool. Values are 1 and 2. pool-base is the first IP address in the pool in dotted decimal format. pool-mask is the subnet mask of the pool addresses. pool-size is the size of the address pool, 0...254.
Example	<pre>M5122(conf-common)#dhcp address 1 168.190.1.1 255.255.255.0 100 M5122(conf-common)#</pre>

Command	Set DHCP gateway address
Description	Sets the gateway address, which the DHCP server sends to DHCP clients.
Syntax	[no] dhcp gateway <scope> <gw-server>
Arguments	scope defines the DHCP pool (1 or 2). gw-server is the IP address of the DHCP clients' default gateway.
Example	<pre>M5122(conf-common)#dhcp gateway 1 192.168.1.1 M5122(conf-common)#</pre>

Command	Set DNS address for DHCP clients
Description	Defines a DNS address for the DHCP clients.
Syntax	[de no] dhcp dns <scope> <class> <dns-server>
Arguments	scope defines the DHCP pool (1 or 2). class defines whether the server is a primary or a secondary server. dns-server is the IP address of the DNS server.
Example M5122(conf-common)#dhcp dns 1 primary 190.168.2.1 M5122(conf-common)#	

Command	Set DHCP server lease time
Description	Defines the time how often the PC has to renew its DHCP lease.
Syntax	[de no] dhcp lease-time <scope> <time-count>
Arguments	scope defines the DHCP pool (1 or 2). time-count is the renewal interval in minutes, 1...65535.
Example M5122(conf-common)#dhcp lease-time 1 360 M5122(conf-common)#	

Command	Set DHCP pool domain name
Description	Set the domain name for the DHCP pool. The domain name is used to show the client in which network the client is in.
Syntax	[no] dhcp domain-name <scope> <name-string>
Arguments	scope defines the DHCP pool (1 or 2). name-string set the domain name.
Example M5122(conf-common)#dhcp domain-name 1 nokia M5122(conf-common)#	

Command	Set DHCP relay server address
Description	Set the IP address of the DHCP server when you are using M5122 in DHCP relay mode.
Syntax	[no] dhcp relay -addr <server>
Arguments	server defines the IP address of the DHCP server.
Example	<pre>M5122(conf-common)#dhcp relay-addr 192.168.111.1 M5122(conf-common)#</pre>

Command	Set Domain name server address
Description	Defines the address of the domain name server used by M5122.
Syntax	[no] dns <class> <dns-server>
Arguments	no deletes domain name server address. class defines whether the server is a primary or a secondary name server. dns-server is the IP address of the DNS server.
Example	<pre>M5122(conf-common)#dns primary 190.168.12.1 M5122(conf-common)#</pre>

Command	Switch on/off weighted fair queueing
Description	Switches on/off weighted fair queueing.
Syntax	[no] misc global-wfq
Arguments	no switches off weighted fair queueing.
Example	<pre>M5122(conf-common)#misc global-wfq M5122(conf-common)#</pre>

Command	Switch between full-rate ADSL and ADSL lite
Description	Switches between full-rate ADSL (G.992.1) and ADSL lite (G.992.2).
Syntax	[no] misc adsl-variant <specifier>
Arguments	<code>specifier</code> argument <code>lite</code> switches to ADSL lite. Argument <code>t001</code> allows the use of the old Alcatel data-pump software (2.5.8). Note, that this command will restart the DSL line. <code>no misc adsl-variant</code> sets full-rate ADSL mode.
Example	<pre>M5122(conf-common)#misc adsl-variant lite M5122(conf-common)#</pre>

Command	Switch on/off VCC-to-VCC bridging
Description	Switches on/off bridging between ATM channels.
Syntax	[no] interwan-bridging
Arguments	<code>no</code> switches off bridging between ATM channels.
Example	<pre>M5122(conf-common)#misc interwan-bridging M5122(conf-common)#</pre>

Chapter 6

How your Nokia M5122 works

This chapter introduces the principles according to which Nokia M5122 operates.

6.1 ADSL

ADSL stands for asymmetric digital subscriber line. It is a technology that enables the use of your normal telephone wires for very high speed data transmission. With ADSL technology, you can retrieve data from network through the telephone wires at rates up to 8 Mbit/s and send data at rates up to 800 kbit/s. The achievable rate depends on the length of the telephone cable from your premises to the central office, as well as noise and disturbances in the cable. The ADSL technology adapts to the line length and other line conditions and adjusts the speed in 32 kbit/s steps.

ADSL is standardized by both ANSI and ETSI. It uses the so-called Discrete Multitone Techniques (DMT). In DMT, the data is sent over the telephone wires in multiple subchannels. By tuning the use and the information content of these channels Nokia M5122 can adapt to different telephone lines.

6.2 ATM over ADSL

Nokia M5122 can carry ATM cells on the ADSL line. M5122 uses a single fixed ATM channel for the network traffic with virtual path identifier (VPI) and virtual channel identifier (VCI) 0 and 100, respectively. Cross connection to other ATM VPI/VCI values can be done in the Digital Subscriber Line Access Multiplexer (DSLAM).

6.3 Bridging

Nokia M5122 functions as an Ethernet bridge. It can bridge all protocols between the Ethernet (10Base-T) and ATM/ADSL interfaces. The bridging function automatically learns the MAC addresses located behind both of its interfaces and uses that information to filter local traffic at an interface to prevent it from being unnecessarily relayed to the ATM channel. For that purpose M5122 has a 1024-slot MAC address table where it keeps these learned addresses. The table entries are also automatically deleted in case the specific address is not detected behind the interface during 10 minutes.

6.4 Hub

M5122 has an integrated 4-port hub. A hub is a device which joins the communication lines on the local area network providing connection to all devices on the network. It acts as a centre of a star-topology network.

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Appendix A

Technical specifications

Features	
ADSL	
Physical layer	ANSI T1.413 Issue 2 (ANSI ADSL), ITU-T G.992.1 (ITU-T ADSL), and ITU-T G.994.1 (Handshake) compatible.
ADSL line connector	RJ-11
ATM over ADSL	
ATM connections	PVC, up to 8 virtual circuits
Service categories	UBR
Encapsulation	RFC 2684 Ethernet LLC
Ethernet interfaces (4)	
Ethernet	10Base-T, half duplex, 4-port 10Base-T hub
Encapsulation	DIXv2 (transmit), IEEE 802.3 and DIXv2 (receive)
Ethernet connectors	RJ-45
Bridging	
Bridging	Self-learning bridge, bridges between all interfaces, possibility to disable bridging between WAN interfaces
MAC table	1024 entries
Class of Service	Weighted fair queueing

Features	
Command line interface (CLI) for local management	
Physical layer	Electrically RS-232, TxD, RxD and GND signals
Data format	Asynchronous, 8+no parity
Bit rate	9600 bps
Flow control	None
CLI connector	RJ-45
Dedicated ATM management channel	
Service categories	UBR
Encapsulations	RFC 2684 Ethernet LLC, RFC 2684 IP LLC, PPP over ATM
IP addressing	Statically configured Through IPCP when PPP over ATM is used
Routing	Static routes RIPv1
Management protocols	Telnet/TCP/IP for command line interface TFTP/UDP/IP for software and configuration download
Management through payload	
Service categories	UBR
Encapsulations	RFC 2684 Ethernet LLC
Routing	Static routes RIPv1
Management protocols	Telnet/TCP/IP for command line interface TFTP/UDP/IP for software and configuration download
Indicator lights	
DSL	ADSL line status
ETH-1, ETH-2, ETH-3, ETH-4	Ethernet activity and status
COL	Ethernet collision
STA	M5122 startup error
PWR	Power on

A.1 Mechanical construction and power supply

M5122 is a stand-alone device which can also be wall-mounted.

Mechanical construction	
Width	225 mm
Height	65 mm
Depth	230 mm
Weight	1 kg

Table A-1 Mechanical construction

M5122 has an in-built power supply. The characteristics of the mains connection are presented in Table A-2.

Mains connection	
Voltage	100 ... 240 VAC
Frequency	45 ... 65 Hz
Power consumption	8 W

Table A-2 Mains connection

A.2 Ambient conditions, EMC and safety

Ambient conditions

Operating temperature range 0 to 40°C

Humidity 10% to 90%, non-condensing

M5122 is for indoor use only

M5122 can be connected to an earthed socket outlet only.

EMC

M5122 complies with the following specifications provided that the device is connected to an earthed socket outlet:

Emission EN55022: 1998 class B

Immunity	EN55024: 1998
EMC	EN300386-2: 1997
Overvoltage	ITU-T K.21
Safety	
Safety	EN60950

A.3 Copyright note

HTTP server, Copyright 1996, 1997, 1998, 1999 Michiel Boland

Glossary

Abbreviations

ADSL	Asymmetric digital subscriber line
ATM	Asynchronous transfer mode
CLI	Command line interface
COL	Collision
DHCP	Dynamic host configuration protocol
DMT	Discrete multitone
DNS	Domain name system
DSL	Digital subscriber line
DSLAM	Digital subscriber line access multiplexer
EMC	Electromagnetic compatibility
ETH	Ethernet
IP	Internet protocol
ISP	Internet service provider
LAN	Local area network
LLC	Logical link control
MAC	Media access control
PC	Personal computer
POTS	Plain old telephone system
PPP	Point-to-point protocol

PPTP	Point-to-point tunneling protocol
PWR	Power
RAN	Remote access node
RFC	Request for comments
STA	Status
TCP	Transmission control protocol
UBR	Unspecified bit rate
VCC	Virtual channel connection
VCI	Virtual channel identifier
VPI	Virtual path identifier
WWW	World Wide Web

Terms

10Base-T

10 Mbit/s Ethernet specification using two pairs of twisted cabling. 10Base-T is a part of the IEEE 802.3 specification.

ATM access network

An access network where traffic from the subscribers is multiplexed and forwarded using ATM technology.

bridge

A device that connects two or more physical networks and forwards packets between them. Bridges can usually be made to filter packets, that is, to forward only certain traffic.

command line interface

Character-based man-machine interface where a command line ending with <CR> character is used to configure a device. The device interprets the command and returns a character-based response.

Digital subscriber line access multiplexer

A network element which multiplexes the traffic coming from the high-speed subscriber lines and forwards this traffic to the ATM network.

encapsulation

Wrapping of data in a protocol header.

Ethernet

LAN specification IEEE 802.3.

host

Computer system on a network.

IP network

Data communications network based on the Internet Protocol.

low-pass filter

Passive filter used for separating the telephone signal from data signals in the digital subscriber line.

MAC address

Ethernet address.

multiplexer

A device where several logical connections are combined into one physical connection.

POTS filter

A device used for separating the telephone signal from data signals in the digital subscriber line.

remote access node

RAN accepts a high concentration of data traffic from many DSLAMs. It grooms the traffic to reduce the heavy processing load for backbone routers which can limit the scalability of high-speed networks. RAN receives cell- or frame-based end user traffic from the DSLAM and sends the aggregated IP traffic to ISP backbone routers.

serial console connection

Serial connection (CLI) on the back panel of M5122. It is used for configuring M5122 locally.

telecommuter

A person who works at home with data communications to the central office.

virtual channel

A communications channel which provides for the sequential unidirectional transport of ATM cells.

virtual channel connection

A concatenation of virtual channel links that extends between the points where the ATM service users access the ATM layer.

virtual path

A unidirectional logical association of virtual channels.

Web browser

A software that is used to browse the World Wide Web.